



OUTCOME BASED PEDAGOGIC PRINCIPLES FOR EFFECTIVE TEACHING

**Prof. Shyamal Kumar Das
Mandal**
Multidisciplinary
IIT Kharagpur



INDEX

S. No	Topic	Page No.
<i>Week 1</i>		
1	Lecture 1 : Introduction to Need of 21st Century Education	1
2	Lecture 2: Accreditation	19
3	Lecture 3: Outcome based Learning	39
4	Lecture 4: Approach to Design Outcome based Learning	54
5	Lecture 5: Approach to Design Outcome based Learning (Contd.)	74
6	Lecture 6: Instructional Design for Active Learning	102
<i>Week 2</i>		
7	Lecture 7	114
8	Lecture 8	144
9	Lecture 9	174
10	Lecture 10	203
11	Lecture 11	216
<i>Week 3</i>		
12	Lecture 12	227
13	Lecture 13	248
14	Lecture 14	276
15	Lecture 15	285
16	Lecture 16	302
<i>Week 4</i>		
17	Lecture 17	317
18	Lecture 18	330
19	Lecture 19	349
20	Lecture 20	362

Outcome based Pedagogic Principles for Effective Teaching
Professor Shyamal Kumar Das Mandal
Center for Educational Technology
Indian Institute of Technology Kharagpur
Lecture 01
Introduction to Need of 21st Century Education

Okay so good morning. Welcome you in the course of Outcome Based Pedagogic Principle for Effective Teaching. So the word itself said that what kind of pedagogic principle we should use or what kind of teaching-learning process we should use, outcome based process we should use so that the teaching-learning is effective.

So this course is will be taught in ten hours, ten hours lecture hours. So there will be twenty lectures of half an hour each and this course will be myself I will take some lectures and some lectures will be taken by Dr. Tamali Bhattacharyya and the course deal with that bloom taxonomy, assessment and evolution, outcome-based curriculum design, accreditation and how this outcome based curriculum design or pedagogic kind of pedagogic principle can increase the effectiveness of the teaching learning and we will discuss how we will do this thing during the course.


Now if you see that what is the outcome of the course? Outcome of the course is that at the end of this whole course, whole ten hour lectures, ten hour ten lecture hours you should able to write the outcome based curriculum objective or say the outcome base course objective, module objective and unit objective based on the bloom taxonomy. Second outcome is that you should able to develop the test title which will relate to those objectives.

So how to write down the correct test title relate to that objective. Most of the cases if you find examination system we given write a short note on this thing. Why this kind of test title is not correct? We will discuss. What kind of modification is required? We will discuss. So at the end of the course you should able to write the correct test title for the correct objective.

(Refer Slide Time: 2:29)

Outcome of the course

- I. Developed the outcome based course, module and unit objectives of her / his courses based on Bloom Taxonomy
- II. Develop / select appropriate test items for all outcome based objectives
- III. Plan an outcome-based curriculum document to meet NBA and Washington Accord requirements.
- IV. Design the evaluation methods which reinforce teaching and learning




Next you can plan or you can design your course curriculum which required for NBA or Washington accords accreditation. Not only that you can use that how this can help to teach effectively in the large classroom. So in the large classroom what kind of teaching-learning process I should use so that that teaching is effective we will discuss. Then you should able to design that evaluation method which will or not only that test the, take the test of the students of assign the grade which will reinforce the teaching learning. How that assessment system is help to reinforce the teaching-learning process also we will be discussed.

(Refer Slide Time: 3:20)

Yesterday's World of Education

- ▣ The educational material is the information or message and Limited / expensive .
- ▣ Teacher-centric : The student is the receiver of the information
- ▣ In a lecture students assume a purely passive role and their concentration fades off after 15-20 minutes.
- ▣ Teachers often continuously talk for an hour without knowing students response and feedback
- ▣ More emphasis has been given on theory without any practical and real life time situations.
- ▣ Learning from memorization but not Skill
- ▣ Small no. of students in class



Now before I go to the course can you think, what is that yesterday world of education? That means I am saying yesterday means before the Google is came. Today I can search anything in the Google, if I search any key word, Google will give some reply, some material will come out. Any topic you search in the Google then will hundreds of video lectures, hundreds of power point presentation, hundreds of web contents are available.

So we are not discussing about how to generate the content. So content is available so this is the difference. Yesterday means before the Google has come before those kind of material is freely available or widely available in the net you called it is yesterday education. And that time what is there if, we what kind of, if you see that you can correlate that this same thing we are also following today so today is change is required. What kind of yesterday education was there?

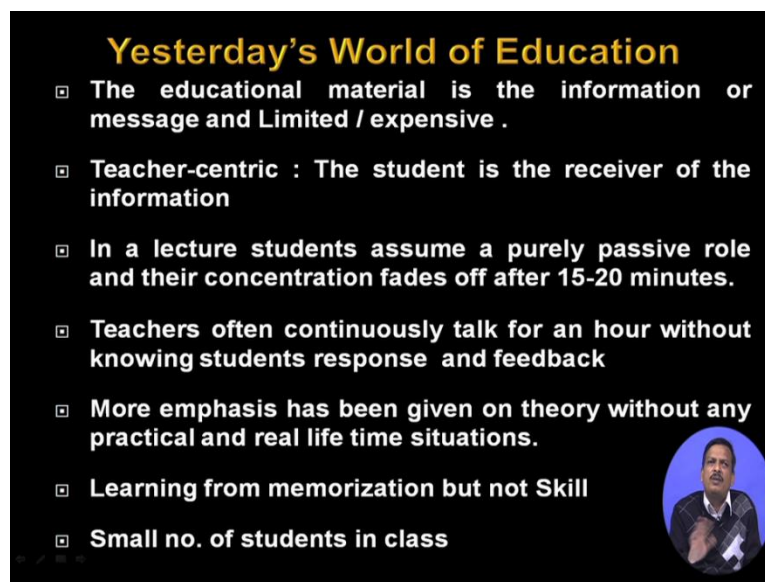
Now in that days the education material is very costly. Student cannot afford to buy a very you can say the costly book. Or you can say the this kind of a today life right now today if you ask my daughter she can search anything from the net. Once I say the what is meaning of this word, she just wait I will type in the Google and Google will give me the meaning.

So not that, that time that kind of material is not available. Information was expensive that's why we that whatever the teacher said we write down the note, so it is teacher centric. Thus teacher

deliver the information to the student and student write down as a class note and give exam. That kind of things.


But today a teacher if teacher says, okay I will write down some information students say okay this is available in the Google. So why I waste my time to attending in the class so that kind of things is available. So yesterday that is not available that's why student come and write down the teachers lecture note.

(Refer Slide Time: 5:25)



Yesterday's World of Education

- ▣ The educational material is the information or message and Limited / expensive .
- ▣ Teacher-centric : The student is the receiver of the information
- ▣ In a lecture students assume a purely passive role and their concentration fades off after 15-20 minutes.
- ▣ Teachers often continuously talk for an hour without knowing students response and feedback
- ▣ More emphasis has been given on theory without any practical and real life time situations.
- ▣ Learning from memorization but not Skill
- ▣ Small no. of students in class



Next one, in the lectures student assume purely passive role student does not have an active role. Teacher came in the class most of the cases it is happen with some teacher teaching out that second order differential equation, he came in the blackboard and write down some problem in the blackboard one corner and try to solve it whole blackboard.

So it is a kind of passive role of the student. There is no interaction, not all cases but some cases this interaction is very limited. Teacher often continuously talk for an hour without knowing student response and feedback.

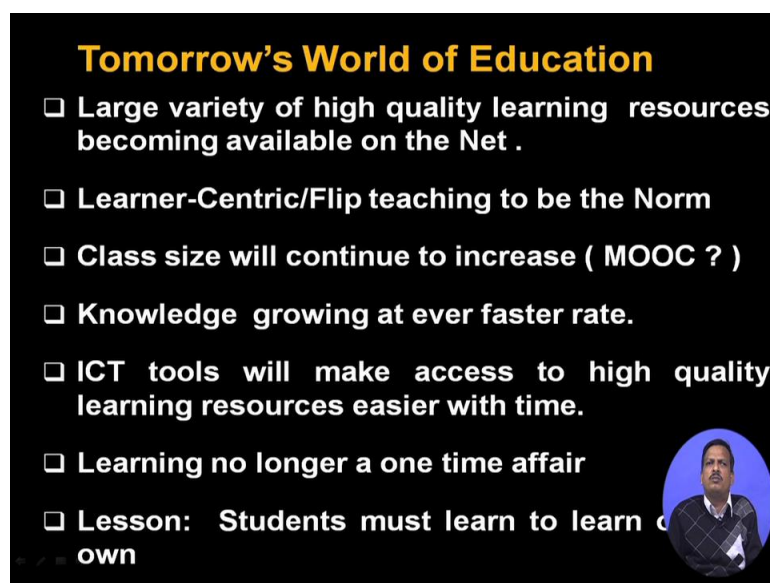
Teacher just deliver the information, teacher thought student learn and teacher got. More emphasis has been given on the theory without any practical and real life time situation. Not all the cases most of the cases like that, learning for memorization but not skill. Skill is not there

you have just learn from the memorization, and the advantage yesterday education was the that is minimum number of student was very less in the class.

If you say, why that earlier education system was so good in spite of all those drawback number of student. If you see number of student in a class maybe thirty, twenty so teachers know, which student is coming in the class which is not coming in the class.

He can read the face while explaining something, while of the student is achieving, responding to that things or not so those kind of facilities available. But if this same practice if I followed today I cannot say that I only take a class for thirty students. It is not possible. It is large number of students.

(Refer Slide Time: 7:12)



Tomorrow's World of Education

- ❑ Large variety of high quality learning resources becoming available on the Net .
- ❑ Learner-Centric/Flip teaching to be the Norm
- ❑ Class size will continue to increase (MOOC ?)
- ❑ Knowledge growing at ever faster rate.
- ❑ ICT tools will make access to high quality learning resources easier with time.
- ❑ Learning no longer a one time affair
- ❑ Lesson: Students must learn to learn on their own

So tomorrow education or today education system large variety of first one is a large variety of high-quality learning resources available in the net. If you say anything it is available in the net, so if you come in the class with the power point presentation and describing that presentation none of the student will interested to receive that information.

Because they already search it and they got it and the information is available in the net then say why I attend this class, okay that class I can get the video lecture better video lecture from the

MIT website. Those professor is given a better lecture than this professor, so why I go to that class?

This is the true fact large variety of high quality learning resources is available in the net. Learner centric, flip teaching to be the norm. So if the student is not coming student will come in the class, see this is happening. In most of the cases average attendance rate of across the institute a decrease.

Most of the student teacher complaining that attendance rate of the class is average below 60%. Then I ask some of few student that why you are not interested to attend the class? Then student said me, sir can you give a two very concrete evidence that why should I attend this class?

Some of the class is just if you said the teacher come with the power point presentation, display the presentation, read it in that presentation. So why we will come to the class? so there is no interaction, no discussion, nothing is there so we have to take the note. So note why I take the note in the class that is available in the Google, better I learn from the Google is to sitting in the hostels. So why I go the class?

So that means learner centric approach is required, so it is no longer a teacher's centric approach. What I will deliver student will learn this is not mandatory. The student will demand that I want to learn this thing and I am unable to or you can say I have miss conceptions on this problem only. So student will demand that I want this kind of skill from the teachers.

So that is learner centric. So it is not only the information, nobody interested about that how many theorems you have remember, how many law you have remember? If I do not have that how to apply those law in real life problem. So student will come that yes I have this I want to acquire this skill as a teacher can you suggest me some very good material or can you clarify me what kind of technology is you know here, what kind of methodology is to overcome this kind of situation.

So that means they demand discussing in the class that is learner centric student demand then flip teaching, instead of delivering by the teacher they want that we want discussion on this issue only so that is the flip teaching. Then class size, you cannot restrict the class, today I cannot say

in my Institute that okay I will not take than more than thirty students. The institute will say no, it is not happening. You have to take a class of two hundred students.

So if I take a class of two hundred students, what is happening? The two hundred student large class the large classroom, so in the large classroom two hundred students I cannot take the attendance, if I take the attendance of the two hundred student name call it will take time. I cannot remember the face of the students. I cannot read the face of the students whether the students are following the lecture or not?

So if a two hundred student class average attendance is will sixty percent and then some of the student was sitting in the back bench they will do the Facebook because they say the teacher is saying same information that information is available in the Google. So don't follow the teacher lecture, what teacher is saying, so you are the since your attendance is carrying five percent mark. By force is coming in the class and doing Facebook in siting in the back bench.

So effectively he is not attending in the class. So that is the main problem how do you teach a large classroom with all students attending with the all students. This is a very challenging problem, so I will define that problem in the next slide and then we will discuss how to overcome this kind of problem.

Knowledge growing at faster rate today tomorrow. Today if you see today I taught something next semester I have to modify it because this is knowledge is faster rate it is going. ICT tools how do I used that ICT tool make my teaching is more effective not that power point, yes power point is one kind of ICT tool, so what kind of ICT tools I should use, in what way I should use so that the teaching is become effective.

Next learning is no longer a onetime affair. I have to taught the students learning to learn, how do you taught it. Then student must learn to their own that is the important issue that the a student should learn by their own that habit has to be practices not to spoon feeding, spoon feeding practice is not required because at the end of that program they will be they have learn by themselves so that skill has to be develop. So how to this kind of goes of the dimension of today's education systems.

(Refer Slide Time: 13:06)

Challenges in 21st Century Education

- How to Improve Student **Engagement**
- How to equip students with the 21st century **knowledge, skills** and **attitudes**?
- Allow **continuous improvement** in curricula, incorporation of better Open Educational Resource, more effective teaching *ensure the outcome of Education Create **Industry-Ready Engineers***
- Ensure examination system reinforce teaching and learning
- Ensure life long learning
- *Teach a large class*

So what are the challenges based on those dimension. The challenges are the how to improve the student engagement. I am saying that the one of the major issue in today's education system is the how to improve the student engagement.

If you ask any student that let take subject X any subject if you asked most, of the most of the cases it is true that if you ask any student, how many days you have studied this subject to get a grade A or get a eighty percent mark. His answer will be simply sir, mid semester before mid-semester, five to six days and before end semester five to six days. So why I taught the subject for six months. If I say lets for the graduate engineer there is eight semester and average engagement of the student is ten days per semester, so if you say four year, eight semester eight into eight ten eighty days.

So there only engage eighty days in the among the along the four year to get a degree B.Tech degree. So what kind of student engagement we have to talking about. Student claiming that he can get the 80% marks, it is practices among the students many courses many discipline many Institute it is practices, then a student can say or student can claim that I can get the eighty percent marks of this course by only studying the ten days.

So why I have to taught the student for the four year. That mean something is as serious mistake, some serious mistake we have done so that we have not engaged the student throughout the

semester and we are only student is engage just beginning of the examination. Because their main agenda is to how to get pass the subject and to they will get a grade.

Most of the cases if you see that okay student are just giving the exam and forgot everything. Many cases if you see the grand viva if you ask any students how many subject you have studied just tell the name of the subject. He is not unable to tell all the name of the subject that means his engagement was very temporary and he gained was so less that he cannot develop anything on that engagement.

But today what is required in industry or today world is required the skill set. How to equip a students with twenty first century knowledge, skill and attitude. How to equip the student with twenty first century knowledge skill and attitude? How do I do that? What kind of skill that means if I say I am BE engineer civil, then I have to prove, as a BE engineer civil I have this this skill which other person does not that is why I am a BE engineer in civil.

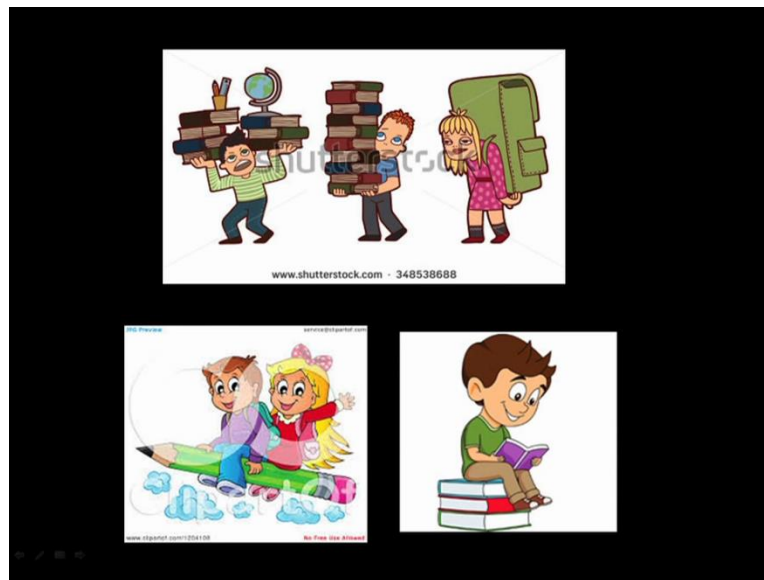
So any study, any course suppose you said that okay I have attend this course, why I have attend this course to get a certificate, if you attend this course for certificate my advice is do not attend this course. If you not use this knowledge in your practical life that means skill if does not have any skill is acquired by this course then the objective of this course is total zero.

So if you say I study mathematics to pass the exam then why I study mathematics, so I get a certificate and that certificate is that my characteristics that I am civil engineer, I have only a certificate. If you say that same example is given in skill development program by present Prime Minister. Then if you say that, you cannot say that I am BE civil that is not your that is not your tagline you can say I have this this this this skill which any other person does not had that's why I am BE in civil engineer.

I can do this this this this thing and that differentiate me from the others that is why I have get a degree that BE in civil. See the government has taken initiative of MOOC. What is the basic objective of the MOOC? It is not to provide a certificate okay you have get 90% in analog electronics and later on if I ask you can you design a push pull amplifier, he said no sir I studied it but I forgot it after the exam.

That kind of education is not required for twenty first century. So I cannot say I offer a subject on MOOC and okay I give you this book subject you follow this subject solve some mathematics and give an exam and get a 90% grade, without any skill, I am not I am not happy that grade will do anything on you.

(Refer Slide Time: 19:10)



I will show you one pedagogy, that I can I will show you right now that suppose this pedagogy if you want, which picture you will be like much more. Are you carrying the education or education will carry you? If you are a Bengali and if you studied that Tagore's, long back Tagore said that that we are only carry the education but education are not carrying us. If you see that Tagore writing it is like that "Sikkha ke amra bohon kore chole aleam dahon korite parilam na".

That means we are carrying the education so lot of book, lot of formula, lot of theory, lot of exam, lot of grade card everything is there but in practically I don't have any skill. So that means we are carrying the education in our back. We have studied this Millman Halkias this book. I have studied this top selling this digital communication book, lot of theory, Shannon's work theory I know that all those kind of theory but one somebody give me a some simple problem I am not able to solve it. Then whole education is totally junk I can say a whole education is totally junk.

(Refer Slide Time: 20:41)

Challenges in 21st Century Education

- How to Improve Student **Engagement**
- How to equip students with the 21st century **knowledge, skills** and **attitudes**?
- Allow **continuous improvement** in curricula, incorporation of better Open Educational Resource, more effective teaching *ensure the outcome of Education Create **Industry-Ready Engineers***
- Ensure examination system reinforce teaching and learning
- Ensure life long learning
- *Teach a large class*

So in that case what I required we have to develop the skill and attitude, as a teacher my responsibility to provide a lectures or to follow a teaching-learning process which can develop the skill and attitude which is required by the 21st century.

Some students are there if you say they got ninety percent marks but if you give them some simple complex problem or a tough attitude is required they break down. So not only the skill, also I required attitude, positive attitude I should not be civil engineer what will happen what will happen what will happen that kind of attitude not required. You require a bold attitude to the prominent skill so I have to equip the students with the bold attitude and prominent skill, not the only knowledge some information, some theory, some grade and some marks.

It is not true. So how to do that things which is required for 21 century education. Then continuous improvement in curriculum incorporate of better open educational resources, more effective teaching ensure the outcome of education create industry ready engineer.

I am I am talking about the perspective of the technical education, if you say industry say that ohh what about the engineer you are producing are not employable, they does not have any skill, they does not know this things that things so many kinds of objection we are seeing. And as a teacher I said yes they should know the basic they should know this basic so everybody offering a subject introduction to the basic of this thing.

So I would say what skill they have acquired which will be used in industry to solve their problem, so I cannot say okay I will teach curriculum which I have prepared in nineteen forty seven and I follow the same curricula today also. I cannot do that because if I do that then industry will say that okay like that. If you see that example given by the present way same I left can code, he said he is visited a automobile engineering education Institute and there also the they have taught a model which is totally absolute.

So why they required that knowledge? So I can say how do I continuously improve my curricula or the skill set which I want to develop all the students with a active collaboration of the industry so that later on they should not say okay I cannot your engineers are not employable your students are does not know anything about this this this thing.

So as per the requirement with the active feedback from the require industry can I modify my curriculum, not only the objective but also the resources, suppose I said, today I taught some some course which is directly lets I can give an example that I taught a embedded system course okay.

So there is some modern tools are there, so that is used by the auto mobile engineers. So now I do not know everything about that tools and the student is pass out. He joined that Institute and industry and find he cannot do anything because he does not know the tools. Now I should get an active feedback from the industry that today embedded system is moving in this this direction. Those are the modern tools which are coming out so they should share this to institute also. So if they share it then as a teacher as a teacher I can use it effectively in my whole lecture and I can claim that my student has a skill set which is required by this industry.

So what industry ready engineer an ASSCOM or NASSCOM is saying like how do you create the industry ready engineer and we are inviting some industry person in institute and he give a lectures day one and after the end of the lecture everything is forgot. But we want how do you collaboratively develop a active sharing platform by which as a teacher I should be clearly stated that end of this curriculum they will develop those skill. Now industry can comment okay I require this skill but not this skill then the Institute jurisdiction which kind of skill set they should want to promote in their students for which purpose.

Very clearly said then I can say every each and every course curriculum must be continuously modifiable, more resources can be added in anytime, more kind of real-life problem can be added by the industry so what kind of teaching-learning process and frame work we should use so that this can be enabled. At the end of this course you can see that IIT Kharagpur propose a framework that framework allow you to do this kind of things.

Next one, ensure examination system reinforce teaching and learning. I can ask you one question why there is a evaluation system in our education system? So I will come that what is assessment evaluation, what kind of evaluation use in which area, that I will later on I will cover it, but today I can ask you that if I say that why we have a end semester exam, mid semester exam, class test, assessment, evaluation why that are there?

Why you use this evaluation system? The purpose of the evaluation system is not to provide grade to the student, this is a buy product. If I say some doctors prescribe you test your blood, then you test the blood then found that you have sugar is hundred and ninety, okay. Sugar is hundred and ninety if I have not take prescribe the medicine to go it down then the loop is not closed.

So if I say I examine a student, student is fail. What the purpose of the examination system? I examine student he okay thirty five percent is the pass mark, he got a pass. Think about this kind of situation, a student who got a thirty five marks in a examination that means he only know the thirty know means knowledge. He has knowledge or wisdom about the 35% of the syllabus and he promoted to the next class. So I got an analog electronics I fail or teacher give me pass mark P and I promoted to third year go for VLSI design. So should I that the say that I will better in VLSI design not in analog electronics.

So that means the purpose of the examination system is a not to provide the grade to the student, that may be by product, that is required for distinguish or listing my student in a class that okay this is 90% boy, this is 80% boy, seventy percent boy so purpose of the examination system to find out what kind of skill set they have not acquired, in target I said at the end of the course you have this skill, this skill, this skill, this skill the purpose of the examination system to find out whether the student has acquire those skill or not.

If they have not acquired those skill then I have to find out the method that either there may be a problem in teaching-learning process, that what kind of teaching-learning process I have used that may be problematic. I have to change that, that means reinforce that or the skill which I have defined may be not achievable.

Somebody may have say that in one course the student will able to design a rockets, can I say that in a one course, the student will able to design a rocket? Somebody many of you write an objective. Student will able to design a filter, design a digital filter. Are you think what kind of digital filter of they have able to whole digital filter can be covered in a one may be one module? no.

So if you are skill are clearly achievable and in test that and you found that those of the skill student has not acquired then there is a serious problem in your teaching-learning process and if your skill is not achievable whatever the teaching-learning process you follow, it cannot be achieved.

So the purpose of the examination system is not to provide the grade to the student only, it is reinforce the teaching-learning. How many? Many of the teachers we have after grading the paper, I you forget, okay grade is done okay you ABC grade is done and then we destroy the paper. How many of us are examining the paper and find out what kind of problems student are generally missing and what kind of misconception are there on the students and as a teacher I should analyze those kind of miss conception and then I have thought that what is the mistake in teaching-learning process.

What is the mistake in my course outcome? Then I have to correct that for the next batch. I am not saying the same batch and I also advise the batch that look those of the problem you have not able to solve though so that means those skill you do not have please acquire those skill before you go to the next class.

I will say I will I will come that I will say that learning is the learner responsibility not the teacher responsibility. Then ensure lifelong learning. One of the main objective in twenty first century education is that I have to ensure that learner learn by himself that habit is created that means that kind of skill set is develop. That is a student is able to grab the subject by himself or herself.

That means self-learning ability. Everything If you spoon feed I have two I have take a course and I solve some same problem and same problem come in the exam and I said write a short note on this. If you see that today what is practicing, that English on us, Calcutta university of I am not saying that Calcutta university lets, any Institute English on us this teachers, this lecture note, this kind of note, they prepare the note this kind of question this is the note.

Students just remember that things and the end of the exam he give that exam after the exam everything is forgot. Is it create the self-learning ability? No, not at all. So I have to I have to do not spoon feed the students. If you spoon feed so this is same. I can give an example of three idiot in movie that they this it sharing that okay I can say that write an essay on this topic and he remember that topic in essay and give the exam that is nothing but the training.

Memories that things and give it after that is forgotten, everything is forgotten. Most of the cases in or if you see B.Tech course if you ask anything in the final year, any first year courses, no sir I forgot it. Why he forgot it because he studied it as a examination system and he only remember for the get the marks. He does not developed any skill set and question paper also does not test the skill set. Only test is memorization ability and that's why he get a 90% marks at the end of that exam he forgot everything.

This does not create ensure the life self-learning ability. So what kind of teaching-learning process we should follow so that it can ensure that the skill set of self-learning ability is developed on that student. Then I have to teach a large class that a huge class three hundred students class, four hundred student class. Now what is a difficulties, if you scientifically analyze the difficulties since there is a four hundred students, whatever that your entrance exam whatever the filter is there. There will be different kinds of learning ability of the different students.

So ability of learning ability of the student to the different or varies from students to students learning style will varies from students to students, learning approaches will varies from students to students, all those things will be taught in this course. Then what what do you mean by learning style, leaning approaches and that learning style, learning approaches and learning ability?

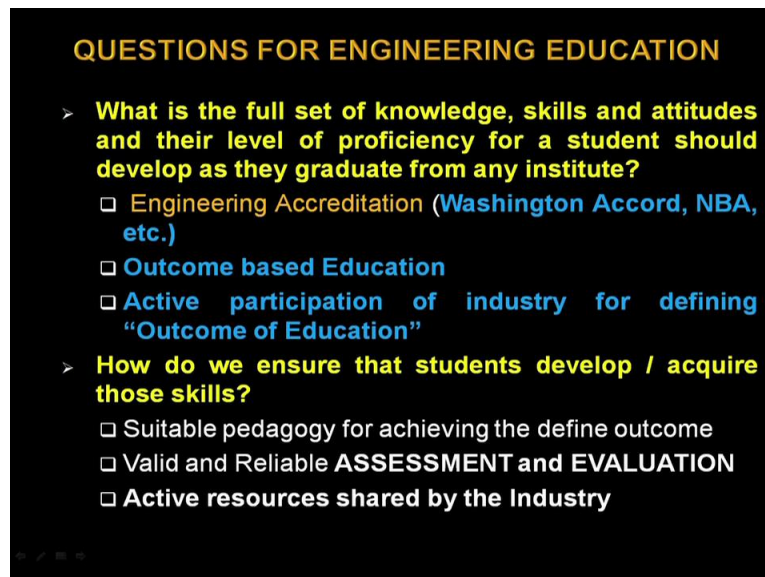
So I have four hundred student class. Every student has its own learning style, learning ability and learning approaches. Some students are surface leaner, some students are deep learner some

students has a very good ability, some students has a less ability. So all kinds of distribution will be there in the class. Now imagine as a teacher if I want to scatter to each and every student what kind of teaching-learning process I should follow?

It is happening if you see if you come in the class and take a lecture some student will follow some student will do Facebook, some student will say that no this is a boring subject and I have get the pass mark in the subject I have sufficient, forget about the subject. Okay let us take the last year question paper and this teacher has follow this kind of pattern do the exam and pass it. Total wastage of time, total wastage of resources, total wastage of student time, teacher time, institute resources. So what kind of teaching learning process should I follow so that I can ensure that all the four hundred students are engage in my class and all the four hundred student moderately achieve my requirement.

I am not saying that all student will be achieve because learning is the learner responsibility, if learner does not want to learn teacher cannot teach the subject. So that means, what I as a teacher but I should very clear that this kind of pedagogy learning pedagogy or learning approaches should scatter to all students and as a teacher I will able to draw attention of every student on the other hand I can say the every students is actively engage in this course throughout the whole semester that is my requirement. How do you do that things?

(Refer Slide Time: 38:02)



QUESTIONS FOR ENGINEERING EDUCATION

- **What is the full set of knowledge, skills and attitudes and their level of proficiency for a student should develop as they graduate from any institute?**
 - ❑ Engineering Accreditation (Washington Accord, NBA, etc.)
 - ❑ Outcome based Education
 - ❑ Active participation of industry for defining "Outcome of Education"
- **How do we ensure that students develop / acquire those skills?**
 - ❑ Suitable pedagogy for achieving the define outcome
 - ❑ Valid and Reliable **ASSESSMENT** and **EVALUATION**
 - ❑ Active resources shared by the Industry

Okay next one this I have already discussed. The question for engineering education, what is see that NASSCOM has said that create industry ready engineer. Nobody define what do you mean by industry ready engineer. Some chemical engineering plants say okay my, the student should know that everything in my chemical engineering plant. Some software industries say no no student should very good in C programming, somebody say in Java programming, somebody says in a Pascal programming.

So as a as a educational Institute what I should scatter? Think about, can I not do something that as a institute I can say the my student will develop those of the skill set, I am intended to develop this skill set in my student. Now it is free to industry to modify or to suggest the which are the mistake we have made, what kind of modification they are willing to do it and what kind of resources they want to share us, so that we can develop the desired common skill set. So what kind of methodology we should use to achieve this kind of goal. I will show you a method by which yes this can be achievable.

(Refer Slide Time: 39:31)



So this is the lecture this is the whole lectures principle that we should encourage the students not carrying the education but education should carry them, so how do you do that? That is the whole summary of this class that our whole course. How do you taught effectively to the student so that they have develop their skill set, they have develop their attitude, they have also develop their knowledge and by after, they have pass out from this Institute they should reflect those skill set and industry will be happy as a education Institute also happy okay. So next class I will talk about the accreditation.

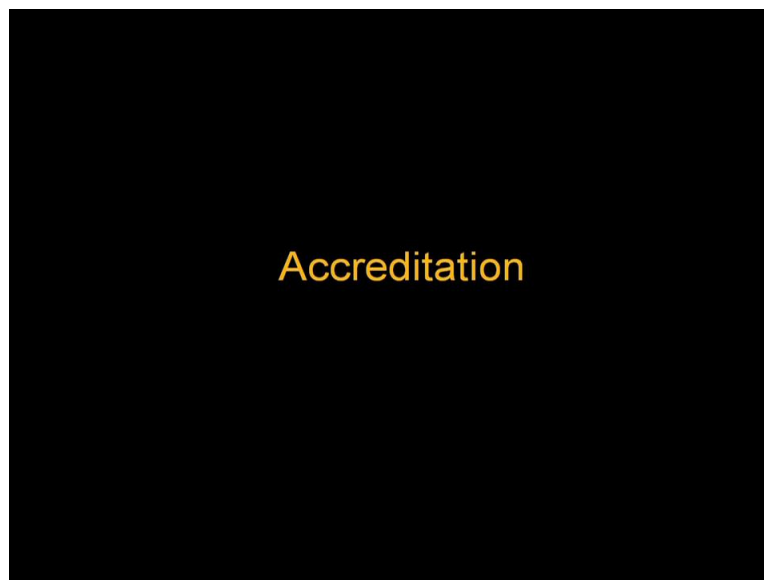
Outcome based Pedagogic Principles for Effective Teaching
Professor Shyamal Kumar Das Mandal
Center for Educational Technology
Indian Institute of Technology Kharagpur
Lecture 02
Accreditation

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 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 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 see 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.

(Refer Slide Time: 1:33)



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

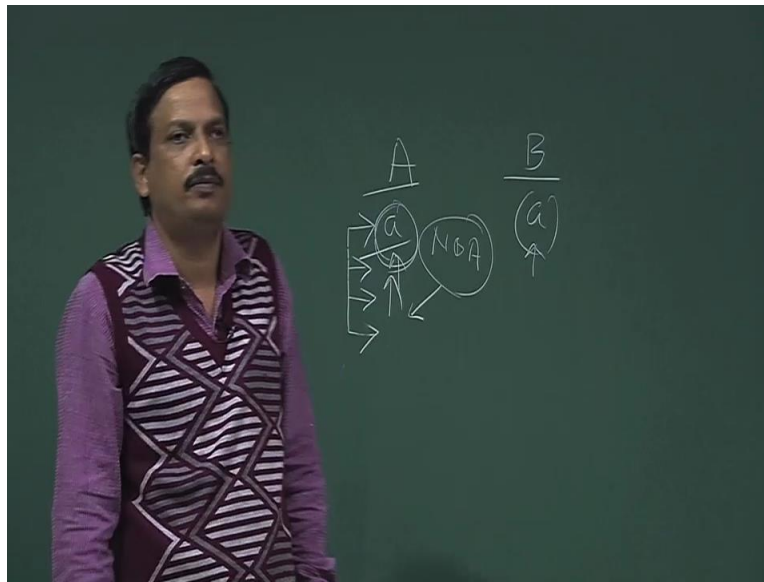
lets B. Can I measure or I can say whether I will attend the program B or not, can I judge based on some parameters? If you see that if I want to buy anything from the market lets if you want buy a television what is look for?

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 lets take 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 are a civil engineer but you do not have any skill.

(Refer Slide Time: 4:47)

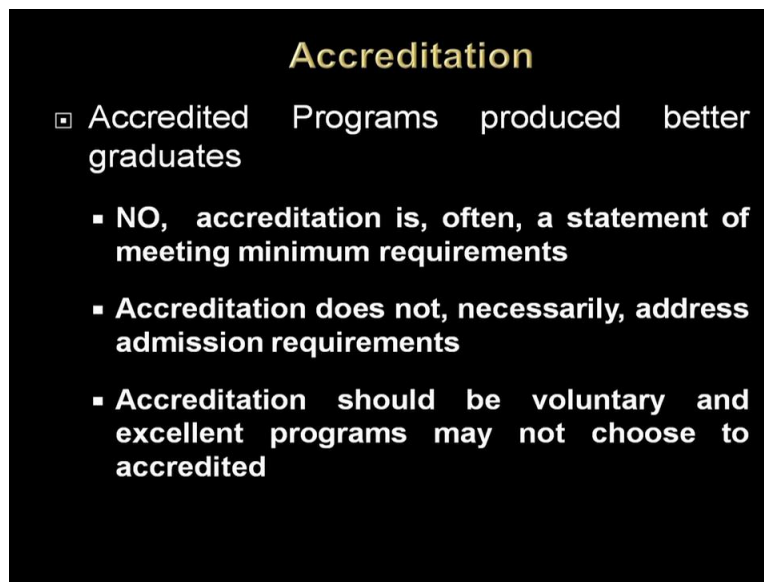


So, accreditation is a process that... Why it is require first of all that suppose I am I follow a program A and another person is following a program B or I said program A and also lets the institute A and institute B same program a and program a here also for program A. how can I say the program a 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 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.

(Refer Slide Time: 6:22)



Accreditation

- ▣ Accredited Programs produced better graduates
 - NO, accreditation is, often, a statement of meeting minimum requirements
 - Accreditation does not, necessarily, address admission requirements
 - Accreditation should be voluntary and excellent programs may not choose to accredited

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 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.

(Refer Slide Time: 7:37)

A Broad Definition of Accreditation

- ▣ Formal recognition of an educational program by an **external body** on the basis of an assessment of quality
- ▣ An evaluation process in which an objective group (**accrediting body**) examines an educational program to ensure that it is meeting **minimum standards** established by experts in the field and industry
- ▣ The outcome of the process is **binary**: program is either *accredited* or *not accredited*

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

(Refer Slide Time: 7:41)

Value of Accreditation

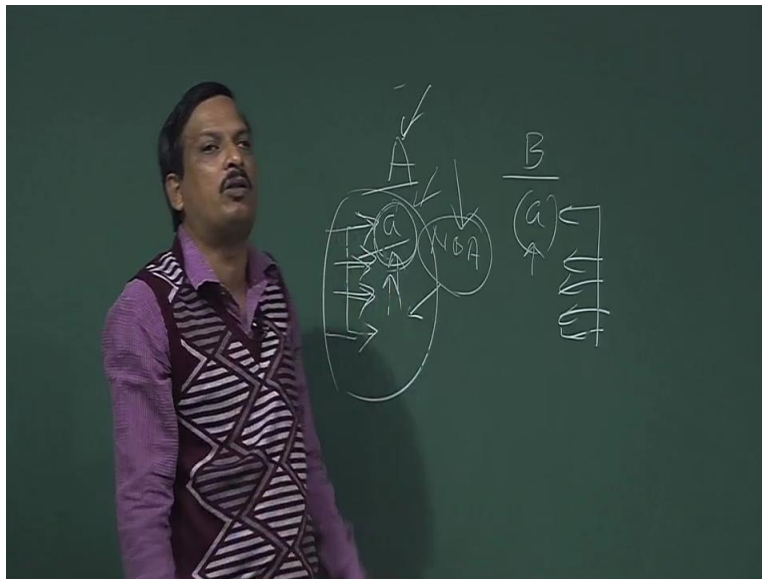
- Accreditation tells **perspective students** that a program meets minimum standards
- **Financial institutions** may only choose to provide student loans for study at an accredited university
- **Students transferring** between accredited programs can have some sense of equivalence
- Students with an accredited undergraduate degree from one **country** may/should receive better consideration in another **country** than a student from an unaccredited program
- Accreditation provides/forces a periodic consideration of educational programs and provides **outside benchmarks and evaluation**

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.

(Refer Slide Time: 8:57)



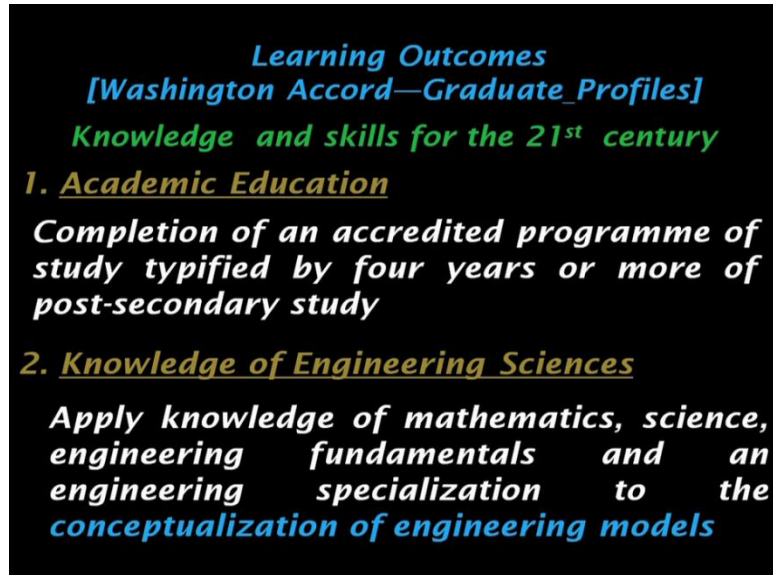
So this is base on the you can say the brand name of the institute but can I say that yes you will able to transfer the credit because the program a maintain the quality parameter this and program a of institute B also maintain the same quality of the program respect to certain parameter. So, you can 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 accreditation, 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.

(Refer Slide Time: 10:12)



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?

(Refer Slide Time: 11:20)

3. Design / development of solutions

Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal and environmental considerations.

4. Investigation

Conduct investigations of complex problems including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.

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 multidisciplinary 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 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 uses, fifth parameter is modern tools and uses.

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

(Refer Slide Time: 16:25)

5. Modern Tool Usage

*Create, select and apply appropriate techniques, resource, and modern engineering tools including prediction and modeling, to **complex engineering activities**, with an understanding of the limitations.*

6. Individual and Team work

Function effectively as an individual and as a member or leader in diverse teams and in multi-disciplinary settings

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 kind of problem he cannot solve using this tools.

So engineering tools modern tools usage is also one of the major parameter for the engineering education. So I cannot say is civil engineer does not know how to draw how to use CAD, CAM software for the drawing I 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 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 from 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.

(Refer Slide Time: 19:42)

7. Communication

Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation make effective presentations, and give and receive clear instructions.

8. The Engineer and Society

Demonstrate understanding of the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering practice.

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 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.

(Refer Slide Time: 20:37)

7. Communication

Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation make effective presentations, and give and receive clear instructions.

8. The Engineer and Society

Demonstrate understanding of the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering practice.

So if I say I have a graduate engineer so my domain dependent attributes are one to five those I have met but I have not met 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.

(Refer Slide Time: 21:11)

9. Ethics

Understand and commit to professional ethics and responsibilities and norms of engineering practice.

10. Environment and Sustainability

Understand the impact of engineering solutions in a societal context and demonstrate knowledge of and need for sustainable development

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 ethics.

I am not saying he is only develop the theory, he only know what is constitution of India no not like that he has to develop a ethics. Understand and commit to professionalism. 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.

(Refer Slide Time: 22:44)

11. Project Management and Finance

Demonstrate a knowledge and understanding of management and business practices, such as risk and change management, and understand their limitations

12. Life Long Learning

Recognize the need for, and have the ability to engage in independent and life-long learning

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

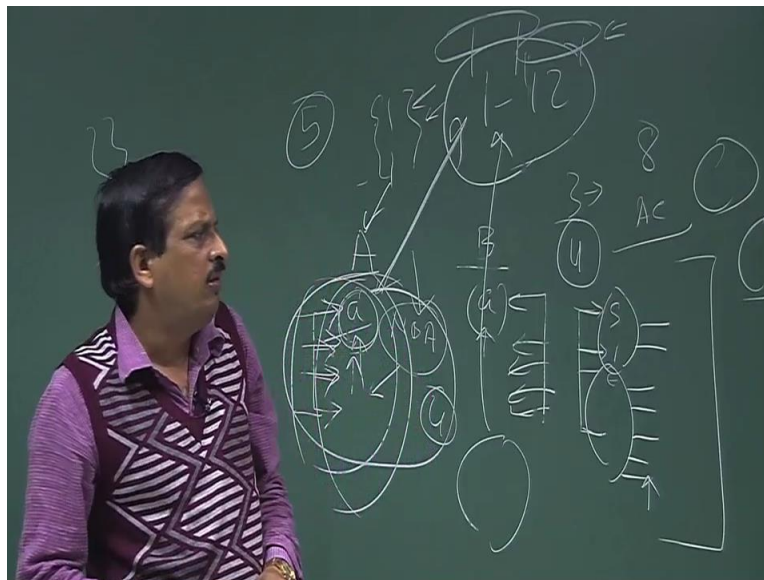
student many practices the students will come in the class, I give a lectures from one corner to another corner, they have note down that lectures, solve some problem in the blackboard in the examination system I give the same problem, they solve it and get the marks.

Am I improving their self-learning 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-learning 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.

(Refer Slide Time: 25:36)



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

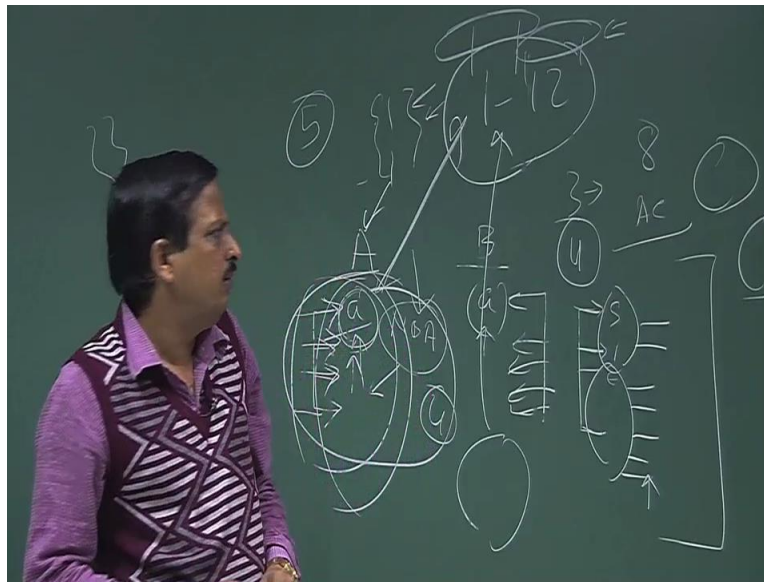
requirement as well as I have to design a teaching learning process which also scatter to this requirement.

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 one 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.

(Refer Slide Time: 28:20)



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.

(Refer Slide Time: 29:48)

4. Modern Tool Usage : Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

5. The Engineer and Society : Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

6. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of need for sustainable development.

7. Ethics : Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

8. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

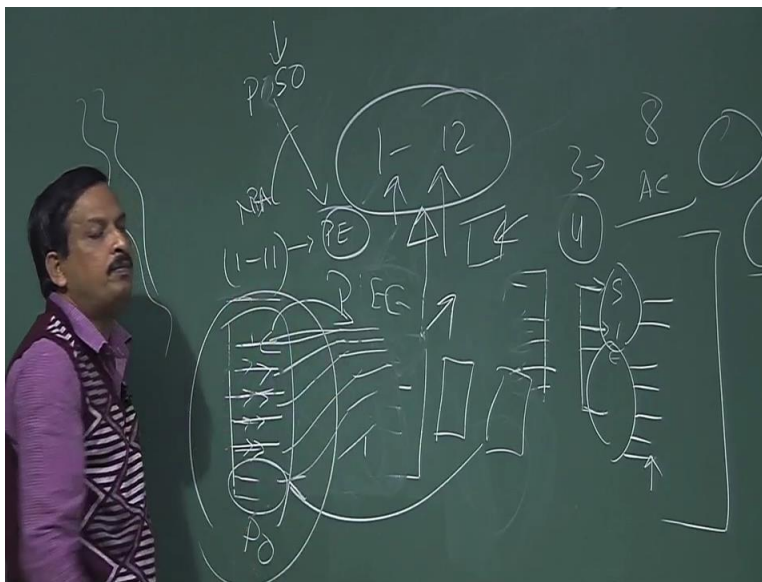
9. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

10. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

11. Life-long learning : Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

Now if you see NBA 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.

(Refer Slide Time: 30:03)



So some of our domain dependent attributes some of our domain independent attributes 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 see 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 okay.

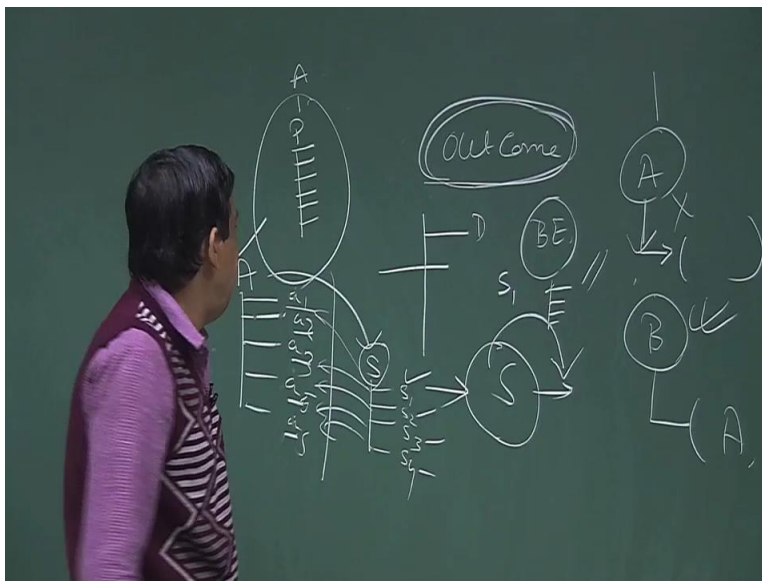
So accreditation program does not for use better graduate. It is only said that my curriculum and my teaching-learning process maintain the minimum criteria required for a graduate engineer which is defined by the accreditation body okay. So many institutes in India mostly the NBA accreditation is important 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.

Outcome based Pedagogic Principles for Effective Teaching
Professor Shyamal Kumar Das Mandal
Center for Educational Technology
Indian Institute of Technology Kharagpur
Lecture 03
Outcome based Learning

Okay so in the last class we shared that accreditation okay and graduate attributes which is required for mainly the graduate attributes that for engineering education graduate four year program graduate attributes, Washington accords and NBA guidelines.

(Refer Slide Time: 0:44)



If you see all this Washington accords and NBA guidelines said that outcome, outcome means it is not that okay some student say sir I have attended a course on analog electronics and I got x but I do not know how to design a push pull amplifier. That is there but I only know I describe teacher said me only description will come in the question paper so I only studied the description.

Then in there your Washington accords or your NBA requirements is followed because none of that accreditation boards or the we define the minimum quality required for a graduate engineer all ways in term of skill not in terms of knowledge. Knowledge means remembering not job. So that means I cannot say as graduate engineer I should have the capability of engineering design. I should have the capability of problem solving.

I should have the skill or capability for design of experiment for analyze the data for interpreted that analysis all kinds of skill set not the problems and that's are the outcome. So unless we know what is outcome based learning how can I say that yes I will write that my curriculum which is NBA accredited or I will follow a teaching leaning process who will guaranteed that Washington accords requirement.

So that means I have to think what do mean by outcome base learning and in first lecture I have said in twenty first century student require skill set. If you see that purpose of the education is to develop the skill means what I have learned or what whatever theory what about the practical or what about the teaching learning process I go through. At the end I am developing certain skill on myself so that I can say I am educated because I have this certain skill.

If you say what is difference between a common people and let I am BE engineer in electronics or B.Tech engineer in electronics. Somebody ask me what is the difference between you and me. I have to differentiate some skill set yes you does not have this skill set, I have this skill set that's why I am BE engineer. Not that I have only a certificate I am BE engineer.

So that means whatever I learn there should be a outcome. Learning is the process for acquiring the skill. Learning is the process for acquiring the skill. Skill is the outcome so any human being nature of the human beings I do something if there is an outcome.

If I somebody said go to Kharagpur station, I will not go. If there is some need, some requirement or some outcome then only I can go to Kharagpur station. So I can say outcome based learning that means I want to develop the skill S1 that's why I admitted this or I take this course.

Many students I have asked in here also. Why you have attend this course? Or what is the expectation that this course will offer you? They said sir only grade. If this is the outcome then the purpose of the education is totally loss. I am attending a course or I am attending a program to develop certain skill which I does not and after that over I attend this program I have this skill.

So outcome base leaning said that suppose I have a program A is a program. If this program said at the end of the program all the leaner must have this skill a1, a2, a3, a4, a5, a6. Those are the skill. Learner have those skill. Now once I define for the program A a learner said that I have

completed successfully program A. when I can say the skill a1, a2, a3, a4, a5 I am acquire, similarly broad down in just break down it in course label.

So program A content a course S and that course is develop certain skill which is s1, s2, s3, s4 and that skill match with this program skill map with this program skill. So that means course developing the skill s1, s2, s3, s4 which are the outcome. So I have attend this course because I want to develop this skill not that I have to get certificate of X A eighty percent, ninety percent.

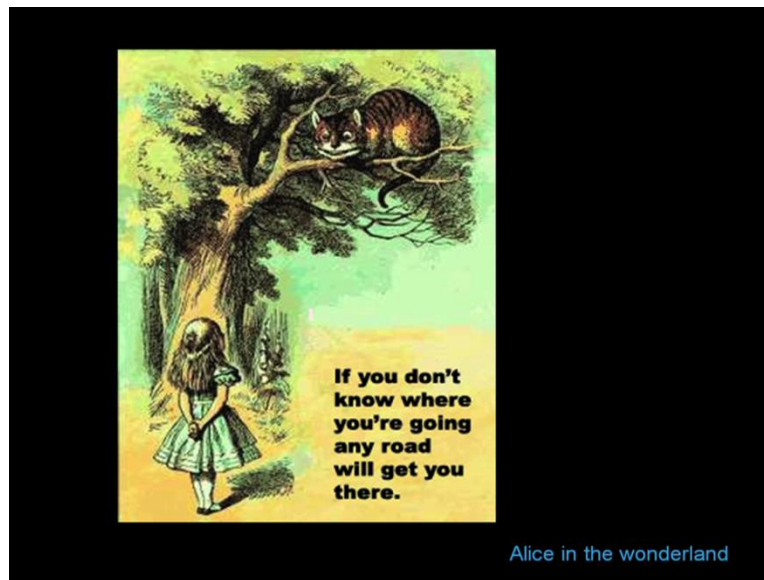
So I want to develop this skill that's why I attend this course. I want develop this skill that's why I attend this program. It is unfortunate the learner today in scenario before a student admitted in program he does not know the expectation. If you ask any parent why you admitted your kid in this program? His said earlier JEE rank this got this institute this program so this year my child got rank similar to this. So my child also go to the same institute same program.

None one it is mention that institute A, program P, if we attend this program then he will develop this skill, it is not mention so parent also not aware about, student also not aware about. After he attend this Course he found I am B.Tech electronics engineer but I don't like this ultimately he get a certificate and get a job. So ultimate aim is that okay get a certificate and get a job not that develop the skill. So outcome based learning says that you should mention that this program, develop this skill once a student enter the program and in the exit student acquire that skill.

That is the program gain. A program force the student to acquire that skill. I give simple example suppose I am admitted in a driving school. Am I happy with the knowing how the glass working? How the gear working? How the accelerator working? Or I want that the end of the driving school I should able to drive a four wheeler if it is a four wheeler driving school for specific road condition this kind of road. So suppose school A said that if you come to my school I will at the end of the program you should able to drive a car in Calcutta city.

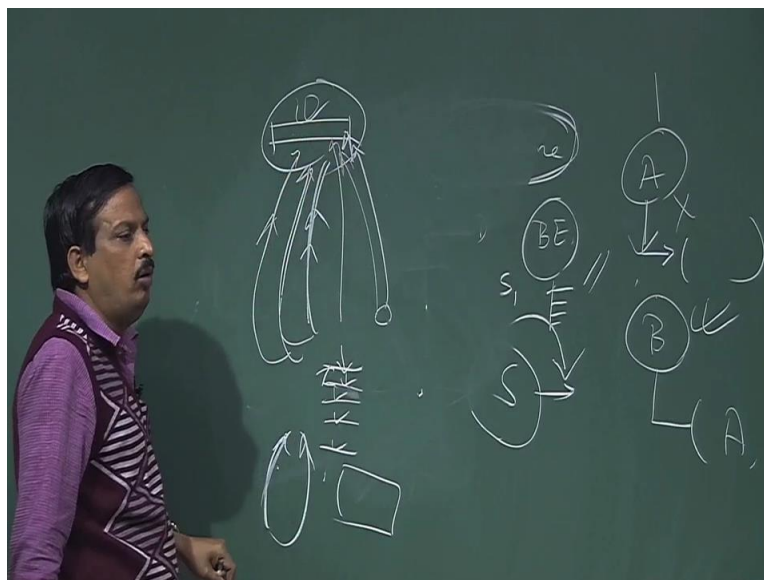
And school B say if you come to my school you will be able to drive a car in highway and Calcutta city. Then it is a learner choice which school he will go. So I A school I do not see that this is not important so I go to the school B so outcome base learning is that you have define, what is the learning goal?

(Refer Slide Time: 10:04)



I just explain in a simple picture. Taken from the Alice in the wonderland everybody know that everybody know the story also that the story is very simple. There is a girl standing on junction of some road and she ask the cat which road I should take? Then cat asked where you want to go? Girl said I do not know then cat said anything any road.

(Refer Slide Time: 10:47)



So that means unless I am not defining the outcome how do I define which learning process, which learning methodology, which book, which material I should follow to attend this outcome

okay. I will teach a subject, I will deliver some lectures. All students is come in my class. The somebody take note, somebody does not take note, they practices from the previous year question paper and it is university said that whatever you taught some question must be come from your lecture material, some question must be solved in the class, I give that student pass.

Is any skill is develop? Am I increasing the self-learning ability? So that means as a teacher I should define the goal and the path to reach the goal that is the role of teachers and test whether a learner reach the specific goal or not? Now reaching the goal is the learner responsibility. Whether the learner is able to reach the goal is the learner responsibility, but I said that suppose if you come to my course those are the course goal, A B C D those of the material, those of the test title is available if a those of the material means those of the path to reach this goal.

Whether you are able to reach this goal or not that is your responsibility, at the end I will test which goal you have reached and which goal you does not. So the purpose of the evaluation only test the confidence of the learner whether he acquired the intended skill or not?

So role of the teachers is change, now what is role of the teachers? Role of the teachers is to define the goal, provide the path, test whether a student reach this goal or not and guide the student for overall, guide the student to reach the goal.

(Refer Slide Time: 13:15)

IT'S NOT WHAT Teacher **TEACH**,
IT'S WHAT Learner **LEARN**

*Role of a Teacher is guide
and mentor the student
→ learner-centric approach*

So the role of the teachers become guide or mentor instead of teaching the student. So learning is the learner responsibility, so whole outcome base learning is called learner centric approach. I want to learn that is why I come to this course, nobody force me, I cannot force anybody to learn something.

So he, he want to learn something that's why come in this course and I said if you want to learn something or if you if you said that you are capable or you may confidence in this course then those of the goal you have to achieve those of the skill, you have to acquired and those of the material available those of the problem available by which you can test, whether you reach the goal or not?

And you practice it and reach there. I am available only for guide you, mentor you to reach the goal, not spoon feeding the student to teach the subject, take the test and assign them grade A, grade B, grade C. So in a outcome based learning the role of the teacher change to instead of teaching mentor and guide.

If this role of the teacher is change then student self-learning ability is already promoted because as I teacher I am no more not providing the ready material to them whether they just study before the semester two day they study and give the exam and after exam everything is forgot.

I say in my course you cannot attend or you cannot pass the course or you cannot say that I am clear the course unless you have developed the skill A, B, C, D, E and my question for evaluation method only test whether the learner has acquire that skill or not? So outcome based learning if I follow then I can say I am scattered to 21 century education, I am scattered to domain dependent requirement, domain independent requirement of the Washington accords and NBA guideline. I am scattered to capability building among the student so it increase the student engagement.

(Refer Slide Time: 16:11)

Outcome-based Learning

- OBE is an educational process that focuses on what students can do or the qualities they should develop after they are taught.
- OBE involves the restructuring of curriculum, assessment and reporting practices in education to reflect the achievement of high order learning and mastery rather than accumulation of course credits.
- Both structures and curricula are designed to achieve those **capabilities** or **qualities**.
- Discourages traditional education approaches based on direct instruction of facts and standard methods.
- It requires that the students demonstrate that they have learnt the required skills and content → **encourage self learning**.

OBE addresses the following key questions:

- ❖ *What do you want the students to have or able to do? (skillset)*
- ❖ *How can you best help students achieve it? (Guide)*
- ❖ *How will you know what they have achieved it? (Evaluation)*
- ❖ *How do you close the loop (How Evaluation system reinforce the teaching and learning)*

30

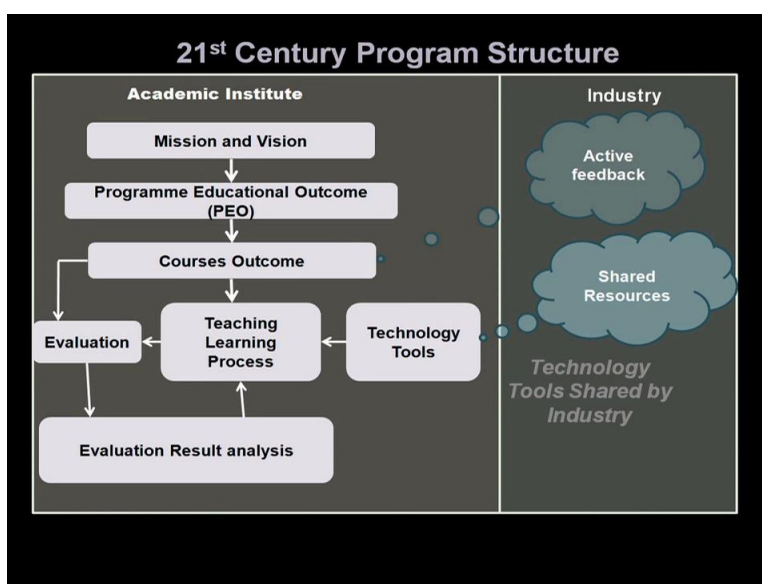
Okay so outcome based learning I am not going to the all the slide, it is there you can see address the following questions. One is what do you want the student to have able to do? That is skill set. How can you best help student to achieve it? That is guide. How will you know that they have achieved it? Evaluation. How do you close the loop? How evaluation system reinforce the teaching and learning?

Once I define the outcome and in evaluation I said only student may most of the student only achieve the skill A and skill B but none of the student is achieve the skill C, then I have to revisit

the teaching learning process and also the outcome. May be this outcome is not achievable or the teaching learning process which I am followed may not scatter to this outcome.

So outcome based education clearly said that learning is the learner responsibility, teacher is only for there to guide and mentor and remove the miss conception happening in the student. If I do that then its promote the self-learning ability, soft skill building and it scatter to the domain independent parameters of Washington accords and NBA guide. So this is outcome based learning. I am not again going all those things.

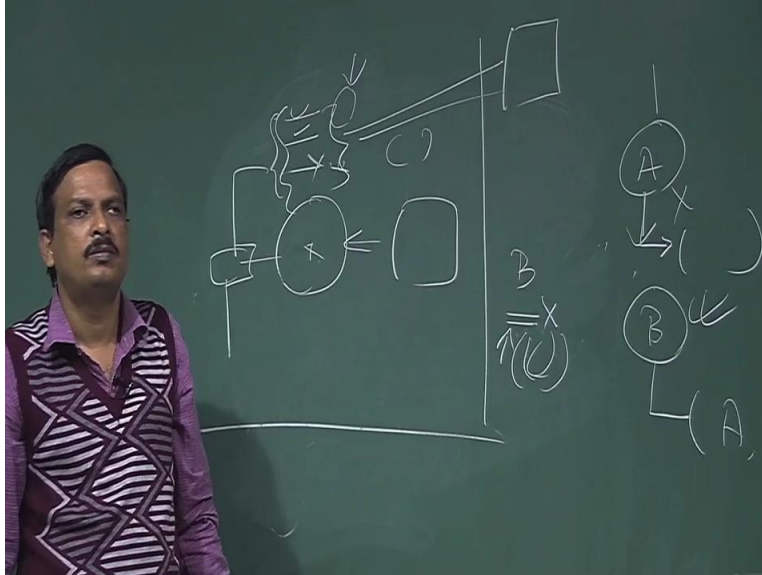
(Refer Slide Time: 17:58)



So if you see this slides, here we are explaining the program structure. What should the overall program structure which promote the twenty first century education and which create the skill set. Skill set among the students which is required by the twenty first century education. So what is that there is mission vision statement there is program educational outcome.

I am not going details of individual block I will come then later on while the design of the curriculum and just explaining from the course outcome to teaching learning process because the purpose of this course is to effective teaching not for the accreditation, NBA accreditation watching the course. I shared the purpose for this course to how teach effectively. What kind of teaching learning process I should use for effective teaching.

(Refer Slide Time: 19:15)



So this structure, what is define? Course outcome I am explaining for the course. Course outcome structure define the course outcome course outcome is define then I follow a teaching learning process then I said teaching learning process which includes the modern tools and usage and I take the evaluation based on the whether a student achieve this outcome or not? That is evaluation and I analyze the evaluation result.

If some of the outcome is not achieve by anyone of the students then I have to change the teaching learning process or the outcome. Now there is another dimension of this. If I write down my curriculum or course in a outcome based manner then what I am doing. Once I write down write down my course outcome in a specific skill set manner or outcome based manner then and there if I share it with the industry, industry will say these kinds of skill is absolute in nature so this may not require please change to this kind of skill.

So as a teacher I get active feedback from the industry that this kind of skill set, suppose still I am I am teaching the basic electronics course and one of the outcome I said that operation principle of the diode half diode or draw the VI characteristics of the half diode then industry said why you will teach this thing. This kind of thing is absolute in nature so it this thing. I get feedback from industry.

Then my curriculum I can continuously revise my curriculum so industry academy collaboration unless we define what kind of skill set we want to develop among the students. How the industry

will comment? Once I said my outcome is this said one of the outcome lets I write that they should able to simulate this kind model using this software.

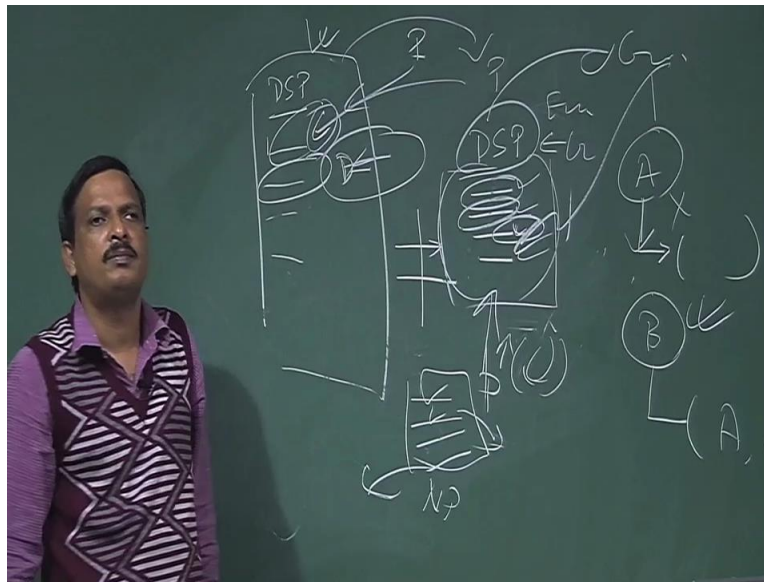
May be this specific software is not available in my institute. That is the modern tools and tools and resource tools and technology and tools. That technology is not available in my institute then industry can said yes this tech this tools is very much useful and here is the open source version or here is the share version you can give it your students to develop the confidence on this tool. So that I can hire them after they complete their study.

Or suppose I am explaining a concept one of the outcome is lets I have I thought subject or power plant engineering and where I teaching that the design of say let's design of turbine. Simple turbine I am teaching here but I do not know actual I do not have any actual turbine picture then if this is shared to the industry then industry person can say let's this are the resources this are the pictures of turbine and those are the design issues in turbine area. So you can discuss those issue in class.

Problem, suddenly we are unable to provide all kinds of problem to the students. Now if it is a collaborative environment lets that outcome a can be tested by a problem t, as a teacher I define, somebody else can say instead of t lets use the t1 which test better that this skill. But industry say use this case study for test whether they have this skill or not.

So active collaboration between the industry and academia only possible if I write my curriculum in outcome based manner. If you say today syllabus is use, if you see the syllabus today syllabus what the syllabus mention? What are that advantage in syllabus and outcome based curricula?

(Refer Slide Time: 24:10)



For the example suppose if you look at the syllabus for DSP for a particular institute it is written A, B, C, D filter, frequency response, LTI response, LTI discrete structure of the LTI system, all kind of list of topics are there in the syllabus.

Suppose today I am teaching this course and I am very good in DSP. I covered every topics in depth whatever require for BE engineer but tomorrow another person is come he may be very good in frequency domain representation but very weak in filter design. So today what will happen? Most of the time the teacher will spend on the frequency domain representation, he spend less time in filter design because he does not define the depth, what kinds of filter you have to completed? How much you have to how much confidence you have to develop? It is only the list of topic.

So it is based on the teacher I can know how much depth I will go based on my knowledge. Now what will the happen? The student should follow this DSP course this. They will lack of knowledge in this filter design when you go for the image processing class he does not know anything about the filter design. So they face the problem.

Now once you define that DSP for electrical engineering those are the outcome is required then anyone teacher so once the outcome is define learner knows that if I say I am confidence in DSP I should able to do this skill this skill this skill this skill does not depend on the teacher.

May be teacher a not provide the material to develop the skill for this next third skill then and there he can search in the Google and find out how to develop that skill. So it is a collaborative teaching environment. A new teacher joined here. He does not know what to taught in DSP. Once this curriculum is available he know I have to develop this skill this skill this skill among the students. Those are the reference material already available those kind of test item used for test a skill. Those material is available and those are continuously upgraded by the industry.

Now teacher is only is guide and mentor to the student to achieve this. So the shortage of quality teacher, can we solve? Using outcome based curriculum design. So teaching not overall the teaching is varies from teacher, to teacher because learner knows how to develop the skill A, B, C, D it is his responsibility whether he develop those skill from the teacher, class teacher or from the Google, from the MIT open course, from the NPTEL open course NPTEL video does not matter.

Once I define this skill it is a done. Similarly one issue, one more issue I have to explain that lets the grade transfer. Some were credit transfer. Somebody said that yes credit transfer I will if you do this course in this institute that credit will be transfer. Presently it is based on what?

(Refer Slide Time: 28:04)



It is based on the reputation of the institute, reputation of the examination system. Why it will base on the reputation? Suppose I defining my course structure course lets the thermodynamics

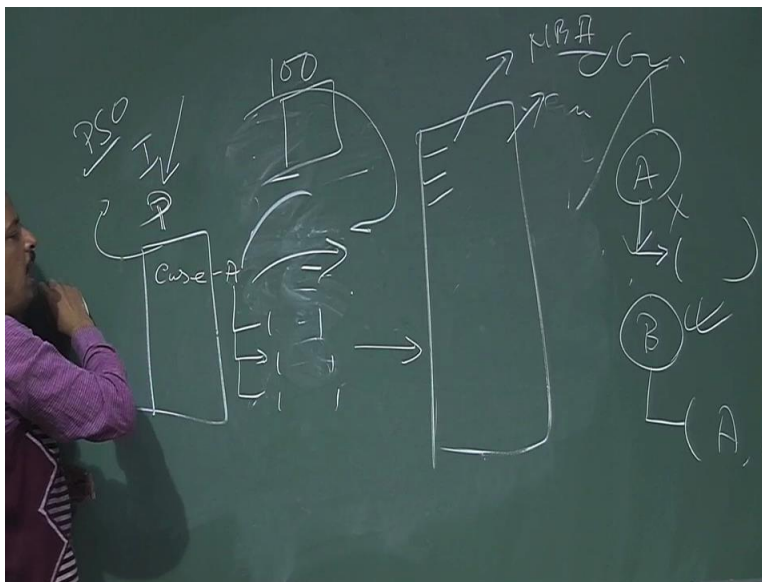
teaching by institute A define his outcome at the end of the thermodynamic course student will be able to do this one this one this one this one and my evaluation process only test whether they have that skill or not valid skill or not.

If this evaluation process is a valid process then whatever the grades students get let's A can be directly transfer to any institute because if I am institute B looking for the same set of skill in thermodynamics then I can say if you completed the course this course your credit will be transfer here.

I will not looking for the reputation of the institute. I am not looking for the educational examination process. What is the question paper? I am not looking. I said those of the skill set require for the, I will want to develop thermodynamics and a student had develop all the skill. Now a program B, institute B, program C want the same set of skill then I can say if you complete this course come to here does not require that reputation, does not require that something else has to be done.

Once fine morning somebody said yes IIT grade can be compatible to everybody, does not required. It is based on the skill only. So defining the, designing the outcome base curriculum for every course, for every program is the key issue once I done that grade task, credit task for industry sharing continuous improvement of the curriculum and designing of the curriculum also very easy.

(Refer Slide Time: 30:38)



Today if you see when somebody syllabus committee, syllabus committee some expert sit and three or four expert sit together and define a syllabus. Syllabus for BE or instrumentation engineering this course this course must be there, this course must be there somebody some expert may come from microwave, he said all the topic of the microwave is very important. So he is listed down all the microwave topic.

Somebody is come from the industrial instrumentation he said all the topic of industrial instrumentation is important. He listed down all that topic. So the huge syllabus is made but does not guaranteed whether that syllabus is achievable by this four year program or not. Whether this whole syllabus are scatter to the NBA requirement or Washington attributes or not, does not?

But think if the same thing, same every subject design based on the outcome based curriculum and is openly available in the net lets there is one thousand subject is available, two thousand subject or every there is a lot of varieties of basic electronic, lot of varieties of electrical engineering, basic electrical engineering, lot of varieties of electrical measurement.

All courses are available develop by the different teachers or outcome based curriculum is available I am designing a program, I can pick any one of the outcome, I can pick the outcome I am designing a lets I am designing a institute I designing a program P for the course let I define

A and I can search for that what kind of skill I want in the course A, I can define or I can search from the thousands of courses and define the skill.

Then I can define the PSO matrix from the skills. So now my syllabus whatever the syllabus I prepared a scientifically validated but the all outcomes are achievable in nature and all outcome scatter to PSO which is PO of NBA or Washington accords and a learner it is available to the learner, learner know if I want to becomes a successful graduate from this program I have to acquire all this skill which is mention in the curriculum not the list of topic.

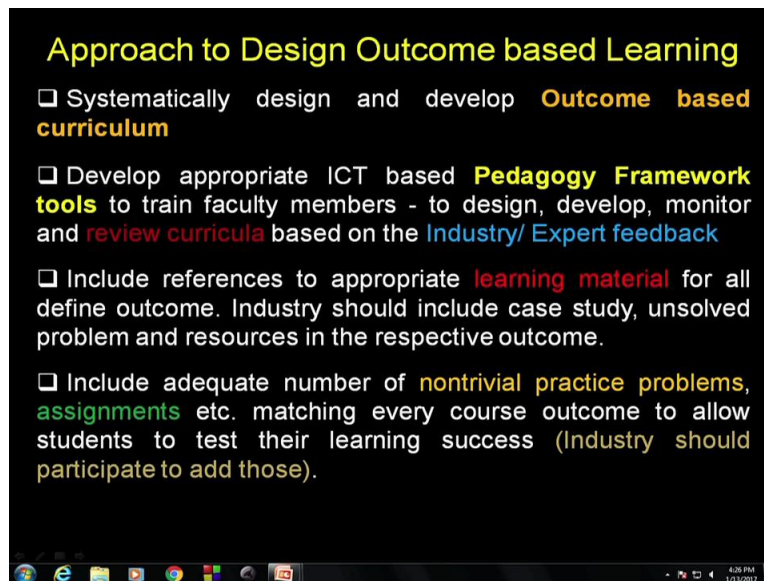
Today if you ask any student, fourth year students what are the subject you study in the last three year. He is unable to name all the subject. Unable to name all the subject name itself skill because again syllabus is available teacher, teach something deliver it is, student take a note student know that question what should the question next semester. Just read ten days before the exam, give the exam. Get X grade, graduated.

No skill nothing. This is the requirement this is the outcome based education advantage. How to design this course curriculum? How to design this this kind of frame work? I will explain in the next lecture okay.

Outcome based Pedagogic Principles for Effective Teaching
Professor Shyamal Kumar Das Mandal
Center for Educational Technology
Indian Institute of Technology Kharagpur
Lecture 04
Approach to Design Outcome based Learning

Okay so last class we have discussed about that outcome based framework and that mission vision program educational objective, then teaching learning process all kind of things.

(Refer Slide Time: 0:33)



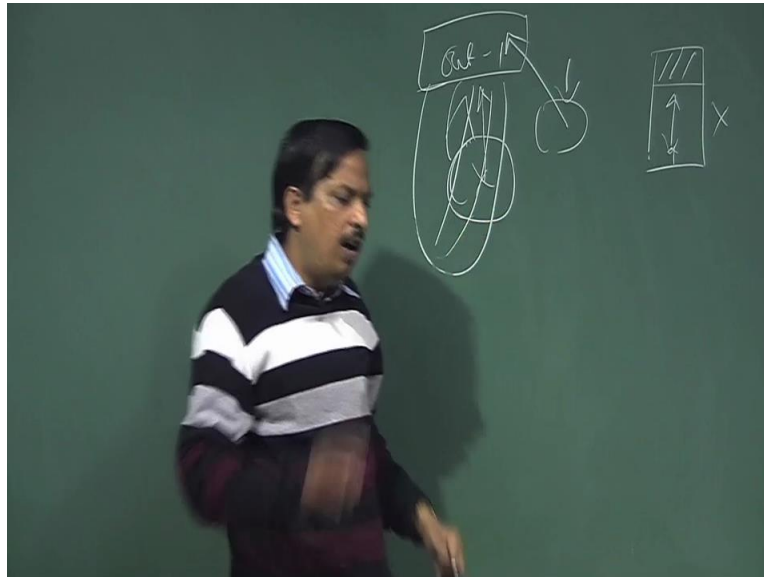
Today let us start to discuss about approach to design outcome based learning. What should be the approach we should take to design outcome based learning? First one systematically design and develop outcome based curriculum which is very important. Systematically develop the outcome based curriculum all details I will cover.

Then develop appropriate ICT based pedagogy framework tools. Why I said the pedagogy framework tools because if I said I developed a outcome based curriculum and submit to NBA or something and I not share with the students and also only develop the top level of the outcome based curriculum not the bottom level. I will come what do you mean by bottom level?

Then what will happen that the pedagogy which I want to follow in outcome based pedagogy is not effective. It is not effective. So what I will do lets develop a tool or framework which can allow to share to design, develop, monitor and review the outcome based curriculum based on

my industry expert, based on the domain expert, based on the students. So everybody take a part in the curriculum design and also the curriculum is readily available to every students before they come to the class, okay. Include reference to appropriate learning material.

(Refer Slide Time: 2:17)



Now I said I define a outcome lets I define outcome one okay. I define outcome one but unless I provide the appropriate learning material to related to outcome one then how do I promote the self-learning. So if I want to promote the self-learning, I said define the goal outcome is the goal, define the path, the resources of the path and define a test item by which a student can test whether he achieve the goal or not?

So include reference to appropriate learning material for all define outcome. Industry should include case study, unsolved problem and resources in the respective outcome. Include adequate number of assignment, practice problem in assignment so that student can test whether he achieve this outcomes or not? So we are not saying thus simply design the outcome based curriculum and keep it secret with the teachers or somebody else.

But not publishing to the students. We are not saying that. We are saying design a structured curricula not only based on outcome but also for every outcome include the learning material. Different kinds of learning material you can include and include the test item so that the students can follow their own path. I will come later on it.

(Refer Slide Time: 3:51)

Outline of a Outcome based approach

Important Steps

- ▣ Choose **Appropriate, Challenging but Achievable** Specific Learning Outcome
- ▣ Write them down in **clear and measurable terms** using **standard action verbs**
- ▣ Prepare **study guides / learning strategies** with detailed list of learning resources
- ▣ Make it **available** early to all concerned

Cont...

Lets what will be the approach? The approach is outline of this approach. That choose appropriate, challenging but achievable specific outcome. So that go to the faster, lets I take a subject. A subject A, I define the appropriate what I said appropriate challenging but achievable outcome I defined. Then this outcome, how to I write this outcome? It not that easy.

(Refer Slide Time: 4:10)



It has to be written with clear, measurable term and standard action hub using bloom taxonomy. So all bloom taxonomy and his structural system design will be later on taught but every

outcome must follow that. Every outcome must be achievable, measurable and challenging and how to write the outcome using Bloom's taxonomy and his structural system design.

Once I write that outcome a student knows where I have to go. What will be given? What skill I have to perform up to what level? That is defined. So students know that, make it available to the students then prepare learning material to achieve this goal. There will be learning material, prepare the learning material to achieve this goal.

There will be different kinds of learning material. Some may be text book, some may be paper, some may be animation, some may be NPTEL video, some may be Khan Academy video, some may be something else. So all kinds of learning material which scatter to the outcome achieve this outcome will be defined by the teachers and this can be modified by the industry can add, industry can modify the resources and add relevant resources. Some domain expert can also add resources and so it is involved in process.

Once I do that, what I am covering is that, if I have a large class. Four hundred student class. Every student is not following the same learning style and same learning capability also learning approaches. Some students are surface learner, some are deep learner, some are very ordinary students. So now outcome is given, material is given, test item is given. Now every student can follow its own path to achieve the goal but everybody has to achieve the goal.

So brilliant students may go through the difficult module, difficult text books and some other difficult text and quickly achieve this outcome but slow learner who are not that much of intelligent but they know I have to achieve this goal. So I can follow, take their own space and follow him here.

So it increases the student engagement. If I am students I know I have to reach this goal and throughout the semester I have to reach this goal and if this goal reaching this goal required let's study some engagement time without attending spending this engagement time I cannot reach this goal. So it increases the student engagement. So systematically I have to design this thing.

(Refer Slide Time: 7:32)

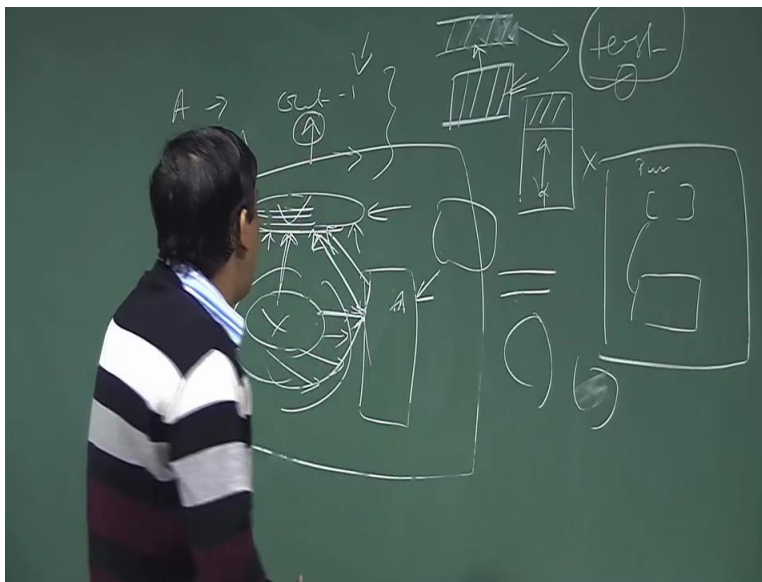
- ▣ **Reduce lecture hours and increase tutorial hours to :**
 - **Discuss unsolved problems.**
 - **Conduct formative evaluations .**
 - **Provide individual feedback.**
 - **Allow more time for students to learn**
- ▣ **Promote use of active learning through simulation tools, virtual labs and also game based learning.**
- ▣ **Design courses to promote collaboration, communication and problem solving.**

- ▣ **Develop adequate self assessment material well matched with learning objectives to allow students monitor their progress and seek timely help.**
- ▣ **Provide suitable technology tools which allow**
 - **Students access to learning resources, interact effectively with peers and mentors.**
 - **Faculty to monitor progress, evaluate and provide timely remedial lessons.**
 - **External experts / industry to participate.**

Cont...

Now I have already discussed that if you see develop suitable that the test item. I always slide also explaining the same thing. So what I have explained and then next I go to here. I am favor of reducing the lecture hour. So once you design this kind of document, I will show you how to design this kind of document and readily available to the students.

(Refer Slide Time: 07:53)



Once you design this kind of document, the goal is available material is there, test item is there then I do not have to deliver this material in the class because I share lets I say the student will able to design a push pull amplifier of this kind of specification. This goal is there and corresponding material for designing push pull amplifier is available that will here. So I do not have to deliver the same material in the form of lectures.

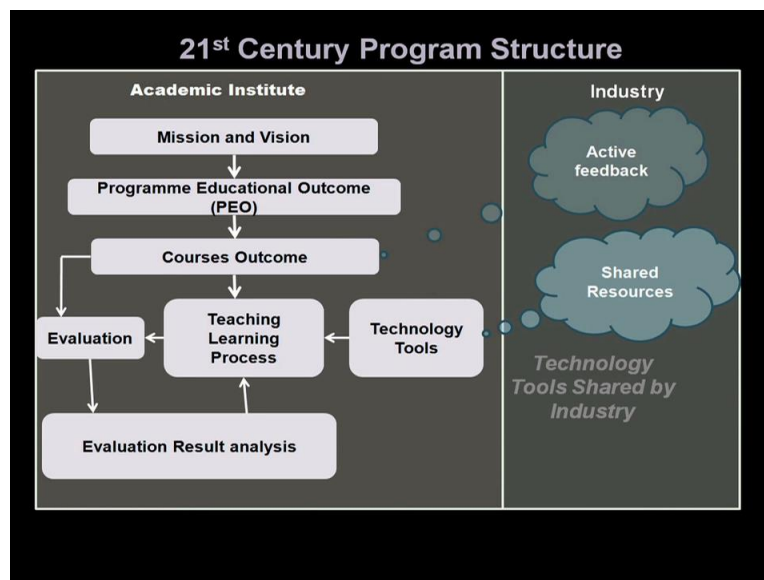
What I will do, I told the students lets today's class this is the objective of this class, outcome of this class and those of the material. If you follow this material you can achieve this outcome. So this may be a video lecture of your previous recorded video lecture. This can be a reference material. This can be a Khan Academy video. This can be a NPTEL video, does not matter but as a teacher I specify if a student follow this material he can achieve this outcome.

Then I told the students, lets you through this material and came prepare with my class. I will test whether you achieve this objective or not? Once the student is come in the class, lets take a test item of this to test whether the student is active or not? And told the students are you able to solve this kind of test item? If they say no then discuss where is their miss conception? So discuss unsolved problem. Conduct formative evaluation to check whether the student achieve the goal or not?

Provide individual feedback. Yes it is possible, once you define the goal and material and test item then the problem misconception to related to the achieving this goal will be vulnerable to certain misconception. So different student may have different misconception but if I have four hundred student there should not be a four hundred misconception. So they will be cluster together. Now in the class I will discuss only those misconception, which is come out.

Most of the time you find the misconception will be solve by the student itself. Very few cases teacher has to be intervene and explain the misconception what our the student is there. So it promote active learning. It promote student engagement. It promote self-learning. So once I design systematically design this whole material then its promote the self learning. Other way even today most of the institute are required to fill up the NBA document. So once this is available for every course fill up in the NBA document is very easy.

(Refer Slide Time: 11:33)





I will discuss, let's typically NBA documents have initially if you see that mission and vision statement then PEO then so, here I have one thing is missing. One is mission and vision statement, then PEO then PEO related to PSO program specific objective which related to PEO. PEO of NBA. NBA PEO as per the NBA PEO attributes program specific objective is return down and top is program educational objective or outcome and then each course continuation course outcome continuation will come.

So we are not we are not restricted to course outcome. We should develop this course outcome along with a simple structure, which I will mention later on. If this structure is available give it to the students before they come to the class it promotes the self-learning. So effective teaching in here and if you do this thing designing that NBA document will become very easy. So let us spend some time on what is the meaning of mission and vision statement PEO.

It will help to develop the NBA documents but the purpose of this course is not to that help you to provide develop the NBA documents. The purpose of this course is to what kind of teaching learning process we should follow, so that teaching become effective okay. So now discuss on that issue mission and vision statement. Everybody knows what is mission and what is vision.

(Refer Slide Time: 13:06)

Vision and Mission Statements

Vision Statements

- ▣ ***Vision is a futuristic statement that the institution / department would like to achieve over a long period of time***
- ▣ ***Example 1: Vision: Create high-quality engineering professionals***
- ▣ ***Example 2: Vision: ---To be a premier university that propagates the generation and dissemination of knowledge in cutting edge technologies***

Vision is a futuristic statement that institute department would like to achieve over a long period of time. Every institute, every colleges or you can say every lets the department also a vision and mission.

(Refer Slide Time: 13:33)

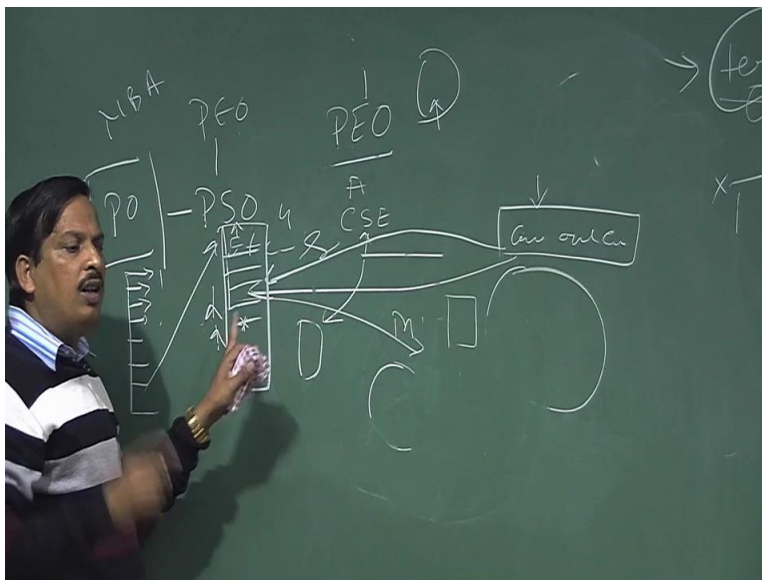


So let us institute A has a vision and institute A has a mission. So mission is the means to fulfill the vision and vision is a futuristic statement that institute department will like to achieve over a long period of time. So institute A mission and vision. I can write down institute B mission and vision.

It may not be same mission of institute A, mission of institute B may not be same that's that so mission statement depending on the requirement that what kinds of quality students institute A want to produce. Unless you can say why required different syllabus I can follow the IIT. If the IIT syllabus is the better syllabus, I can follow the IIT syllabus to the every engineering colleges but why the syllabus is different because the purpose of the institute to create a institute, the purpose of the institute is different from the different institute.

IIT mission and vision is different from any other institute or let institute A mission and vision, institute B mission and visions is totally different. So based on the mission and vision statement, what I have to created? I have to created program educational objective who fulfill the mission and vision statement of the institute. Different program so program educational objective or program educational outcome PEO will be depends on the mission and vision statement of the institute.

(Refer Slide Time: 15:16)



So PEO, PEO program educational objective or outcome here objective means instructional objective which is basically a outcome of that program. So program educational outcome will be different, computer science program CSE of institute A and computer science program four year computer science program of institute B will be different because this institute my produce the student to supply to local industry. This institute may produce the student to do higher research.

It is based on his input and what kind of facility he has and that kind of program educational objective is written. So program educational objective directly related to mission vision statement of the institute and PEO will be different from institute to institute. So PEO somebody said okay, lets write the PEO suppose I copy the MIT PEO. What about the PEO is write by the MIT? If I copy then is there my program will be better? No because I do not have that facility. So depending on that whether I will this PEO is achievable or not.

So achievable term is available, PEO should be achievable. So depending on my infrastructure, depending on my resources I will create my mission and vision statement and PEO. Then you may say okay I will create a PEO very shallow PEO, but once you write down the PEO it quantify, what is the minimum requirement? Then NBA said this PEO does not quantify the minimum requirement so you have to change the PEO

So PEO minimum requirement PEO can be different level depending on institute. You can say infrastructure, facility, input student intake student all kinds of parameter will be varies.

Once I write down the PEO, I have to write down the program outcome. What I said that PEO related to the P program specific outcome which is followed the program outcome of NBA program outcome of NBA.

What is the program outcome? Twelve graduated attributes if it is graduate program then twelve graduate if attributes one, two, three, four in case of NBA. So those NBA once I write down to the electronics department specific lets for four year program on electronics and telecommunication then its becomes PSO program specific outcome.

Once I define the program specific outcome that define me what kind of subject I should offer to achieve this program specific outcome. This is the scientific aspect of designing the curriculum. Now people will say how we do design this kind of curriculum. In my opinion lets you design the course outcome clearly and course structure. So once course outcome not only reflect that what I have taught in the course.

Course outcome along with the course structured. I will mention, what is the course structure will reflect, what kind of teaching learning procedure I will follow and what should be the course outcome? I have already mention the course outcome can meets certain PEO directly and certain PEO parameter can be meet by the how teaching learning process of that course. So both teaching learning process and course outcome is important to match with the program specific objective okay.

So program, outcome program once I write that program outcome for electronics then it is becomes PSO program specific outcome. Once I define the program specific outcome for each I have to achieve all outcome. So to achieving all outcome I have to offer different courses. So it may be iterative process.

I define my program outcome then select the courses available in outcome based course is available then I can select automatically which course meet my PEO or I can define a rough PEO given to the teachers, that this I my PEO. Lets write down the course and course should map with this PEO and I can match with the PEO and after matching algorithm I will found that this

outcome is not matching then I can change the course outcome to match this PEO. I will come how this program matrix and those things I will come.

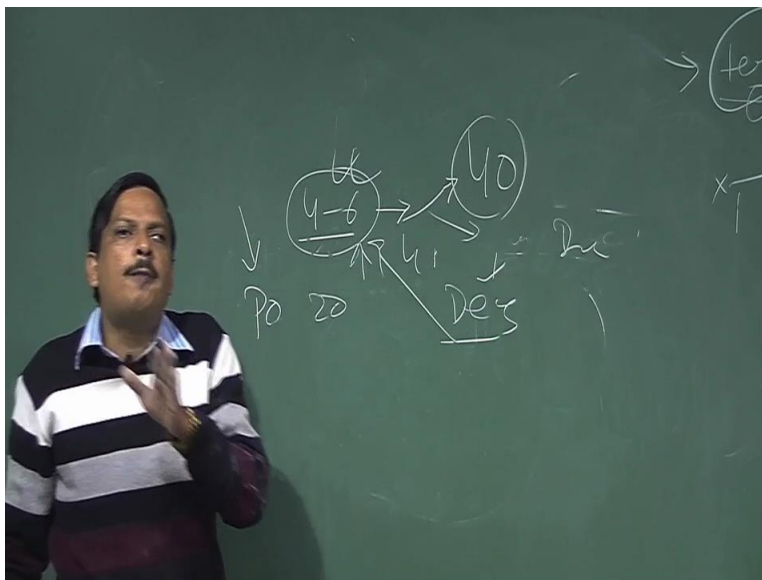
(Refer Slide Time: 20:43)

Course Outcomes (Objectives)- COs

- ▣ *Typically 4-6 CO s are identified /Course.*
- ▣ *COs are major domain specific outcomes written using action verbs which are specific, measurable and can be demonstrated by students on completion of the course.*
- ▣ *Course Outcomes should aim to develop higher order skills in each Domain of Learning. Evaluation, Synthesis, Analysis are typical examples in Cognitive Domain.*

Lets I will not going PEO details. Lets go to the course outcome. What is course outcome? What do you mean by course outcome? Course outcome is typically four to six outcome major outcome of the course which can students develop during the one semester study or lets forty lectures. I consider a forty lecture course.

(Refer Slide Time: 21:11)



So I have a forty lectures hour and one semester long course so I define four to six course outcome which will be achievable, which will be measurable which will be specific for this course. So four to six major outcome and if you say if the course is for graduate engineer four year graduate engineer none of the course outcome should be mention student will define this things.

Student will describe this thing because none of the PO parameter whether it is Washington accords or NBA guideline has said the graduate engineer has only to define only to describe. They have to earn higher cognitive level. Next class this later on the Tamali Bhattacharyya taught you, what are the cognitive level of bloom taxonomy all kind of things. I just follow that things so higher cognitive level means not lower level define, describe that things.

They should able to evaluate synthesis analysis, design apply all kind of higher cognitive level. Once I write down this higher cognitive level four to six course outcome and I said this outcome should scatter to has to be achievable by the forty lecture. It should not be achievable by twenty lectures. Then my course objectives are course outcomes are very wrong and it should not be that. It will be not achievable by the forty lectures.

So as a teacher I have to find out or write down four to six course outcome which is specific, measurable and achievable within the forty hour lectures and which is not in not lower cognitive

level. If I say today we will be able to describe this thing may be one or two lectures is sufficient to develop the skill.

So that cannot be a course outcome. Student will be able to define Newton's second law of motion then we require thirty minutes not require thirty minutes in ten minutes of lectures. So that cannot be course outcome. So course outcome is the major take away by the student or I can say the course outcome or the major skill set which will be developed in the students after they attend the course.

(Refer Slide Time: 24:01)

Program Outcomes

Instructional Objectives

A statement of something which is **SPECIFIC, MEASURABLE, ACHIEVABLE** that students should be able to **DO** after receiving instruction if it

Three Important features of a well-written Instructional Objective

- A. The performance component
- B. The condition component
- C. The criterion component

So how to write the course outcome, if you see how to write the course outcome, there is a slides this slide that each outcome must be written based on the pedagogy of instructional see or based on the theory of instructional system design and bloom taxonomy. For the instructional system design said a outcome or a objective instructional objective is a statement of something which is specific measurable and achievable that student should able to do after receiving the instruction. So each course outcome should be a statement of something with student will able to do after receiving the instruction means at the end of the course I should able to do this thing.

(Refer Slide Time: 24:51)



If I say the students should able to design the push pull amplifier in electronics example so what is the problem? Yes it is doable. Design the push pull amplifier but push pull amplifier complexity is very huge so for four year graduate engineer I have to define how much up to how much complexity I should handle this design or they should able to the handle. So if I say for BE engineer up to this complexity is required then it add the specificity on the objective. Then mean that this objective is achievable. Suppose somebody has taught aerodynamics or something then he write student will able to design an airplane.

It is very open ended statement and it cannot be course objective because it is not achievable. Similarly suppose I taught mathematics and I say student will able to solve differential equation. In the objective cannot because there lot of differential equation available, lot of theories, lot of kinds of differential equation available within the forty lecture of this engineering mathematics

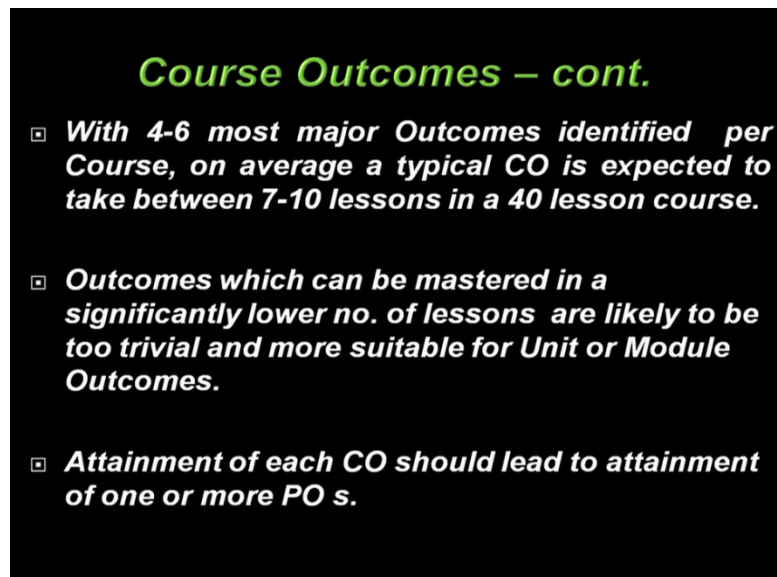
may be differential equation I may for ten lectures or twelve lectures with in twelve lecture I can develop all kinds of solving differential equation.

So I can say instead of differential equation I make it specificity student for a given second order differential equation student will able to solve it. That means it added specificity that up to second order is required for the engineer. I can say student will be able to design a AC machine. It is not possible the complexity of designing AC machine is huge. So what kinds of complexity the student will able to do? I have to specify. Once I specify that and instructional system design is call those are condition component and criteria component.

So a instructional I can say a outcome or instructional objective should contain three component, performance component, condition component, criteria component. So how do you write? For a given this thing do this thing up to this. So once either given this thing is the condition component. Do this thing is the performance component, up to this is the criteria component.

So I define what to do? What will be given? Up to what level if I do that for every objective then I specify that objective. So it may be a course objective, it may be a module objective I will come. It may be a unit objective.

(Refer Slide Time: 28:11)



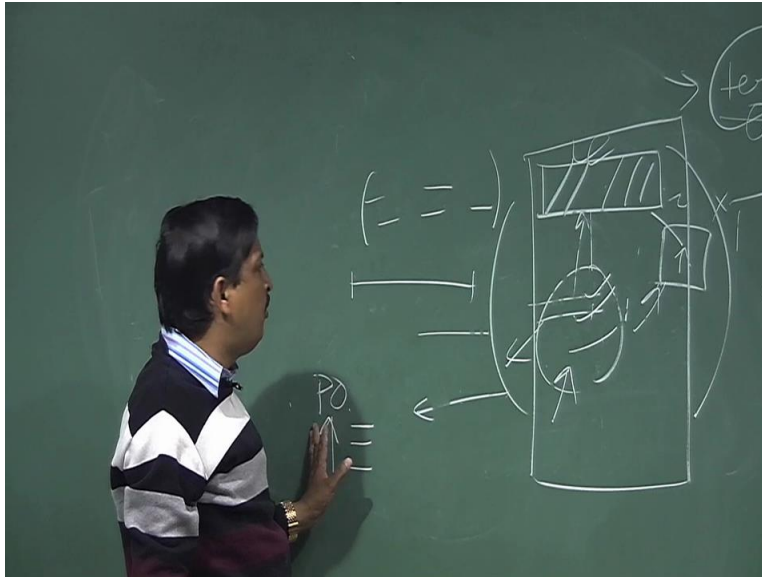
Course Outcomes – cont.

- ▣ ***With 4-6 most major Outcomes identified per Course, on average a typical CO is expected to take between 7-10 lessons in a 40 lesson course.***
- ▣ ***Outcomes which can be mastered in a significantly lower no. of lessons are likely to be too trivial and more suitable for Unit or Module Outcomes.***
- ▣ ***Attainment of each CO should lead to attainment of one or more PO s.***

So when I write that course outcome or course objective course outcome or course objective it should be specific measurable and achievable and it should be unambiguous. What do you mean

by unambiguous? That if you write student will able to explain the basic terminology. As a teacher I know what are the basic but as a learner I do not know what are the basic.

(Refer Slide Time: 28:39)



So instead of writing the basic I can expressively mention what the what do you mean by this thing? So a instructional objective or outcome is not a single line statement it may be a paragraph but it should be specific, measurable and achievable. This will be given to the student they have to perform this up to this level.

So sometime we write student will able to understand different algorithm. Understand is not measurable different if I write such as different as example basic all are non-define term. So instead of writing those term please specify the student will able to design this and this only not other things.

Okay so do not write the different things they do not able to do different things. Instead of do different things I specify which do you mean by different. Once I specify them then the goal is achievable, measurable and specific for this goal, this material this test item given to the student.

So students will read the material, try to achieve this goal by solving this test item. They test whether they achieve this goal or not? If they fail they come to the teacher and ask for the clearance of the misconception. So this added active you can say the active learning or it added interaction with the students.

Once the interaction is added and the self-learning is added so I can say my teaching learning process scatter to not only the domain PEO but also the domain independent PEO building communication skill, building self-learning, building team work, building ethics all kinds of parameter are scatter if I follow this teaching learning process.

So I am not spoon feed the students. I come in the class and give a take lecture from one corner to one corner of a board and to students are copying that lectures and at the examination I say who said this define this, describe this, prove this that will include any student engagement does not improve the any domain dependent skill of the students.

So if I follow this this where you have to go those of the material, material may be a text, material can be video, material can be animation, material can be virtual lab whatever define it here. The students will follow the material as per their requirement. Somebody is a textual learner take a read the text, somebody is visual learner he can visualize the video or go the simulation.

So we I am not restricted to learn only through my lectures or test item. I am not restricted them so I am free to them that you have to you achieve it. You follow your own path. This is the pedagogy inbuilt in this outcome based learning framework that is why we said the outcome based pedagogic principle for effective teaching, so this is the teaching pedagogy.

Teaching learning process is the pedagogy. So what teaching learning process involve is here I am scatter to any kinds of pedagogy that textual learner, visual learner, graphics learner. I do not categories them I have different material is available to them. I have a goal available to them, test item available to them and I told the student follow your own space, own choice to achieve the goal.

Once you achieve the goal you succeed. Now slow learner may take more time, fast learner may achieve the goal quickly and they come to the teacher for other things. So if I follow this methodology then I can say I am scatter to not only the domain independent PEO but also I have follow a teaching learning process which increase the student engagement and I am I am scatter to different pedagogical principle for different student.

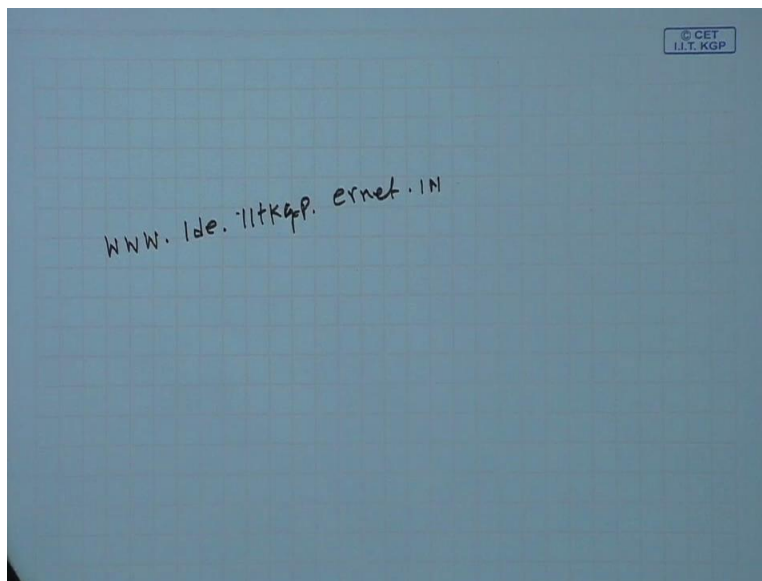
So this is the advantage. So next class I will describe how what is how do you design this outcome based curriculum for every course. I am not talking about the PEO and CO matching. That I can take another class but I will I will definitely explain what should be the course curriculum not only the course outcome but should the module outcome and what is the what should be structured, which can define this kind of which can a scatter to this kind of domain independent PEO and we can which can allow the different pedagogy inside this to for different students okay.

So next class I will demonstrate the software where basically I will demonstrate the structured to develop the course for every teachers. Once you develop this course then you can give it the whole document to the students for their self-learning and once they start their learning so that that their engagement will be increases because they are learning by self. So next class I will demonstrate that software okay.

Outcome based Pedagogic Principles for Effective Teaching
Professor Shyamal Kumar Das Mandal
Center for Educational Technology
Indian Institute of Technology Kharagpur
Lecture 05
Approach to Design Outcome based Learning (Cont.)

Ok so let us explain that IIT Kharagpur develops an open source tools or you can use anybody can use these tools to develop that outcome this curriculum . I am not saying that you will our objective is to develop the NBA recommendation for the NBA recommendation, our objective to use these tools for effective teaching by developing outcome based curriculum structures.

(Refer Slide Time: 1:01)



So if you visit www.ide.iitkgp.ernet.in ok.

(Refer Slide Time: 1:16)



So if you see www.iitkgp.ernet.in than this page will appear ok. If this page will appear. Now if you want to develop your own course forget about the NBA guideline of your institute or other things lets develop your own course using this pedagogical outcome based phase walk. So that whatever I explain that available to the students and it will increase the student engagement. So this course can be used for your day to day teaching ok.

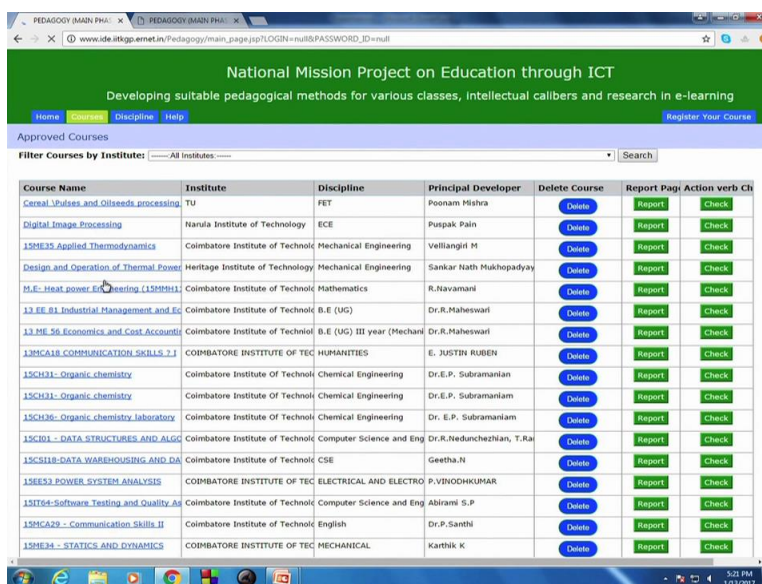
(Refer Slide Time: 1:54)

The screenshot shows the "New Course Register" form on the PEDAGOY (MAIN PHASE) website. The form is titled "YOU CAN REGISTER YOUR COURSE HERE:" and includes a note: "Please avoid Special Character expect Email Id(i.e. @,~,5,~ etc.)". The form fields are: Course Name*, Institute*, Discipline*, Principal Developer Name*, Email Address:*, Password:*, Contact Number*, Course Type* (Core, Elective), Course Level* (UG, PG), and Semester* (1, 2, 3, 4, 5, 6, 7, 8). The form is designed for users to register their courses and includes a "Register Your Course" button.

So for that if you click training this page will open up. First you can register your course include your course name, institute name, district name than put your email ID and list password because why password because I say that during the development of your course this course is not visible to anybody. You develop your own space own course from anywhere of the world. Once you develop the course one you confidence that ok this is my course I have taught.

Lets the I will accept the comment from expert in industry than there is a call final submission once you submit it, it will open to all experts and industry and it will link up with the industry and call them to comment on your course add resources on your course. Your course curriculum will be modified and you will be the you receive all kind of modification machineries ok. So let us concentrate on how to develop the course ok.

(Refer Slide Time: 2:58)



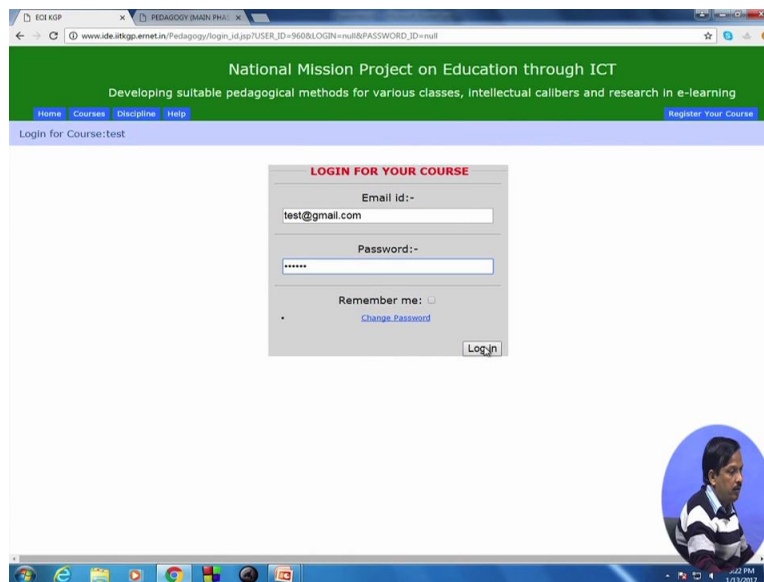
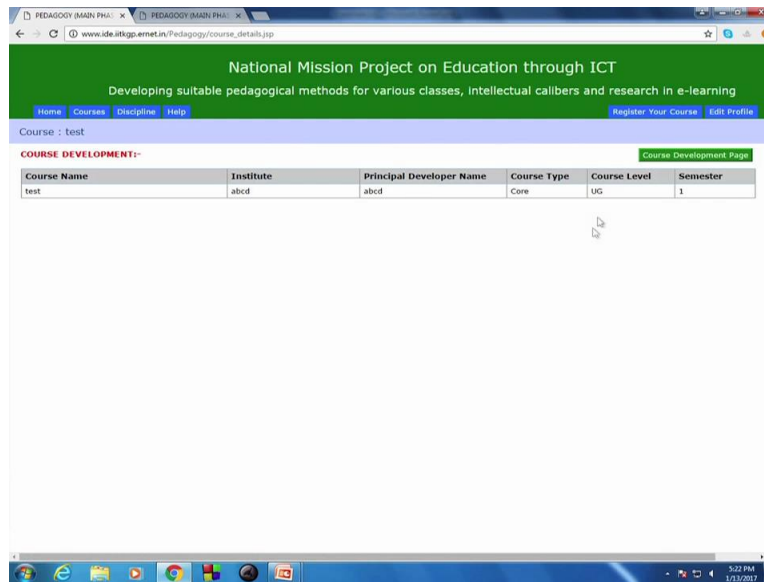
The screenshot shows a web browser window with the URL www.itsg.ernet.in/Pedagogy/main_page.jsp?LOGIN=null&PASSWORD_ID=null. The page title is "National Mission Project on Education through ICT" with the subtitle "Developing suitable pedagogical methods for various classes, intellectual calibers and research in e-learning". There are navigation links: Home, Courses, Discipline, Help, and a Register Your Course button. Below the navigation bar, there is a section for "Approved Courses" with a filter "Filter Courses by Institute: All Institutes" and a search bar. The main content is a table listing various courses.

Course Name	Institute	Discipline	Principal Developer	Delete Course	Report Page	Action verb Ch
Cereal 1, pulses and Oilseeds processing	TU	FET	Poonam Mishra	Delete	Report	Check
Digital Image Processing	Narula Institute of Technology	ECE	Puspak Pain	Delete	Report	Check
15ME32 Applied Thermodynamics	Coimbatore Institute of Technol	Mechanical Engineering	Vellangil M	Delete	Report	Check
Design and Operation of Thermal Power	Heritage Institute of Technology	Mechanical Engineering	Sankar Nath Mukhopadhyay	Delete	Report	Check
15.E- Heat power Engineering (15ME31)	Coimbatore Institute of Technol	Mathematics	R.Navamani	Delete	Report	Check
13 EE 61 Industrial Management and Eco	Coimbatore Institute of Technol	B.E (UG)	Dr.R.Maheswari	Delete	Report	Check
13 ME 56 Economics and Cost Accounti	Coimbatore Institute of Technol	B.E (UG) III year (Mechan	Dr.R.Maheswari	Delete	Report	Check
13HCA18 COMMUNICATION SKILLS 2.1	COIMBATORE INSTITUTE OF TEC	HUMANITIES	E. JUSTIN RUBEN	Delete	Report	Check
15CH31- Organic chemistry	Coimbatore Institute Of Technol	Chemical Engineering	Dr.E.P. Subramanian	Delete	Report	Check
15CH31- Organic chemistry	Coimbatore Institute Of Technol	Chemical Engineering	Dr.E.P. Subramanian	Delete	Report	Check
15CH36- Organic chemistry laboratory	Coimbatore Institute Of Technol	Chemical Engineering	Dr. E.P. Subramaniam	Delete	Report	Check
15CI01 - DATA STRUCTURES AND ALGO	Coimbatore Institute of Technol	Computer Science and Eng	Dr.R.Nedunchezian, T.Ra	Delete	Report	Check
15CS118-DATA WAREHOUSING AND DA	Coimbatore Institute of Technol	CSE	Geetha.N	Delete	Report	Check
15EE53 POWER SYSTEM ANALYSIS	COIMBATORE INSTITUTE OF TEC	ELECTRICAL AND ELECTRO	P.VINODHKUMAR	Delete	Report	Check
15IT64-Software Testing and Quality As	Coimbatore Institute of Technol	Computer Science and Eng	Abirani S.P	Delete	Report	Check
15HCA29 - Communication Skills II	Coimbatore Institute of Technol	English	Dr.P.Santhi	Delete	Report	Check
15ME34 - STATICS AND DYNAMICS	COIMBATORE INSTITUTE OF TEC	MECHANICAL	Karthik K	Delete	Report	Check

Now once you registered your course will be listed in here, via alphabetical name. Alphabetical name all the courses which is voluntarily develop by the different people of different institute are available in here. I will show you a demo course which is . I have demo course means this is I registered the blank course to demonstrate what is the structure.

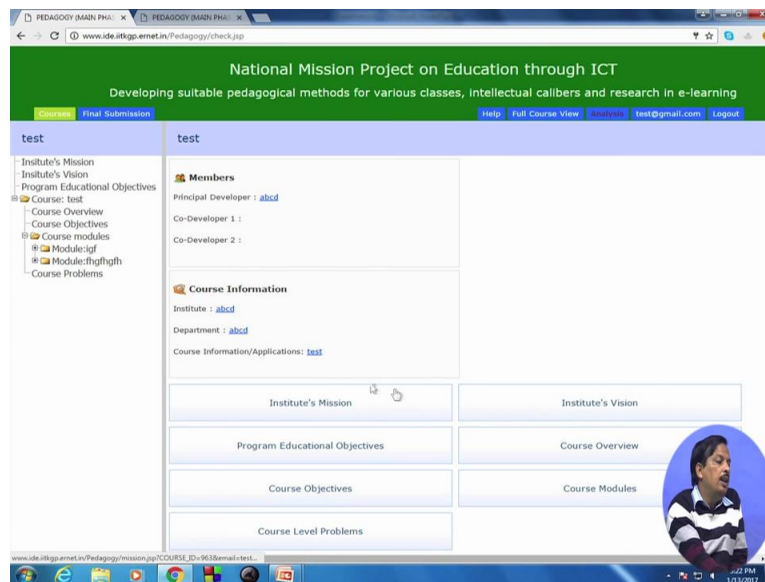
What should be the structure of the development course development ok.

(Refer Slide Time: 3:33) 04



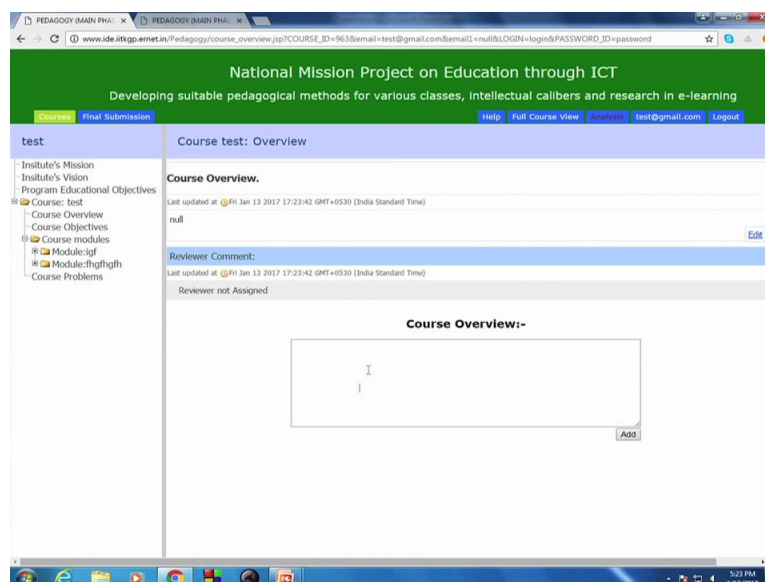
Let us go to the test, course development page than you are already registered using your email ID and password so you have to provide your that email ID I have register using this email ID. Test at the rate gmail dot com and password 123456 ok.

(Refer Slide Time: 3:53)



Once I login this structure will be opened to you ok now if you see institute vision institute vision I am not saying when I am developing a single course I do not have to write institute mission and institute vision. My objective is that use this frame work for effective teaching and my product is that once you develop this course this course can be used for your NBA accreditation so there are two uses one is the develop the course structure available to the students so that it can increase the effective teaching and teaching become very easy.

(Refer Slide Time: 4:50)

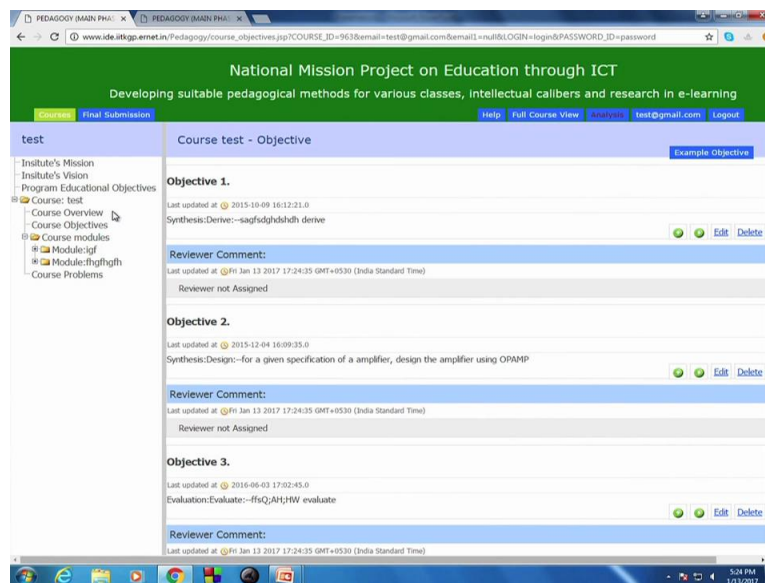


Next it can also by product that NBA accreditation that yes it support the accreditation criteria ok. Now once how do you do it, if you say the course name will become lets I have given the course name test that is why it is come the test then if you open the course click course overview a page will open.

Where I have to write the course overview ok. So what do you mean by course overview here I say course overview is nothing but a one page write up may be first paragraph contain the motivational talk and second paragraph contain the overall coverage of the course.

So two paragraph write up, first paragraph contains the motive why this course is important you say you call and once the students who read that motivational paragraph they will motivated next one is what should be the general broad coverage of the course that is the course overview ok.

(Refer Slide Time: 5:57) 02



Then you write course objective. Once you click the course objective this portion will open up this portion will open up. If this portion I am not saying that since the bloom taxonomy not here explain I am not going to that bloom taxonomy cognitive level. I am just blindly say what is there now you write here the objective. You write the objective here what I said a course objective I have to write 5 to 6 course objective. One objective at a time, one objective at a time write one objective and submit write next objective submit and it will be displayed in upper.

(Refer Slide Time: 6:36)

The screenshot displays the PEDAGOGY (MAIN FRA) web application interface. It shows a list of course objectives with their respective reviewer comments and update dates. The interface includes a form to add a new objective, with dropdown menus for selecting a cognitive level and action verbs. The form is titled "ADD OBJECTIVE:--" and has a "Submit" button. The footer of the application indicates "Copyright © 2013 CET, IITKGP".

Reviewer Comment:
Last updated at 2016-06-03 17:02:45.0
Reviewer not Assigned

Objective 3.
Last updated at 2016-06-03 17:02:45.0
Evaluation: Evaluate--fsQ:APU:HW evaluate

Reviewer Comment:
Last updated at 2016-06-03 17:02:45.0
Reviewer not Assigned

Objective 4.
Last updated at 2016-11-04 16:37:57.0
Application: Apply--fmj:sd:saaps apply, arrange

Reviewer Comment:
Last updated at 2016-11-04 16:37:57.0
Reviewer not Assigned

ADD OBJECTIVE:--

Cognitive level:
All
Knowledge
Comprehension
Application
Analysis
Synthesis
Evaluation

Action Verbs:
All
Analyze
Apply
Appraise
Argue
Arrange
Ascertain
Assemble
Assess
Associate

Submit

So 5, 4 to 6 course objective which is the major outcome of the course. So here objective means outcome, objective means instructional objective that is why it is course outcome. Course outcome so 4 to 6 major course outcome which is specific which is measurable, which is achievable and each objective try to make that it content the performance component, condition component and criteria component ok and do not use the word different, such as, basic unless those are very define basic is very much concentrated. Do not use those kind of terminology.

Explicitly written down that this will be given this you have to perform up to this level and measure a course objective cannot be knowledge level. You cannot write define this thing as a course objective because I said 5 to 6 course objective and I have 40 lecture so average on an average I can say 8 lecture per objective. So a objective which will be achievable by a single lecture cannot be a course objective. So course objective will be the broad or major take away by this tool and write down one objective at a time.

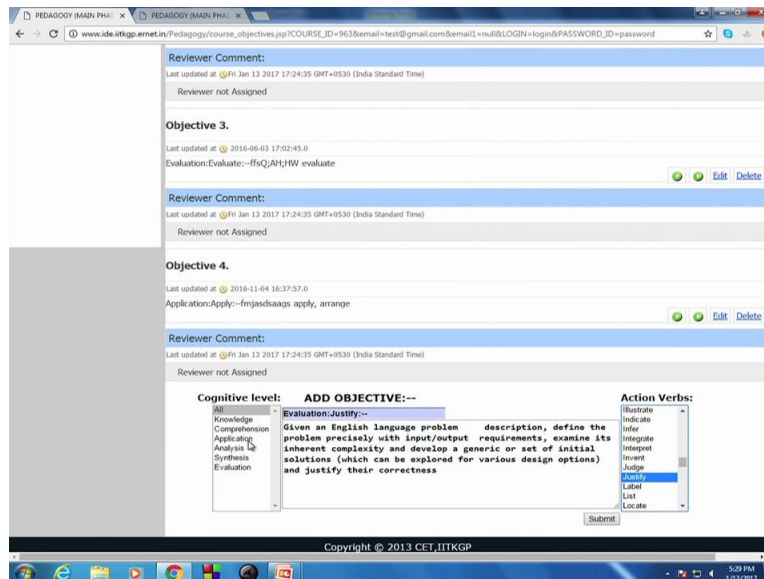
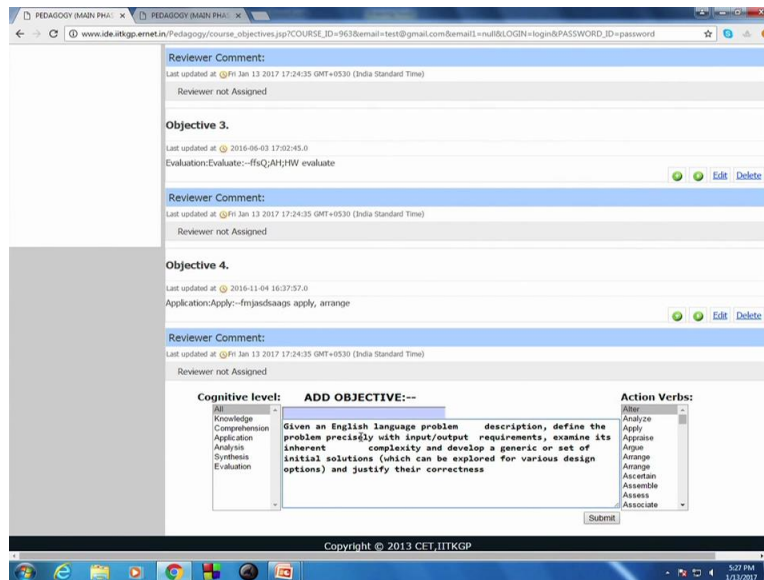
(Refer Slide Time: 8:16)

The screenshot shows the PEDAGOGY (MAIN PAGE) web interface. It displays a list of course objectives with their details, including the last updated date and the evaluation method. Below the list, there is a form to add a new objective. The form includes a dropdown for 'Cognitive level' (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation), a text input for 'ADD OBJECTIVE:--', and a dropdown for 'Action Verbs' (Analyze, Apply, Appraise, Argue, Arrange, Ascertain, Assemble, Assess, Associate). A 'Submit' button is located at the bottom right of the form.

Once you write the objective then you see there is only form. Performance component excel form will be there, so try to use those excel form only because those form are measurable. Here all the a, b, c, d forms are there. Once you say that I have write down a objective which may contain a course objective may contain more than one action verb More than one action verb.

(Refer Slide Time: 9:02)03

The screenshot shows a PowerPoint presentation titled "SAMPLES COURSE OUTCOMES / OBJECTIVES- INTRODUCTION TO ALGORITHM DESIGN" by Prof. P. P. CHAKRABORTY, IIT KHARAGPUR. The slide displays a list of course outcomes/objectives. The first objective is highlighted in red and reads: "1. Given an English language problem description, **define** the problem precisely with input/output requirements, **examine** its inherent complexity and **develop** a generic or set of initial solutions (which can be explored for various design options) and **justify** their correctness."

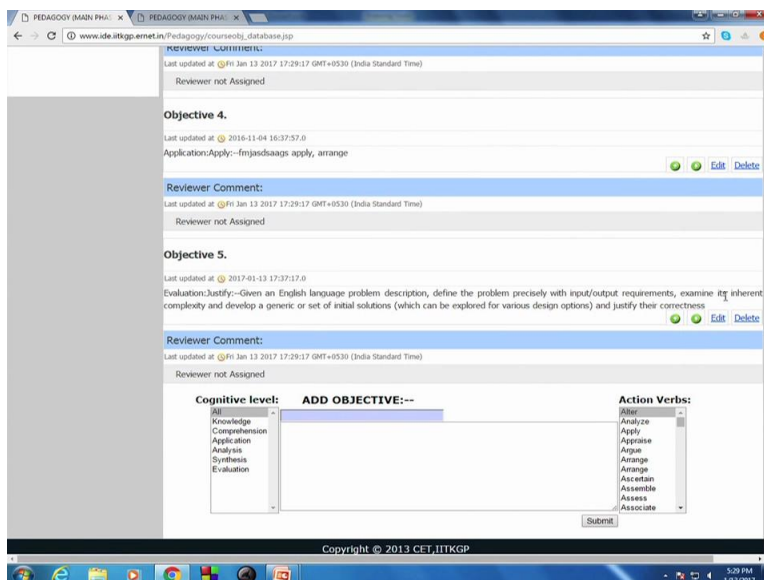


I just give an example lets this is the objective, this objective written by our director prof. P. P. Chakraborty if you see this objective while you come here. So I lets I copy this objective from here control c. Now if you see the real how many action verb define is one action verb, examine is one action verb, develop is another action verb, justify is another action verb ok. Now once you want to submit than you have to select justify because as per the Bloom taxonomy.

Since justify is in evaluation level suppose you do not know Bloom taxonomy so you just select one by one and if you select define. Let define the define it says knowledge level then select develop lets develop. This is synthesis level than lets select justify J this is evolution level so if

you see knowledge, comprehension, application analysis, synthesis and evolution. Evolution is the highest level in the Bloom taxonomy so listen the instruction will receive from the . Dr. Tamali Bhattacharya. So track this objective as evolution.

(Refer Slide Time: 10:50)

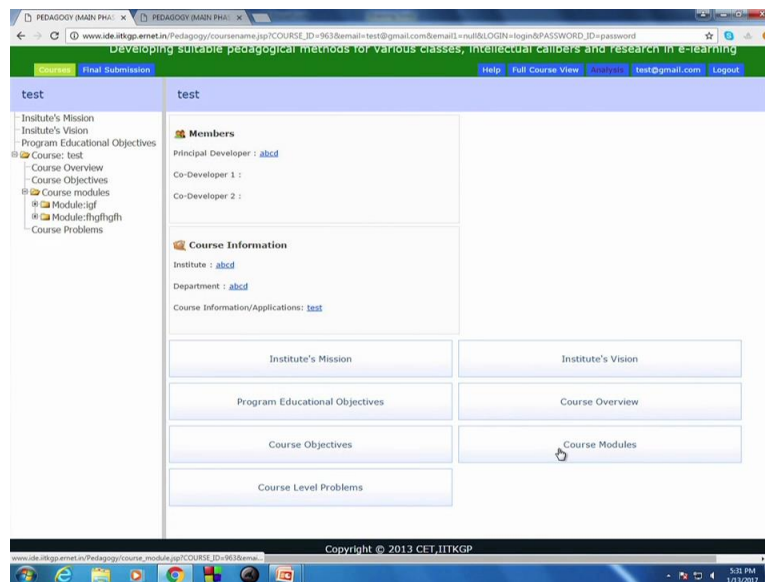


Once you submit objective will come here. If you see this objective has not condition component given an English language problem description condition, performance up to here is the performance. There is no criteria in a component because it does not specify the complexity, he said it should be very known complex open ended problem because this objective is for IITs tools.

They should know much more that is why he said that ok. Now if it is this then I can say this objective is specific measurable and achievable. Then I write another course objective. So a course objective may contain more than one action verb, a course objective may be a few line, a course objective not a single statement it may be a paragraph but it should be explicit, it should be specific, it should be measurable, it should be achievable ok ok.

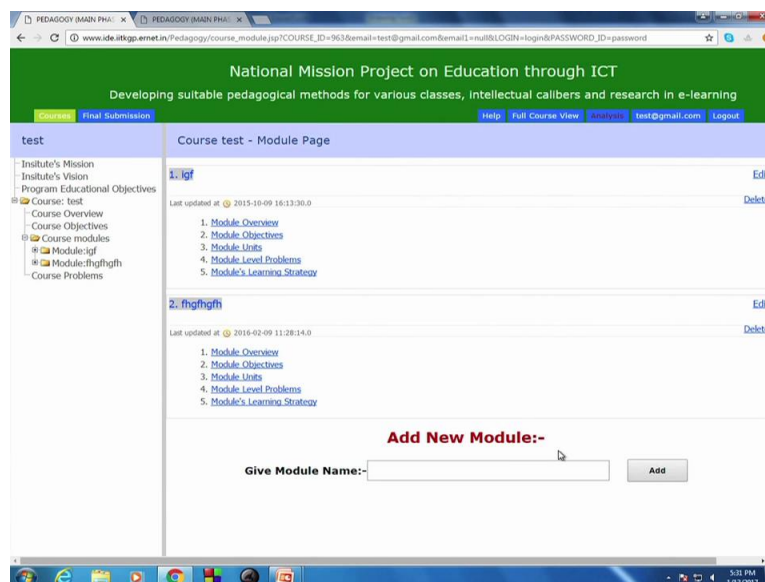
So one by one you write the course objective ok, now once I said goal is set up objective is given that means goal is set up. How the goal will be achieved by the lectures in different module so a course can be achieved course goal can be achieved by different module.

(Refer Slide Time: 12:20)



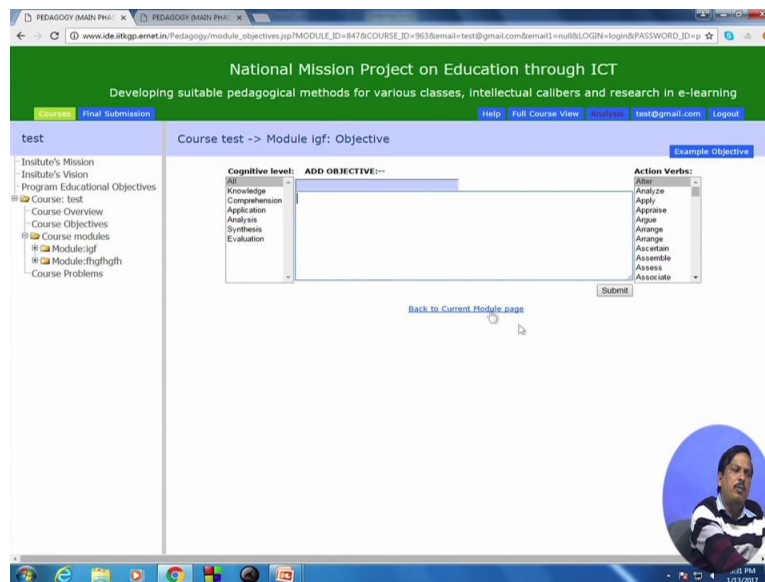
So I will add module if you see course then if you say course module there is a add module. So let us I thought a course on digital communication there will be several module.

(Refer Slide Time: 12:34)



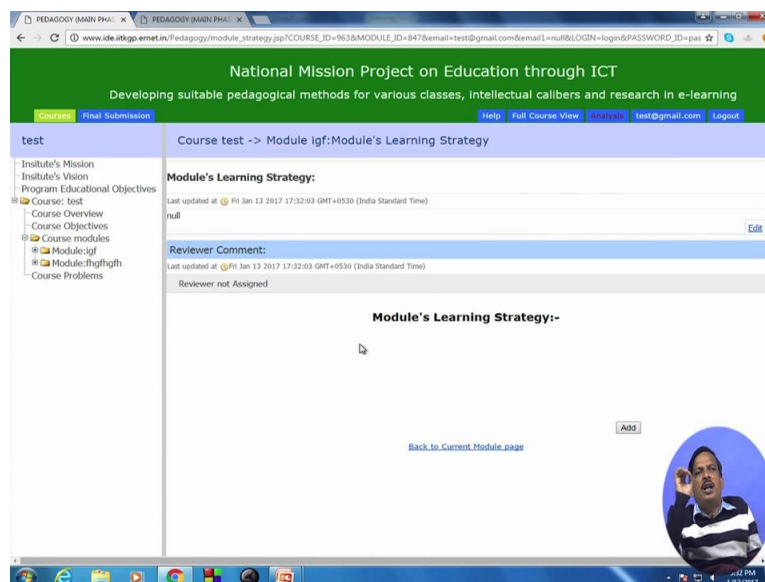
First module may be A to D conversion so I write the name A to D conversion module, once I write the module name and add it module will come like this way. A module has module overview, module objective then the module consists of seven lectures. Module units means lectures here unit means lectures each lectures is consists of one hour lecture.

(Refer Slide Time: 13:14)



One hour lectures so module overview again same as course overview but it within the module then module objective again I can write the module objective the same way course objective.

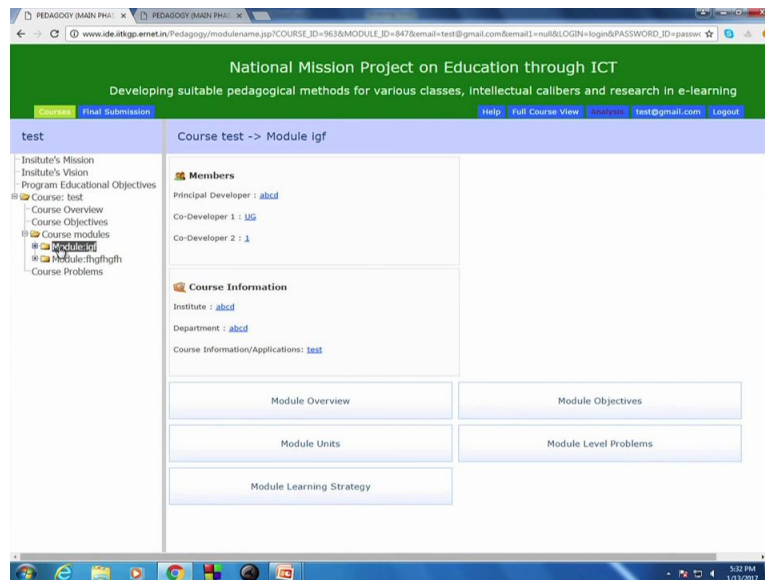
(Refer Slide Time: 13:50)



Then there is a module learning strategy here instead of defining the material for every class I said please write that this is the module objective to achieve this module objective more than the unit, unit level class want those are the material by whose you can achieve this objective.

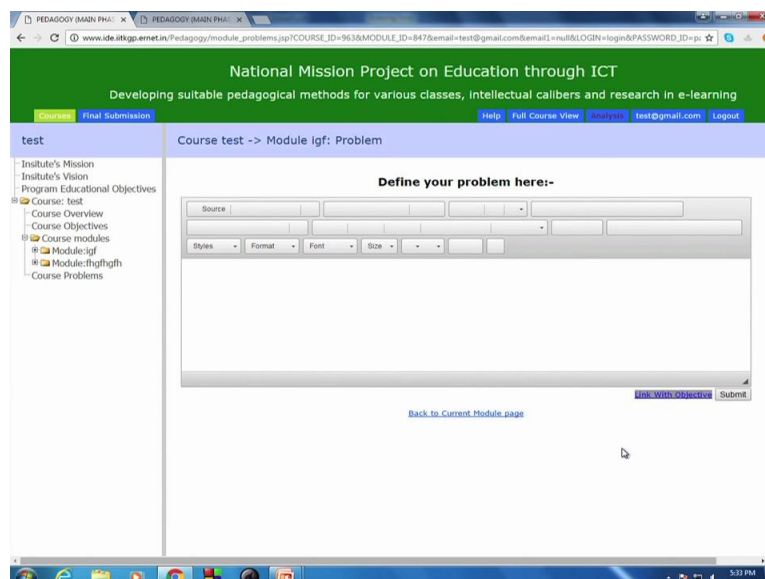
So you write here the name of the material reference material it may be NPTEL video lecture, it may be a book, it may be a paper, it may be a elevation and anything but do not copy paste in here because there could be a problem so you can say that Therasa book chapter number 5 page no this to this to achieve this objective and besides student will go there and search it ok

(Refer Slide Time: 14:14)



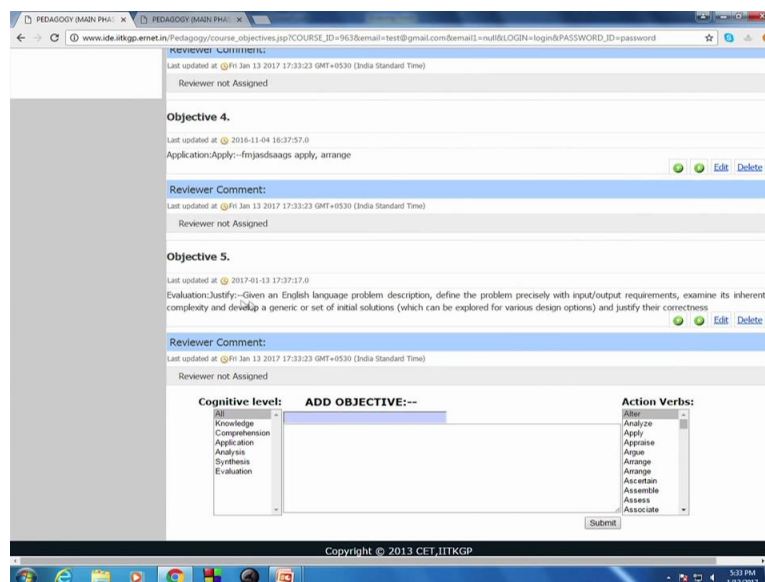
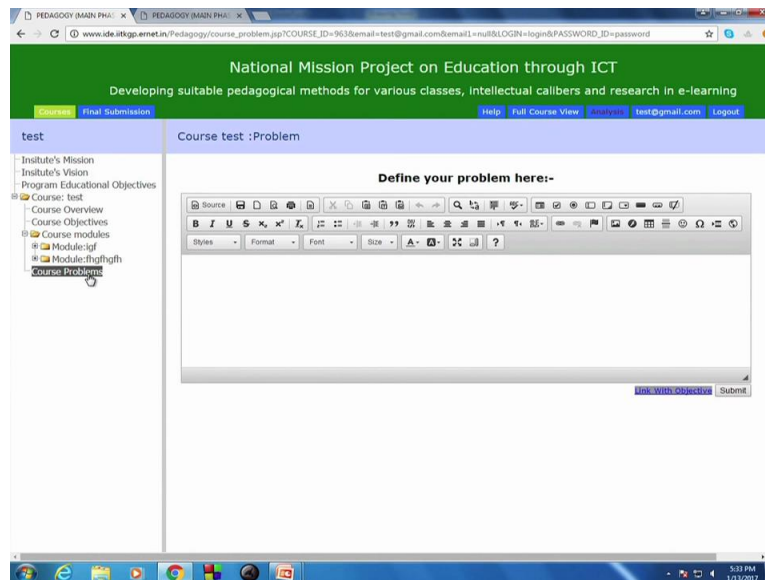
So I . this module so you are developing a whole course whole 40 lectures course may be 5 to 6 module every module is there ok.

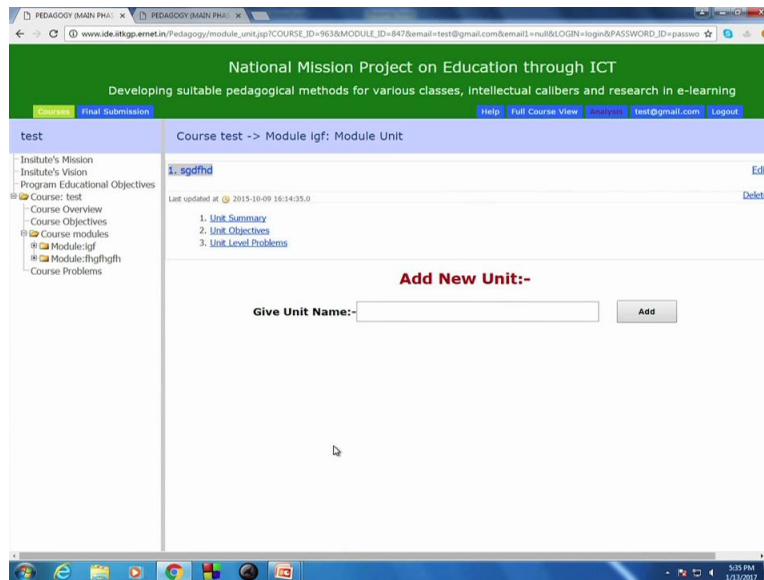
(Refer Slide Time: 14:28)



Now there is a analogue item called module level problem. What is what I said every outcome must have a test item. If I say this is my course out come this is my curse outcome file, there will be a test item related to outcome file so that students self myself can test whether they achieve this outcome or not. How to do it there is a course level problem.

(Refer Slide Time: 14:54)





You will click on the course level problem then here is a link with objective all objective will be listed down, so I write the problem here and link with this objective and submit. So I said this problem objective 5 scattered to objective 5. So student while see the document you can say if I able to solve this problem number 1 without any hesitation.

I can achieve the outcome 5, I am achieve the outcome 5. So its promote the self-learning now students tried and cannot do it this objective supposed to be achieved by the module 1 and module 1 is over but you cannot achieve it than he come to the teachers and say I have a misconception like this I tried to do this but it is wrong then teacher said your misconception like this that is why this solution is wrong.

So the class becomes a interaction between the students increase the communication skill of the students it increase the team work it increase the self-learning abilities it increase the student ethics also that I have to learn by all then if you say any module there is a module limit so a module consists of several lectures. For every lectures there will be lectures summary which is called unit summary there will be a lecture objective again I have to write the lecture objective and for every objective I should have a lecture problem.

Students should know suppose you prepare this document whole document is available to the students and as a teacher I said tomorrow I will take the lecture number 5 so he knows lecture objectives, he knows lecture summary, he knows lecture level problem.

At the hostel you told the prepared with this lectures and come into the class, I will discuss the possible misconception of this lecture instead of delivering the material. Because material is I have already given unit summary, objective and problem all I have given to the students and I have told them unit one in module learning strategy.

Lets unit one is a part of the module one I said in module learning strategy every for unit one you go to this book this page. So they know for unit one which book I have to study which NPTEL video I have to study, study it and he tries the test item finally able to solve it if he able to solve it then he achieve it but if he does not he come the class and discuss what is his misconception instead of receiving the information provide by the teachers ok.

(Refer Slide Time: 18:29)



www.ide.itkgp.ernet.in/Pedagogy_view/index.jsp

List of released Courses

Courses by Discipline

- 1st Year Course (18) (5)
- Chemical Engineering (27) (11)
- Civil Engineering (24) (8)
- Computer Science and Engineering (22) (11)
- Electrical Engineering (21) (1)
- Electronics and Communications Engineering (24) (4)
- Mechanical Engineering (20) (2)
- Mixed Group (30) (9)

Developed Courses other than this Project

- Applied thermodynamics
- basic computation and principle of computer programming
- Computer Design
- Data Structure and Algorithms
- Data Structures Using C
- Data Warehouse Data Mining
- Electromagnetic field theory
- ELECTRONIC SWITCHING SYSTEMS
- Faculty development Programme for Effective Teaching
- INSTRUMENTATION AND CONTROL SYSTEMS
- Kinematic and Dynamics of Machines
- Marketing Management
- Operating Systems
- Protein and Amino Acid Metabolism
- SOIL MECHANICS

5:37 PM 1/13/2017

www.ide.itkgp.ernet.in/Pedagogy_view/courses.jsp?USER_ID=55

Developing Suitable Pedagogical Methods for Various Classes, Intellectual Calibers and Research in e-Learning

Sponsored by: Ministry of Human Resource Development
Government of India

HOME >> Courses

Courses by Discipline	Courses by Coordinating Institute	Find Courses
1st Year Course (18) (5)	Chemical Engineering (27) (11)	Civil Engineering (24) (8)
Computer Science and Engineering (22) (11)	Electrical Engineering (21) (1)	Electronics and Communications Engineering (24) (4)
Mechanical Engineering (20) (2)	Mixed Group (30) (9)	
Amrita Vishwa Vidyapeetham University (7) (3)	Birla Institute of Technology and Science, Pilani (7) (5)	Birla Institute of Technology Mesra (12) (4)
IIT Hyderabad (4) (0)	Indian Institute of Technology Bombay (2) (0)	Indian Institute of Technology Delhi (9) (5)
Indian Institute of Technology Guwahati (12) (6)	Indian Institute of Technology Kharagpur (6) (7)	Indian Institute of Technology Roorkee (27) (9)
Minors National Institute of Technology Allahabad (1) (0)	National Institute of Technology Durgapur (10) (5)	National Institute of Technology Rourkela (2) (0)
National Institute of Technology Trichy (6) (2)	National Institute of Technology Varanasi (7) (5)	S.V. National Institute of Technology Surat (13) (5)
SASTRA University (11) (6)		

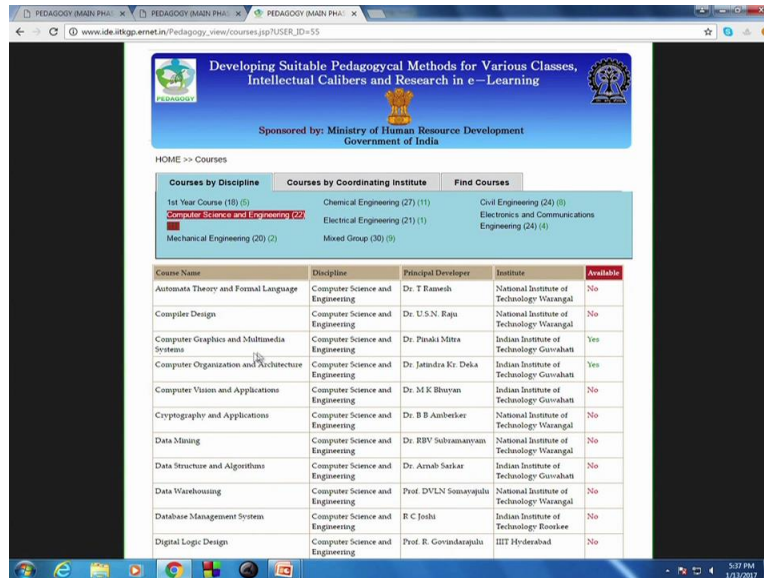
Discipline: 1st Year Course

Institute: Amrita Vishwa Vidyapeetham University

Search

© 2014-2016 Birla Institute of Technology, Kharagpur

5:37 PM 1/13/2017



So same liquid objective so you can use this framework to develop your whole course and once the course is developed if you see and you submit for public review then if you see if I view in the course view there will be a page will come up while all the available course are there. If you see there is a lot of complete courses are there ok. So let us computer science if I click there are lot of courses are their in the computer science.

It will open up lets load it, so let us I will go to the computer . computer . computer organization. It will click student will click the course whole course will open up. Let us take some time to open up with I will show you how the feedback will come. So whole course will be open up there then student can visit the lecture number 5. I will show you . this is opening rendering problem it is come it is open up ok.

(Refer Slide Time: 19:32)

The screenshot displays the PEDAGOY website interface. The top navigation bar includes links for Home, About, Cognitive Analysis, FAQ, Contact Us, and Admin Login. The main content area is titled 'Computer Organization and Architecture' and lists several course modules with their respective units. The bottom section features a green banner for the 'National Mission Project on Education through ICT' and a 'New Institute Registration' form.

Course: Computer Organization and Architecture

- Course Modules
 - Module: Introduction and Digital Logic Preliminaries
 - Module Units
 - Unit: Building blocks: Digital Logic Systems
 - Unit: Number Systems and Representation of Information
 - Unit: Computer Arithmetic and ALU
 - Unit: Evolution of Computers
 - Unit: Structural and Functional view of Computer
 - Module: Central Processing Unit
 - Module Units
 - Unit: Component of Central Processing Unit (CPU) and External Interface
 - Unit: Main Memory
 - Unit: Instruction Execution
 - Unit: Instruction Format
 - Unit: Instruction Set
 - Unit: Addressing Modes
 - Unit: Flags and Conditional Instructions
 - Unit: Instruction: Procedure CALL, RETURN
 - Module: Control Unit
 - Module Units
 - Unit: Instruction Cycle and Micro-operations
 - Unit: Control Signals and Timing sequence
 - Unit: Control Signals for Complete Instruction execution
 - Unit: Handling Different Addressing Modes
 - Unit: Handling Control Transfer Instructions
 - Unit: Design of Hard-wired Controlled Control Unit
 - Unit: Different Internal CPU bus Organization
 - Unit: Micro-instruction and Micro-program
 - Unit: Organization of Micro-programmed Controlled Control Unit
 - Module: Memory Module
 - Module Units
 - Unit: Binary Cell and Memory Unit
 - Unit: Memory Cell Construction
 - Unit: Memory Unit
 - Unit: Interfacing Memory Unit
 - Unit: Cache Memory
 - Unit: Mapping Functions
 - Unit: Replacement Policy
 - Module: Input/Output Interface
 - Module Units
 - Unit: Input/Output Priorities
 - Unit: I/O Instructions and Addressing of I/O devices
 - Unit: Programmed I/O
 - Unit: Interrupt Driven I/O

National Mission Project on Education through ICT
Developing suitable pedagogical methods for various classes, intellectual calibers and research in e-learning

[Home](#) [Institute](#) [Register Your Institute](#) [Administrate](#)

New Institute Registration

Institute Registration

Name of The Institution:-

Institute Representative Name:-

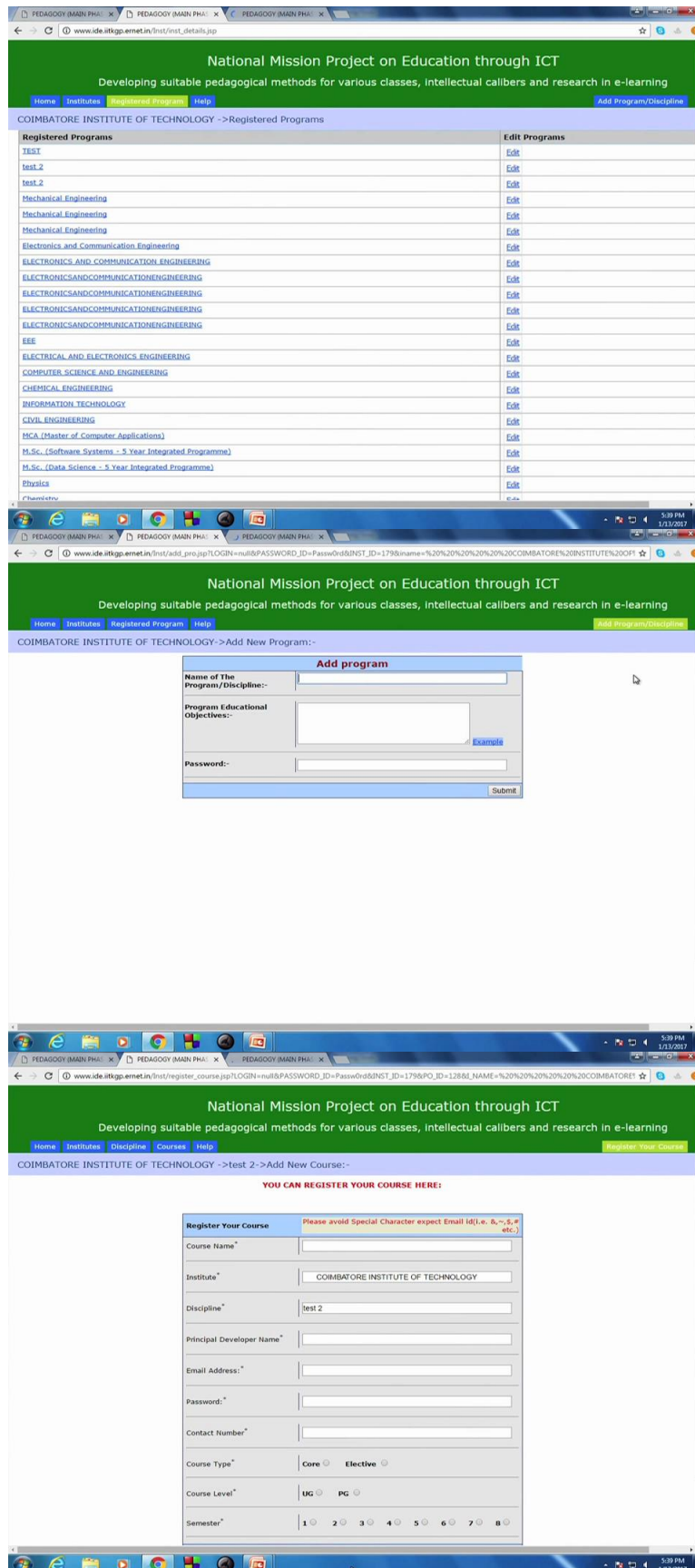
Representative Email Id:-

Password:-

Institute Mission:- [Example](#)

Institute Vision:- [Example](#)

Home Address:-



So course view describe the different courses now I can show you another bottom called institute registration. Suppose as a matter of fact that all of you are very much sincere to develop all whole institute course in using this curricular this framework then you can do a one person from your institute can do a institute registration and he can register for all programmes.

So if you click on the institute registration it will come register your institute, you write that institute name, institute representative name, email ID, password, institute mission, institute vision and submit it then once you come to the institute lets once you institute register then it will come like this way then add programme. You can add any programme of your lets computer science programme.

So you write computer science programme evo programme educational objective then submit. Once you write the programme inside the programme there will be different courses will be available. All courses you can then you can say that all courses are there, register the courses register your courses for computer science programme. All courses as a moderator you will register and send the password to the corresponding developer then they will see the courses click the courses and develop their own courses ok.

Once the whole courses are available so structured data is available then I will show you how the NBA documents fill up in the NBA documents is very become very easy, how the outcome will match to programme specific objective or programme objective and how that programme objective is matched to programme educational objective. I will show you that part also.

(Refer Slide Time: 21:34)

Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
1. Given an English language problem....	3	3	3	3	3	2	0	0	0	0	0	0
2. Given an Algorithm Description Analyse...	2	3	3	3	3	2	0	0	0	0	0	0
3. Given a problem definition, Explore...	2	2	3	3	2	2	0	0	0	0	0	0
4. Design and Analyse algorithms...	3	3	3	3	3	2	0	0	0	0	0	0
5. Examine and Prove whether a problem....	2	2	2	3	3	2	0	0	0	0	0	0
	2.4	2.6										

So now if you see the delivery site (just opening it) so if you see the delivery site I will explain later on so let's those who can do institute registration ok. ok now what I said that I told you that once the whole courses of let's computer science department all courses are developed using this way. So all course outcome are written now which is specific measurable and achievable then course to PO or PSO programme specific objective, if it is electronics instead of PO I write PSO and it is course objective.

So those are the course objective, have written now this way. This is the POS 1 to 12 for NBA or Washington accord whatever this 1 to 12. Now let us I say the 3 point LYCA scale that if this objective is matched to this PO attribute fully then I put 3 if it is partially matched put 2, if it is 30 percent matched put 1, if it does not match I will put 0. So that way for every objective I will go to each PO and put some number.

Now what I said see that given an algorithm description analyse. This may be fully occupy that domain dependant. fully matched with the domain dependant objective sorry.

(Refer Slide Time: 23:15)

Course Matrix CO Vs PO	P O	P O	P O	P O	P O	P O	P O	P O	P O	P O	P O	P O
Course Outcomes	1	2	3	4	5	6	7	8	9	10	11	12
1. Given an English language problem----	3	3	3	3	3	2	0	0	0	0	0	0
2. Given an Algorithm Description Analyse	2	3	3	3	3	2	0	0	0	0	0	0
3. Given a problem definition, Explore ...	2	2	3	3	2	2	0	0	0	0	0	0
4. Design and Analyse algorithms..	3	3	3	3	3	2	0	0	0	0	0	0
5. Examine and Prove whether a problem.....	2	2	2	3	3	2	0	0	0	0	0	0
	2.4	2.6										

Domain dependant objective fully matched, domain independent parameters I say teaching learning process will define. If I follow this outcome based curriculum design outcome based training so I can say I scattered to PO 12 self-learning ability very much.

So I can put 2 here I can say I building the communication skill so I can put something here. I building the team work I can put something here. So once I say that then for every course outcome how it is matched I fill up then I take the average. Once I take the average and round up it and go to the program matrix.

(Refer Slide Time: 23:58)

	Program Matrix - Example											
Course No	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
-----	2	2	1	1	2	1	3	1	3	1	2	3
PH 103	3	2	2	3	3	3	2	0	1	2	1	1
-----	3	3	3	3	2	3	2	2	2	2	2	2
MA 203	3	2	2	3	2	3	2	2	1	1	1	2
-----	1	1	2	1	2	2	3	1	3	2	3	2
-----	2	1	1	2	2	1	3	2	3	1	2	3
EE 409	3	3	3	3	3	2	2	2	2	2	2	3
CS 410	3	3	3	3	2	3	0	0	0	0	0	0
HS 211	1	2	1	2	3	2	3	2	3	2	1	3
EE 100	3	3	3	3	3	2	1	0	0	1	0	0

So in program matrix those are the programme outcome and this is the course number this course match with this programme. This is the average come from the each and every objective average so a PH1003 may consists of 6 outcome. So for the 6 outcome I develop a weighted average scale that scale is I put it in here.

Once this matrix is fill up then I know which are the course I have to talk so course outcome and course number of courses is defined by the coverage of the matrix not arbitrary ok. Now I will go the software again I think it is already open.

(Refer Slide Time: 24:51)

The image displays two screenshots of a web application interface for a course titled "Computer Organization and Architecture".

Top Screenshot: Course Overview

- Navigation Bar:** Home, About, Cognitive Analysis, FAQ, Contact Us, Admin Login.
- Course Title:** Computer Organization and Architecture >> Course Overview
- Course Modules (Left Sidebar):**
 - Course: Computer Organization and Architecture
 - Course Modules:
 - Module: Introduction and Digital Logic Preliminaries
 - Module: Central Processing Unit
 - Module: Control Unit
 - Module: Memory Module
 - Module: Input Output Interface
 - Module: Performance Enhancement of Processor
- Course Overview Content:**

Computer Organization and Architecture is a core course in the curricula of Computer Sciences and Engineering discipline at the second-year level in most of the Indian universities and technical institutions, after successfully undertaking a course on Digital Logic Design. This is the first course in Computer Organization and Architecture (COA); and the course would provide students with an understanding of the design of fundamental blocks used for building a computer system and interfacing techniques of these blocks to achieve different configurations of an "entire computer system". Finally some advanced topics are introduced to help the students to study advanced level course on Computer Organization and Architecture.

The course will have unit level and module level problems. Finally there is a course level problem related to design of "entire computer system" (involving CPUs, Memory, Buses, etc. and their interfacing) for a given specification, which would require concepts of the whole course.

The course is divided into the following modules:

Module 1: Basics: Functional Blocks in a Computer System, Number system and Computer Arithmetic

Basic functional blocks of a computer: CPU, memory, input-output subsystems, control unit.

Data representation: signed number representation, fixed and floating point representations, character representation.

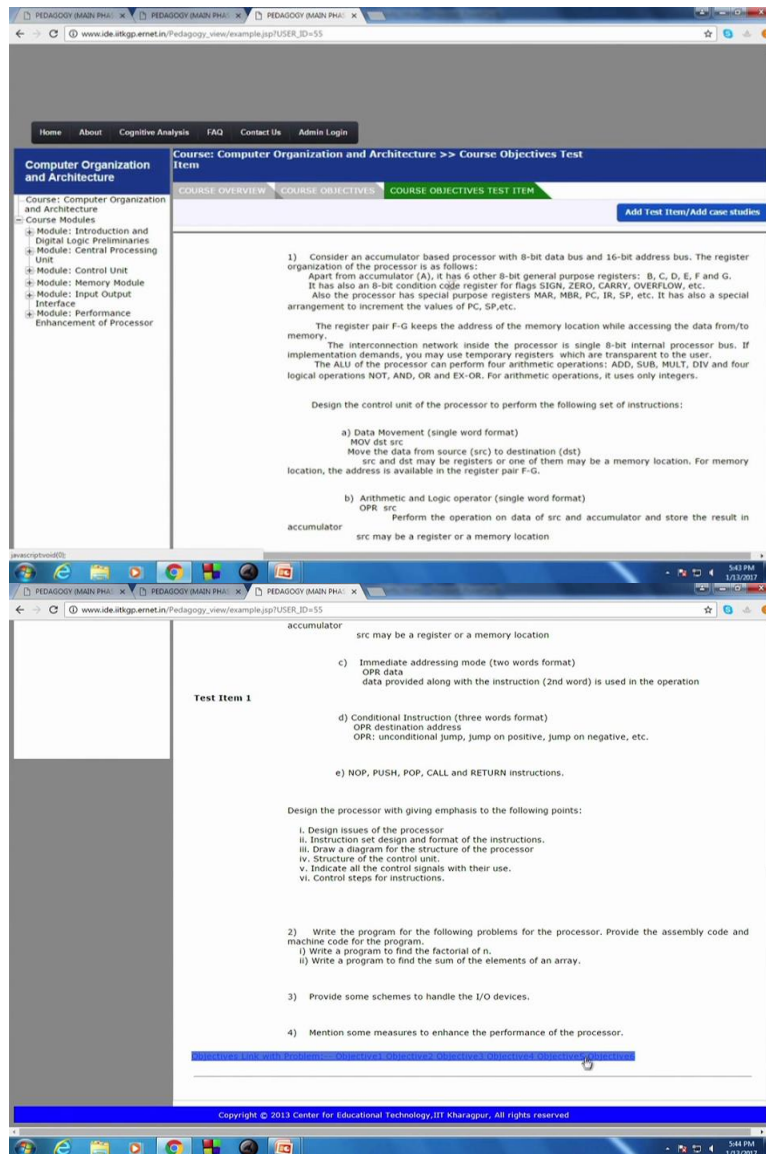
Computer arithmetic - integer addition and subtraction, ripple carry adder, carry look-ahead adder, etc. multiplication - shift-and-add, Booth multiplier, carry save multiplier, etc. Division - restoring and non-restoring techniques, floating point arithmetic.

Module 2: Addressing Modes, Instruction Set and Instruction Execution Flow

Instruction set architecture of a CPU - registers, instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set. Case study - instruction sets of a generic CPU.

Bottom Screenshot: Course Objectives

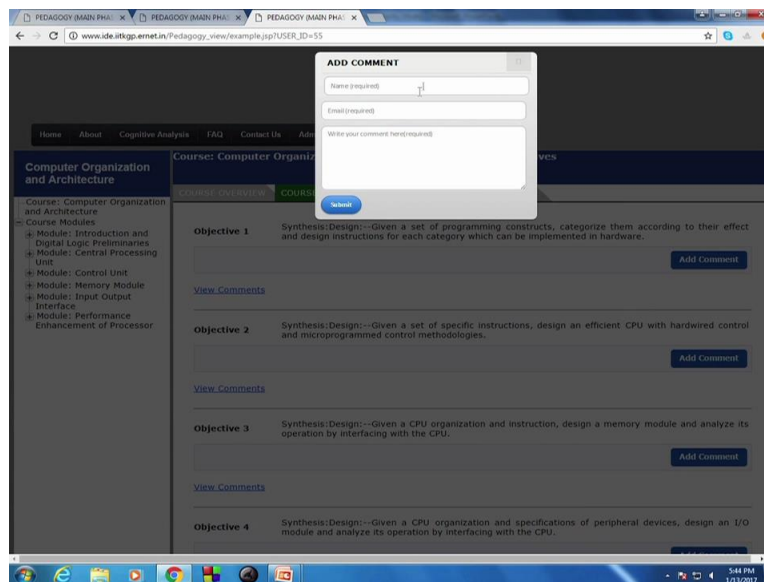
- Navigation Bar:** Home, About, Cognitive Analysis, FAQ, Contact Us, Admin Login.
- Course Title:** Computer Organization and Architecture >> Course Objectives
- Course Modules (Left Sidebar):** (Same as the top screenshot)
- Course Objectives Content:**
 - Objective 1:** Synthesis:Design:--Given a set of programming constructs, categorize them according to their effect and design instructions for each category which can be implemented in hardware. [Add Comment]
 - Objective 2:** Synthesis:Design:--Given a set of specific instructions, design an efficient CPU with hardwired control and microprogrammed control methodologies. [Add Comment]
 - Objective 3:** Synthesis:Design:--Given a CPU organization and instruction, design a memory module and analyze its operation by interfacing with the CPU. [Add Comment]
 - Objective 4:** Synthesis:Design:--Given a CPU organization and specifications of peripheral devices, design an I/O module and analyze its operation by interfacing with the CPU. [Add Comment]



So now see this is the delivery site once your course is submitted for public comment anybody can see your course like this. This is the course overview, course objective ok so this objective I have to achieve, this is the test item I have to, this is the problem. If I able to solve this problem I have achieved the objective number 1, 2 and 3 and 4.1, 2, 3, 4, 5, 6 all.

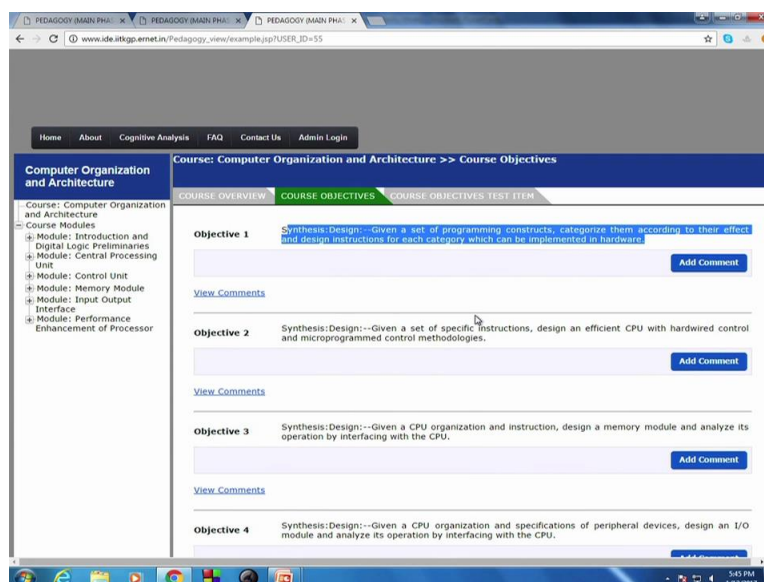
So that means if I able to solve this problem I am achieving the course objective ok. Now course objective is given, now suppose I write this course objective and some expert or some industry said or some of your friend who is very good in this course said. This objective is not correct because this kind of skill set is no longer required for this industry.

(Refer Slide Time: 25:48)



Then he can add a comment write his name and email ID and write his comment and submit. Once he submit the comment that is visible to you, your friend given this comment with respect to this objective. So if I talk to this industry give me the comment on my curriculum does not, nothing is there nothing specific is there. What kind of comments will be there he give so he will say some general comment but here everything is specified.

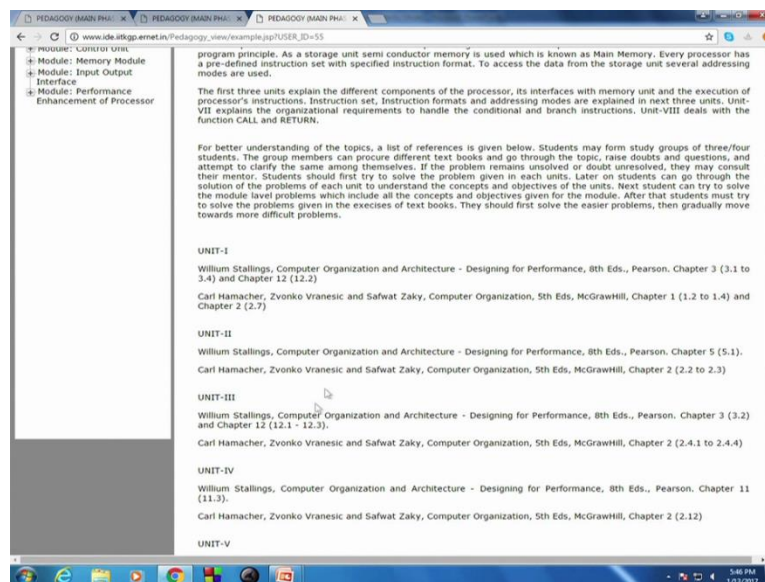
(Refer Slide Time: 26:25)



Suppose this course is programming in data structure some very good software company can say this kind of skill today does not required. We are looking for this kind of skill more or less so you will add that comment ok. Now test item suppose somebody said this is the one problem by which all the objective can be said tested. Somebody means no this is just one problem I am adding it which can test the objective number 2, very good in objective number 2.

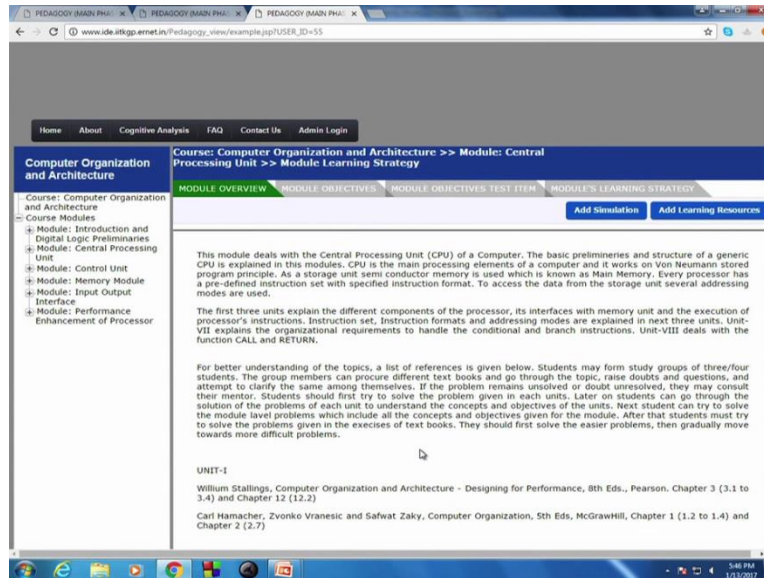
So I will add the problem here in click the objective number 2 and submit. Once I submit it problem is come to the developer and he said somebody expert says that this kind of problem much more clearly test the objective 2. It is a course developer preview whether he agree or not, if it is agree he said agree and that there and there it will be modified or it will be added resource will be listed there in this site. So students can say ok this and this problem is added by some industry so I try to solve it ok for test items.

(Refer Slide Time: 27:35)



Similarly if I say a model so lets module 1 module. I said module learning strategy, there is module learning strategy unit one this book this chapter unit 2, this book this chapter is already written now. Somebody said here is an very good material from industry or from abroad. Here is an NPTEL video created by this person and this concept explain very good. We can add it, it is there in there it will be added and students can see ok those are the material set by this people ok.

(Refer Slide Time: 28:15)



So I can say if I develop this course and openly available to the students, academia, faculty, experts, everybody. Everybody by collaboration we can improve the teaching by collaboration you can convey the students that you have to develop this skill and those are the material available, those are the lecture available those are the test item available it is your responsibility to acquire the skill and if I say as a teacher at the end of the semester I only test whether you have acquire the skill or not.

None of the students require to study the last three years question paper. They are already know what kind of question paper will come but it cannot be answered by memory. It has to be skill instead of memorization ok. So I will not repeat any problem I will give a problem which is new to the students but concept will be the same because I want they should apply their skill to solve the problem ok.

So I think assign after the theory part is over . it will be come in assign number 3 will be based on this software. All of the participant, all of the learner of this course has to develop their own course objective using this software which is free available and I will check that objective and I will give an another half an hour lecture based on that good objective and bad objective ok. Thank you.

Outcome based Pedagogic Principles for Effective Teaching
Dr. Tamali Bhattacharyya
Center for Educational Technology
Indian Institute of Technology Kharagpur
Lecture 06
Instructional Design for Active Learning

Good afternoon.

(Refer Slide Time: 0:25)

Instructional Design for Active Learning

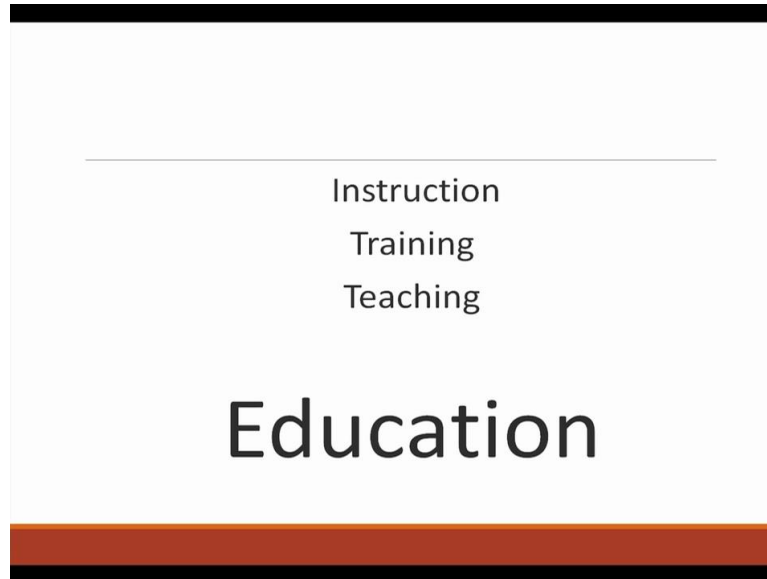
What do we DO?

- Understand the meaning of instructional design
- Obtain an overview of the ADDIE model



Today I will, tell you the instructional design for active learning. So, what do we do we mainly explain the meaning of the instructional design and we will give an overview of ADDIE model.

(Refer Slide Time: 0:47)



Now, instruction, training, teaching and education. First I will tell what is instruction. Instruction is the intentional facilitation of learning toward identified learning goals. So, Driscoll in the year of 1994 defines instruction from the similar perspective it is that the deliberate arrangement of learning conditions to promote the attainment of some intended goal.

So, it is nothing but a purposeful activity, instruction purposeful activity intended to course guide to support learning. To support the learning what is the purposeful activity that is called the instruction.

Now, what is training? Training is the instructional experiences a focused upon individual acquiring very very specific skills, very specific skills that they will normally apply almost immediately. So, that is the call we training but what is teaching.

Teaching is the learning experiences that are facilitated by a human being not you know just a videotape or the textbook or a computer program but a live teacher so that is the teaching. So, there is a difference between the training and the teaching. What is the difference?

The first is that, training used to a most specific focus than the teaching which ask, to install a deeper knowledge over a longer period of time. So, it is the training is more specific, teaching is little broad and training in on the other hand, it sticks to help, people master a specific scale or skill set until they are able to execute it efficiently. So, after training, they will do some work efficiently. So, it is a to develop a specific skill and skill sets.

Training is usually a one time or a very short term event as the job training, we will give for the job lots of training. So, it is very you know one time or a short term training we are giving. So, that is training. Teaching is usually a broader in focus than training and it generally is theoretical while training is the practical application of the knowledge.

Teaching we are giving lecture, so teaching you are giving you know theoretical knowledge but the training; they are doing some practical use of the teaching, they are applying in the training is nothing but the application of knowledge.

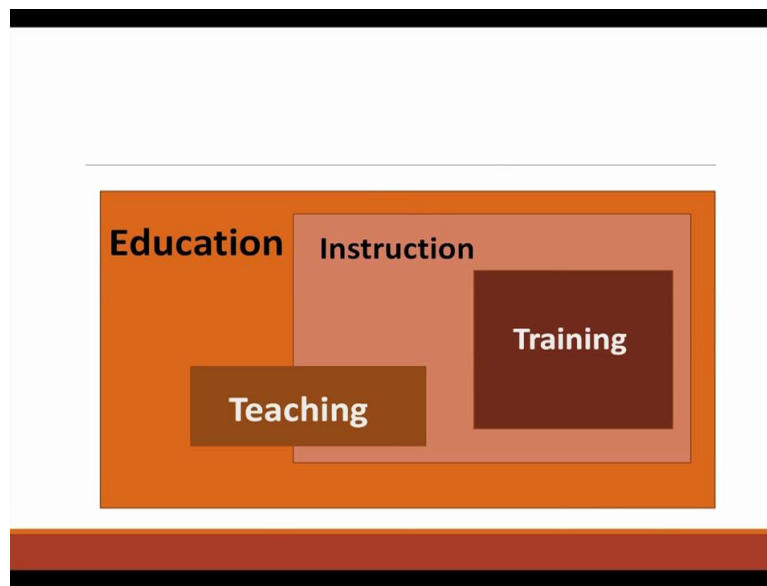
So, teaching sticks to impart new knowledge while training equips the already knowledgeable with tools and techniques to develop a specific skill sets. Another point we can say the difference is that teaching is you know training and teaching, teaching is usually within the context of the academic world while training is generally, you know associate with the commercial realms. So, that is the difference, the commercial purpose we mainly give the training.

Teaching, it usually deals with a subject or the topic while training deals with a duty or the functions. Teacher generally gives students feedback where in the training the trainers receive feedback from the trainees, right. Teaching is also a never ending process whole life you know is a teaching it is a never ending process.

Teaching can be both formal and informal. In the formal when it occurs inside the classroom and informal when you learn you know very things outside the classroom, from the parents you know we can learn, right. So, teaching from the grandparents you know that is also, one kind of teaching, it is not in the only in the class .

So, when we talked about instruction, it is not as complex as teaching. So, instruction is giving a direction.

(Refer Slide Time: 5:42)



So, just see the picture here. Here, in that instruction training and teaching both are in a in the instruction but teaching, it is a more you know the teaching is more so, teaching is not only the instruction. So, all these teaching, instruction, training all together it is the education.

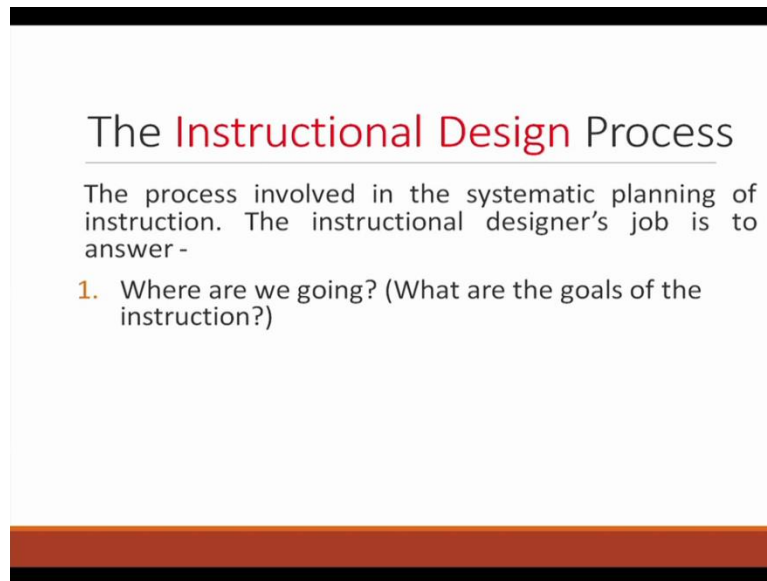
So, now in the instructional design we come to the design right. What is design? Design is a plan or drawing produce to show, the look and function of working of something. So, design implies, it is a systematic or intensive planning and ideation is a process prior to the development of something or the execution of some plan or in order to solve a problem. So, to doing something we just to design it.

Instructional design what is that? It is a systematic process. Now, instruction is clear, design is clear, so instructional design is a systematic process by which the instructional materials are designed, developed and delivered. So, that is the instructional design. So, it is the entire process of analysis of learning needs and goals and development of the delivery system to meet the needs that is the instructional design.

So, it includes the development of the instructional materials what are the instructional material development of that and activities and try out all instruction and learner activities. So, there are some key elements of the instructional design what is that?

Number one; there is a genuine need for learning . The learning events whatever the learning it should be well designed. Quality learning material are developed learning events are implemented using the appropriate strategies and approaches. Using appropriate strategies and approaches, the learning events are developed. Learning events after the development it should be evaluated to ensure learning has actually takes place.

(Refer Slide Time: 08:30)



So, the instructional design process there are three parts; one the process involved in the systematic planning of instruction and there is (three) first the question it arises where are we going? What is the learning goals that is the first part? What are the goals of the instruction that is the first one? The second part is how will we get there, if the goal is there how we will get there that is the second part.

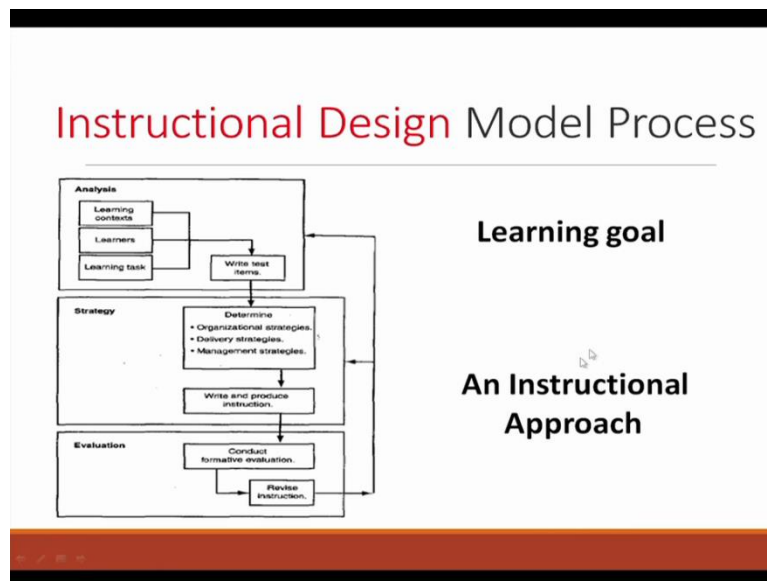
What is the instructional strategy and the instructional medium? So, that is the second part and the third one is how will we know when we had arrived, so that is the what should our tests look like. How it is and how will we evaluate and revised the instructional material. So, the first part is the learning goal, second is the learning processes and the third one is the evaluation part.

So, the instructional design processes the major activities that an instructional design are completes during the design and development the first is the perform an instructional analysis to determine where we are going, and the second one (is) will be how we will get there right and

the third one is how we will know when we were there? So, that is the main the instructional processes.

So, instructional processes designers insist on creating instruction , in which the goals, the instructional strategy and the evaluation but all should be matched right. So, that is by match, match is very important you have to match it that means we mean that the strategy that the instructional that method that is use the appropriate that the learning goals and the test that is the assessment or the evaluation, it should be match. So, instructional method, goals and assessment it should be properly match then it will be the proper instructional designed process.

(Refer Slide Time: 10:58)

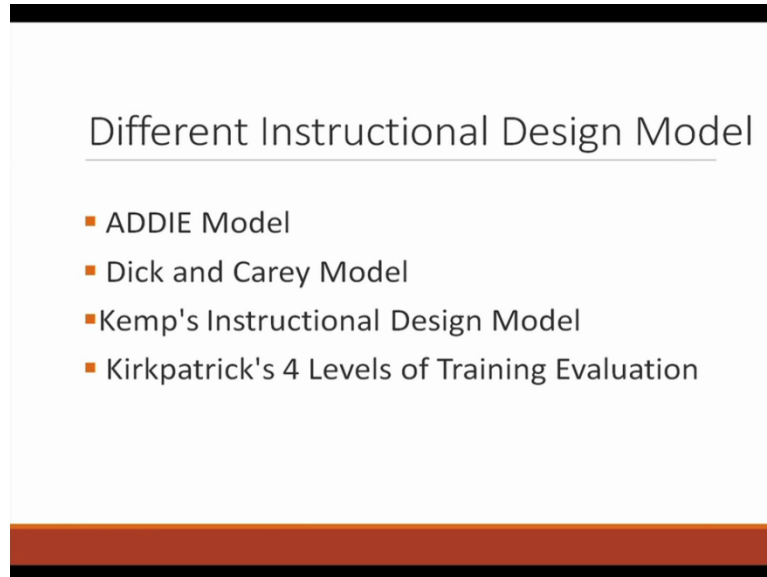


So, first here in this model, here in the analysis the learning conditions are there. The learners you have to the learning conditions we are analyzing, the learners we are analyzing, the learning task we are analyzing and we have to write the test items. And in the strategy what you are doing? We are determining the organizational strategies, the delivery strategies how we will deliver and the management strategies all this is in the determine part.

Write and produce instruction and the last part that is the evaluation that is the conduct the summative evaluation, and the conduct the formative evaluation not the formative evaluation and then the revise instruction and what is that it will go back if there is, it will go back either in

analysis on strategy. So, the aim is the learning goal and then the and instructional approach, right. So, this is the instructional design model process.

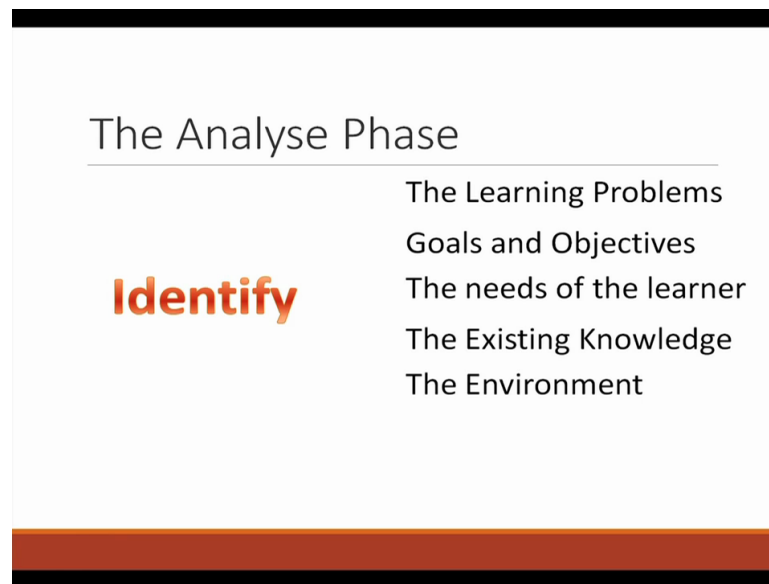
(Refer Slide Time: 12:24)



So, different instructional design models are there, one is that the ADDIE model. Dick and Carey model, Kemp's instructional design model, Kirkpatrick's 4 levels of training evaluation but we will talk about this ADDIE model first. What is ADDIE model? A analysis, D is design, ADDIE A for analysis, D for design, D for development, I for implementation and E for evaluation. So, it is a traditional and systematic instructional design model.

The outcome of each step is critical for one after it is in a sequence. So, ADDIE is main characteristic is that it is a linear approach and it provides a clear cut step-by-step sequence of events in teaching a lesson in that ADDIE model. So, in the analyse phase, this is the first ADDIE A identify, the main keyword is identify what they have to identify? Identify what are the learning problems that is identify.

(Refer Slide Time: 13:58)



The goals and objectives that you have to identify, the needs of the learner what are learner needs that have to identify, the existing knowledge have to identify, the environment how the environment that also identify, different constraints are there you have to identify those constraints and the delivery option that of the first in the analysis phase you have to identify all these things, then only after analyzing then only the design phase will come.

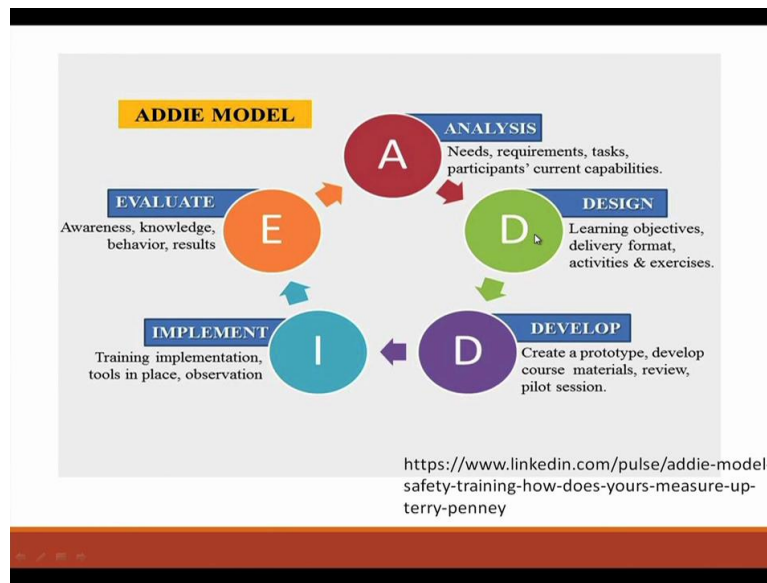
So, after identify we will do will specify. What we will specify? What is the learning objectives that we have to specify? The story boards that we have to specify, user interface, content. So, here the keyword is specify in the design process.

Now, after that we will come to the development phase, here the development thing what you have to produce the learning material we are producing the learning the learning material, content we have produce. So, here the keyword is the produce, produce learning material, produce content so that is the keyword in the case of the development phase.

Now, the fourth stage is the implementation phase where the content put in production or the training that is put in the place. So, that is the implementation phase and the last phase the last one is the evaluation. Evaluation is assist criteria used, gather learner feedback or this we are evaluating it. There is two types of evaluation one is the formative evaluation and other is the summative evaluation.

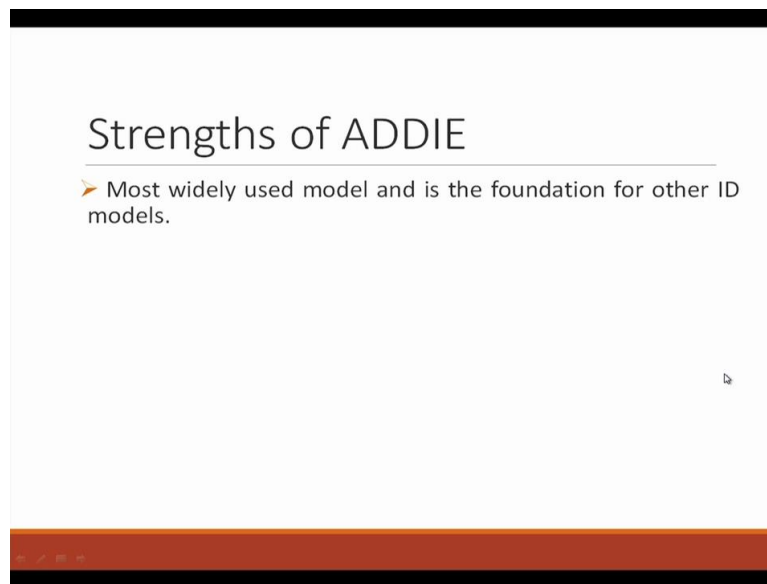
Now, what is formative evaluation? It present at each stage in the ADDIE process one evaluation that is the formative evaluation and summative evaluation is conducted on finished of the instructional programs of the products or the finish one you know evaluation that is the summative evaluation.

(Refer Slide Time: 16:25)



So, just see here, the in this picture ADDIE where A is analysis needs, requirements, tasks. This is the A and then from A to D. D is the design learning objectives, delivery format, activities and exercises. From D to come it develop, create a prototype, develop course materials, review, pilot session from D to I implement, training implementation, took in place, observation and E is the evaluate awareness, knowledge, behavior, results, this is the ADDIE model.

(Refer Slide Time: 16:59)



Now, what is the strengths of the ADDIE model? Why ADDIE model what is the strength. It is most widely used model, in the foundation for other instructional design model, it is the most used model and it is flexible and can be used for traditional instruction and across many you know industries the ADDIE model is used and it is very effective when testing for easily measurable criteria . It allows for collaboration at each level and at any or every stage. So, this ADDIE model is used and evaluation is the key component built into ADDIE.

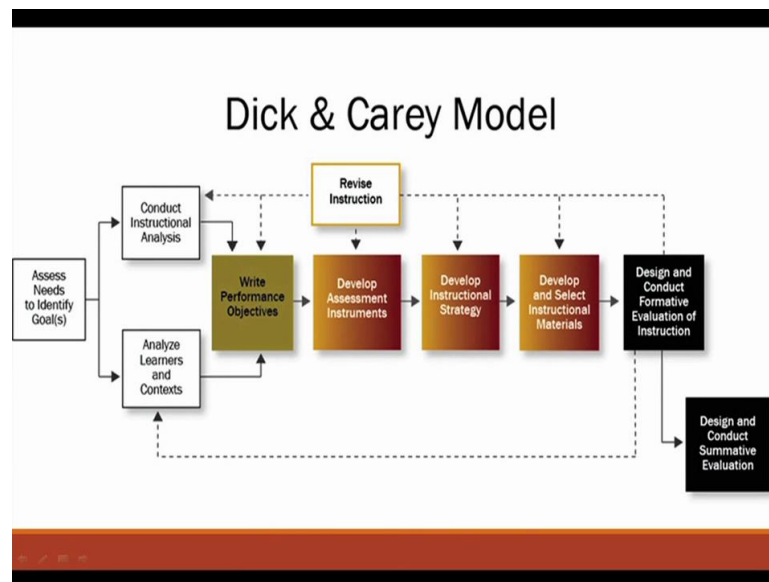
Structured guidance for design ADDIE model. So, but there some weaknesses of ADDIE model what are those? ADDIE is a linear model, analysis, design, development, implementation, evaluation. So, it is a linear model which is not amendable to (acum) accommodating user generated content. So, it is that is the problem and you cannot get to the next phase without addressing the one. So, in that case you cannot get (here) development if you do not do the design part, right.

So, you know (it see) this the problem. So, it is you know time consuming and it is that is why it is costly and time consuming. Evaluation is the key component in to the ADDIE and it does not allow the designer creativity right. So, this is the problem in the ADDIE but further more story boards are not always effective in creating or you know, conveying good design but in this because the process in the ADDIE model we are using this. So, this is the weaknesses in the ADDIE model to we come to the Dick and Carey model.

The Dick and Carey systems approach model promotes a systems view of instruction instead of viewing instruction as the sum of the isolated parts. So, what is that? The model engages instruction as an entire system including the interrelationship between the context, content, learning and instruction. So, the Dick and Carey model is widely known and forms the baseline of many other systems. So, what are the major components in the Dick and Carey model?

One is to first identify the instructional goals. The second is to conduct instructional analysis. The third one is to analyze the learners and the context. The fourth is to write the performance objectives. Then, develop assessment instruments, develop instructional strategy, develop and select instructional materials, and finally, design and conduct formative evaluation of instruction. After that, design and conduct summative evaluation. If needed, revise the instruction and loop back to the previous steps.

(Refer Slide Time: 20:54)



So, just see here, this is the Dick and Carey model. So, here assess needs to identify the goals and there are one is here, the conduct instructional analysis, in this part analyse learners and contexts and the and from here, the second part is the write the performance components objectives. Develop assessment instruments, develop instructional strategy, select instructional

materials, design and conduct formative evaluation and design and conduct and here, this is the revise. So, whatever the revise instruction we can do that. This is the Dick and Carey model.

So, what is the strength of the Dick and Carey model? The main strength of this model is that the designers requires, clear and measurable learning objectives, okay thereby, developing instruction is a systematic process. So, this is the strength of this Dick and Carey model but weakness is that it is the base of the premise that everyone of its components are essential and therefore, none can be you know skip you cannot skipped anything, so that is the weaknesses.

What is the difference between the ADDIE model and the dick and Carey model? The ADDIE model has five phases we know that ADDIE but the Dick and Carey model, it has 10 phases and more detail and the ADDIE model has an evaluation at the last phase but where the Dick and Carey model has two big you know parts of evaluation.

The first part is the evaluation that are done in every steps that have you know purpose to revise the instruction in every its steps and the second is that the evaluation that evaluates that the instruction that have evaluated formally and from and sufficiently revise to meet the standards to the design. So, in that case you know each it will the evaluation is there but in the ADDIE model the evaluation is in the ADDIE in the last phase. Thus but the similarity is there that in this two system the focus is both on the methods, right.

So, the system approaches that the focused on both the model of inputs that is the output and the process of designing the learning goals what the learning processes is? The evaluation them mapped the basic design is the same and for today. Next day I will teach you the detail about what is the ADDIE model. Thank you.

Outcome based Pedagogic Principles for Effective Teaching
Dr. Tamali Bhattacharyya
Center for Educational Technology
Indian Institute of Technology Kharagpur
Lecture 07
Instructional Design for Active Learning (Cont.)

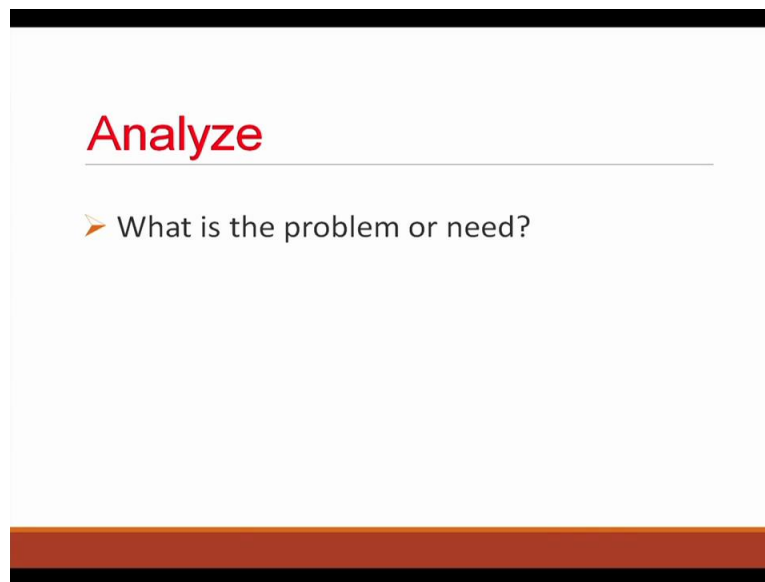
Good afternoon.

(Refer Slide Time: 0:29)



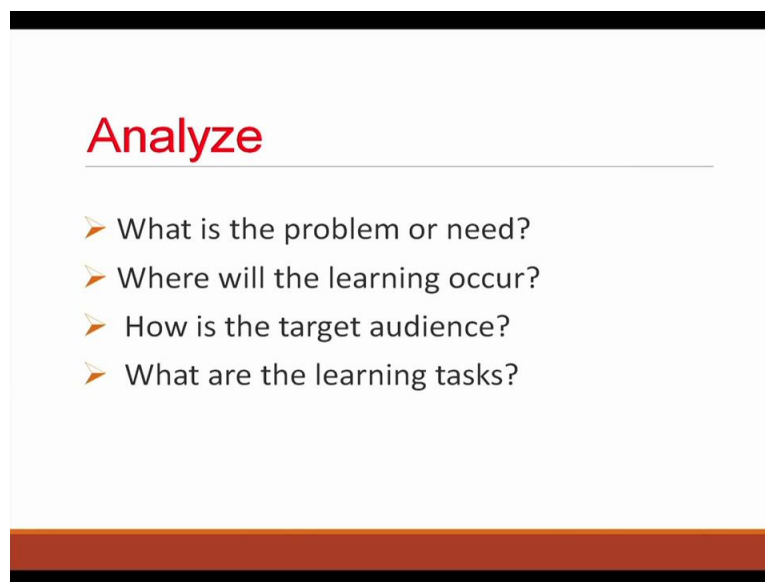
In my last lecture I mentioned the ADDIE model what is that ADDIE model but today I will explain the detail of ADDIE model.

(Refer Slide Time: 0:39)



So, instructional design for active learning and I mainly cover ADDIE model and learning theory.

(Refer Slide Time: 0:41)



Analyze

What is the problem or need?

Needs Assessment

<https://www.youtube.com/watch?v=KREQSLGnL3A>

Now, in the ADDIE model the analyze A for analyze but what actually we analyze, okay. So, what is the problem or need that is very we have to find out. What is the problem or need that we have to analyze? Where will the learning occur? How is the target audience? What (is the) are the learning tasks and so, these all things we have to analyze. So, there E is what is the need you know that we have to find the need and we have to analyze the need then only we can give the instructional design.

(Refer Slide Time: 1:39)

Analyze

Can this be solved without instruction?

Needs Assessment

What We Desire
– What is Happening
= **Need**

<https://www.youtube.com/watch?v=KREQSLGnL3A>

So, what is the problem or need or can this be solved without instruction? So, what is the need? Need is nothing but what we desire and what is happening. The difference between the desire and happening is called the need. So, there is for these need we have to analyse.

(Refer Slide Time: 1:47)

Analyze

Be Sure that instruction is the solution to your Problem or need

Needs Assessment

So, be sure that the instruction is the solution to your problem or need.

(Refer Slide Time: 2:04)

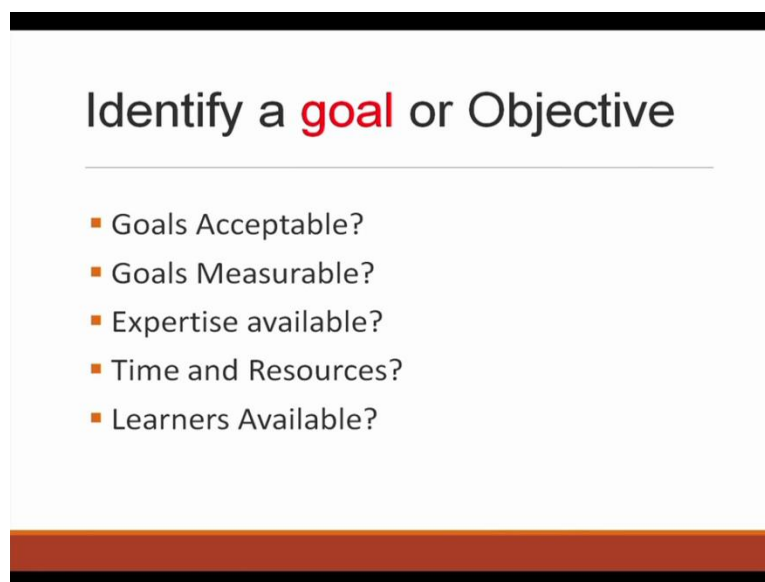
Identify a goal or Objective

- Will your goals be acceptable to those that asked you to develop the instruction?
- Are the goals clear and measureable?
- Will there be expertise available to help you solve the instructional goal?
- Are time and resources available?
- Will some learners be available during the development process so that you can refine your instruction along the way?

So, what is the need to (we have to solve the) we have to see that what the instruction we will give and whether it is solve the problem or not. So, we have to identify is the keyword in the instructional design and what you have to do we have to identify a goal or the objectives in that case identify will your goal be acceptable to those that asked you to develop the instruction. With will this that goal is acceptable so that we have to identify.

Are the goals are clear and measurable that we have to identify. Will there be any expertise available to help you solve the instructional goal that we have to identify? Are the time and resources available and will some learners be available during the development process so that you can refine your instruction along the way? So, all these things you know before going to the goal we have to identify those things.

(Refer Slide Time: 3:10)



The slide features a title 'Identify a goal or Objective' in a large, black, sans-serif font. The word 'goal' is highlighted in red. Below the title is a horizontal line. Underneath the line is a bulleted list of five questions, each preceded by a small orange square. The slide has a white background and is framed by a black border at the top and bottom, with a red bar at the bottom.

Identify a **goal** or Objective


- Goals Acceptable?
- Goals Measurable?
- Expertise available?
- Time and Resources?
- Learners Available?

So, identifying the goal and the objectives are the goals acceptable? Are the goals measurable? Are you know is a expertise available or the time and resources or if the learners available? So, these things we have to identify. So, identify in the analysis things that identify is very important.

(Refer Slide Time: 3:38)

Analysis has four sub phases-

- [Instructional Goals](#)
- [Instructional Analysis](#)
- [Learner Analysis](#)
- [Learner Objectives](#)



In that analyse analysis there are four sub phases-one is the instructional goal, instructional analysis, learner analysis and the learner objectives, so that the first if we the what is the instructional goal?

(Refer Slide Time: 3:56)

Analyze- **Instructional Goals**

Goals are broad, generalized statements about what is to be learned

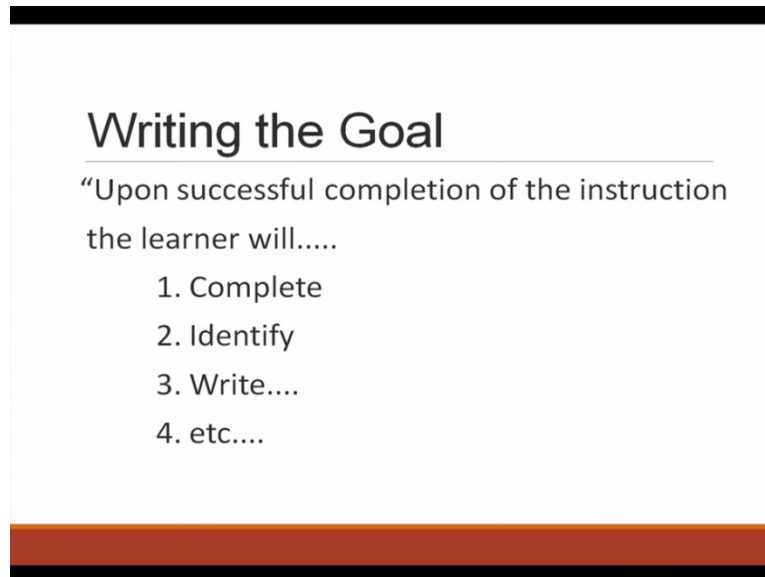


Objectives as tools you use to make sure you reach your goals. They are the arrows you shoot towards your target (goal).

Here, goals are very broad, generalized statements about what is to be learned so that is the goal. To attain that goal objectives is nothing but tools right. Objectives as tools you can make sure that you want to go to that goal so that is the objective. So, the arrows here you shoot you know

towards your target that is the objective. So, what the analyse the instructional goal we have to analyse.

(Refer Slide Time: 4:29)



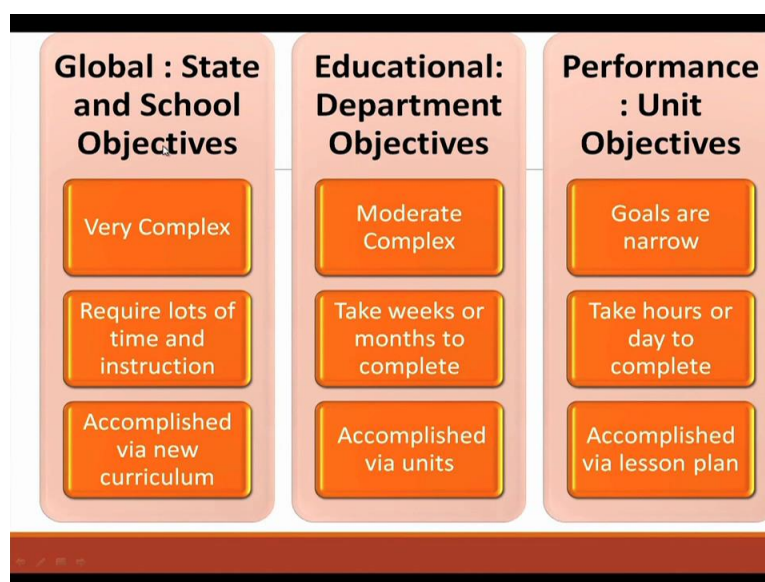
Writing the Goal

“Upon successful completion of the instruction the learner will.....

1. Complete
2. Identify
3. Write....
4. etc....

So, upon successful completion of the instruction the learner will complete something, identify the problem, write, these are the action verbs. So, in these ways we have to write the goal.

(Refer Slide Time: 4:46)



Global : State and School Objectives	Educational: Department Objectives	Performance : Unit Objectives
Very Complex	Moderate Complex	Goals are narrow
Require lots of time and instruction	Take weeks or months to complete	Take hours or day to complete
Accomplished via new curriculum	Accomplished via units	Accomplished via lesson plan

Here, in this picture, suppose different there their goals, their objectives are there very different suppose in the global, suppose schools and state . Here, the objectives is very complex in the schools or in the state, objectives are very, it is a complex. So, in that case you require lots of time and instruction and (you) it is accomplished you know via new curriculum but when it comes to from the global or the state to the educational or the department wise in that case the objective if this a moderate complex right.

So, we have to take suppose one week or you know that are month to complete the objective right, and it is accomplished via small small units so there is a difference between that the state and the school objectives to the educational or the department wise objectives and in the case of the performance the unit objectives, it is the goals are very narrow, a small unit the goal should be very narrow.

So, you know two hours or you know three hours I need two day to complete the goal and not only that it is accomplished by you know via the lesson plan before starting the class I will just take okay, today I if I teach that this unit, in that case our objective will be very narrow our goal will be narrow but in the lesson plan I will in these things we will cover and after one unit, the student will learn this.

So, if the objective is very clear to me, it is easy for the students also learn on their own or what I need that they can understand.

(Refer Slide Time: 6:49)

Educational Objectives

1956 – Bloom’s Taxonomy

- Cognition – Knowledge
- Emotional Skills – Self
- Psychomotor Activities- Skills

2001- Anderson/Krathwohl’s Revision

Educational Objectives

The slide features a title 'Educational Objectives' at the top, followed by a horizontal line. Below the line, it lists '1956 – Bloom’s Taxonomy' and its three domains: 'Cognition – Knowledge', 'Emotional Skills – Self', and 'Psychomotor Activities- Skills'. It then mentions '2001- Anderson/Krathwohl’s Revision'. The title 'Educational Objectives' is repeated at the bottom of the content area. The slide has a black header and footer bar, with a red bar at the bottom and a small orange square on the right side.

So, educational objectives in that case in the 1956 Blooms Taxonomy was discovered. So, he there the cognition things, emotional skills and the psychomotor activities were there. So, in the cognition it mainly to the knowledge, emotional mainly to the self and the psychomotor activities is the skills. I will explain this in my another lecture, okay.

So, in the 2001 Anderson/Karthwohl’s revision. So, main we are talking about the educational objectives in the first thing.

(Refer Slide Time: 7:26)

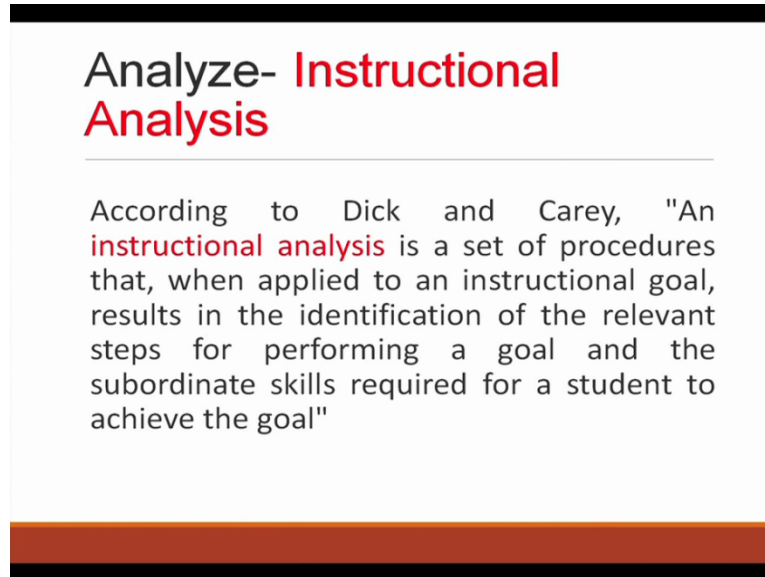
Analysis has four sub phases-

- Instructional Goals
- Instructional Analysis
- Learner Analysis
- Learner Objectives

The slide features a title 'Analysis has four sub phases-' at the top, followed by a horizontal line. Below the line, it lists four sub-phases: 'Instructional Goals', 'Instructional Analysis', 'Learner Analysis', and 'Learner Objectives', each preceded by a square bullet point and underlined. The slide has a black header and footer bar, with a red bar at the bottom and a small orange arrow pointing right on the right side.

So, the firstly instructional goals if it is clear so on the and up to that the taxonomy and the instructional, educational objectives. So, next come to the instructional analysis for second point.

(Refer Slide Time: 7:44)



Analyze- Instructional Analysis

According to Dick and Carey, "An **instructional analysis** is a set of procedures that, when applied to an instructional goal, results in the identification of the relevant steps for performing a goal and the subordinate skills required for a student to achieve the goal"

According to Dick and Carey, an instructional analysis is a set of procedures when applied to an instructional goal, when it the instructional goal is there so how we will analysis right, results in the identification of the relevant steps. So, what steps we will for performing the goal, to perform the goal what is the steps we will take and the subordinates skills, it require for a student to achieve that goal so that thing you know, is the instructional analysis.

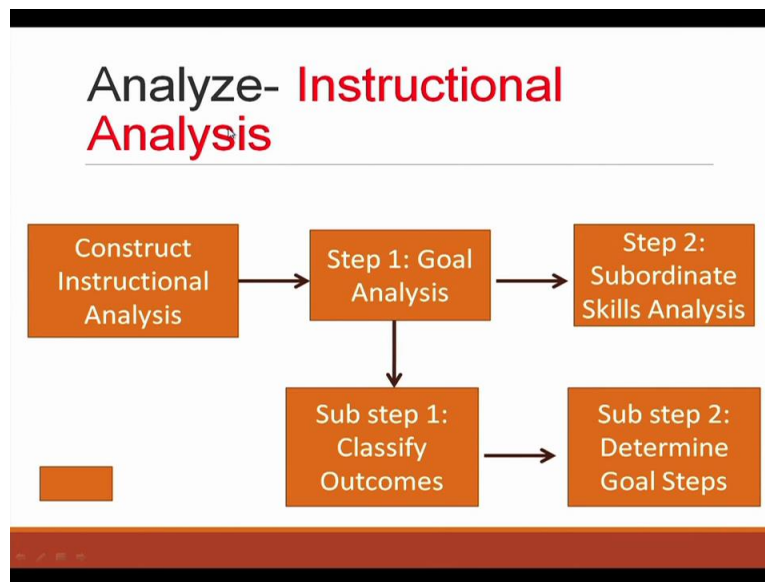
(Refer Slide Time: 8:22)

Analyze- Instructional Analysis

- The Analysis phase can be considered as the "Goal-Setting Stage."
- Two fundamental steps involved in conducting the goal analysis --
 1. The first is to classify the type of learning outcome involved in achieving the goal (**Classifying Outcomes**).
 2. The second involves taking your goal statement and analyzing it in order to identify the relevant steps involved in order for someone to perform that goal (**Determining Goal Steps**).

So, the analysis phase can be considered as the goal-setting stage, the goal is clear so we will take in that case two fundamental steps involved in the conducting the goal analysis. The one is the clarifying outcome what's that classify first clarify and then classify the outcomes that means the type of learning outcome involved in achieving the goal. This is the first okay, so the classifying the outcome and the second is the objective is taking your goal statement and analyzing in order to identify the relevant steps involved for someone to perform that goal that means the second one is the determining the goal steps.

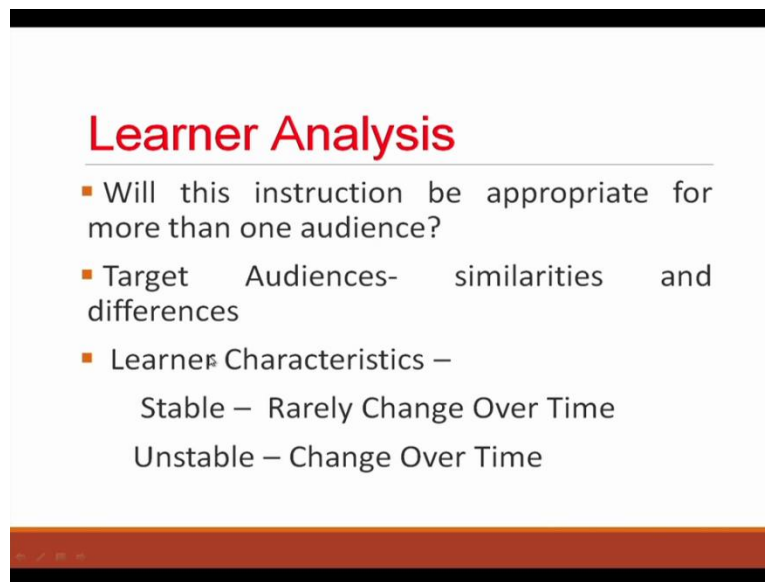
(Refer Slide Time: 9:18)



So, in that case in the picture you can see that the first one the in that construct instructional analysis. The step one is the goal analysis and this the step one the sub step one is the classify outcome what I mention and the sub step two is the determine the goal steps and here, if the goal analysis we will go to the step two that is the subordinate skill analysis, okay.

So, let us come to the instructional goals is clear, instructional analysis is clear. Now, the learner analysis and the learner objectives. So, in that analysis phases I already explain the instructional goals and the instructional analysis.

(Refer Slide Time: 10:13)



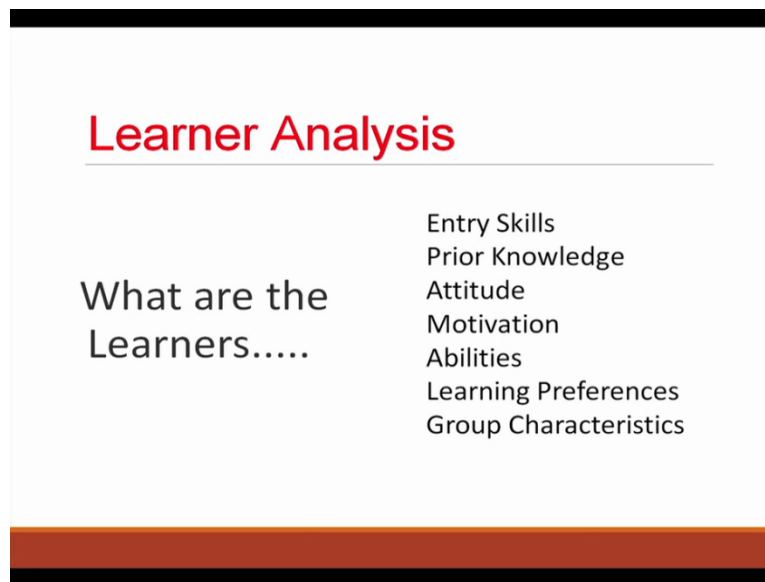
Learner Analysis

- Will this instruction be appropriate for more than one audience?
- Target Audiences- similarities and differences
- Learner Characteristics –
 - Stable – Rarely Change Over Time
 - Unstable – Change Over Time

Now, we will come to the learner analysis. So, what is that learner analysis? First learner analysis first it comes in a will the instruction is to be appropriate for more than one audience or the target audience what is the similarities and the differences between the target audience that we have to analyse right and then the characteristics also, if is stable or they are unstable or the changes over time or the stable means you know rarely change over time.

So, different types of learners so we should analyse it and they only we can give the instruction and the learner a learner approaches a different, learner styles are different.

(Refer Slide Time: 11:02)



The slide features a title 'Learner Analysis' in red text at the top. Below the title, on the left, is the question 'What are the Learners.....'. On the right, there is a list of factors to analyze: Entry Skills, Prior Knowledge, Attitude, Motivation, Abilities, Learning Preferences, and Group Characteristics. The slide has a black header bar at the top and a red and black footer bar at the bottom.

Learner Analysis

What are the Learners.....

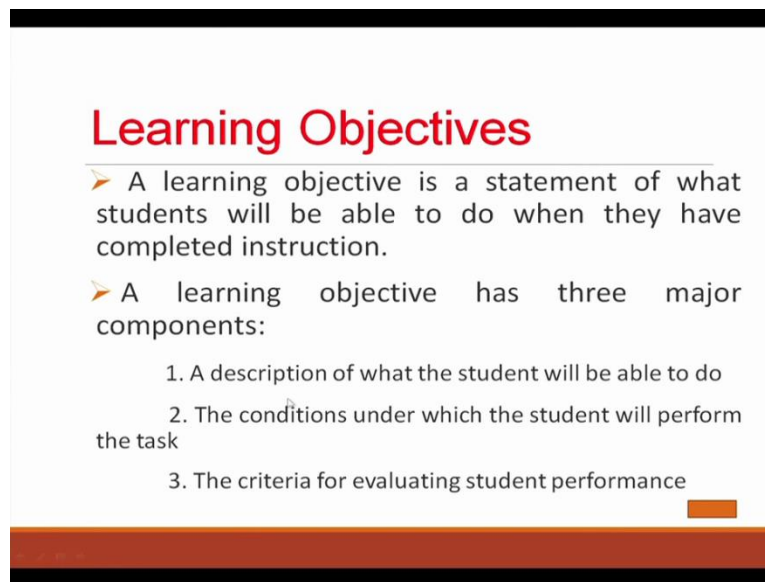
- Entry Skills
- Prior Knowledge
- Attitude
- Motivation
- Abilities
- Learning Preferences
- Group Characteristics

So, what are the learners main what is the entry skills, before coming to instruction what the entry skills that we have to analyse and then the if there any prior knowledge or not if they have prior knowledge that is another point. What is their attitude?

How are they or motivation, whether the learners have the motivation or not, you know if they do not have any motivation with the instruction also you cannot? So, that we have to analyse before starting your instructional design. Abilities, for that their abilities that we have to understand. Learning preferences, are they are visual learner? Are they are verbal learners? What is their learning preferences.

Group characteristics what type of the learner? What type of the group analysis? How they want to do? So, these things is very important when you start you know the learning analysis is very learner analysis is very important.

(Refer Slide Time: 12:14)



Learning Objectives

- A learning objective is a statement of what students will be able to do when they have completed instruction.
- A learning objective has three major components:
 1. A description of what the student will be able to do
 2. The conditions under which the student will perform the task
 3. The criteria for evaluating student performance

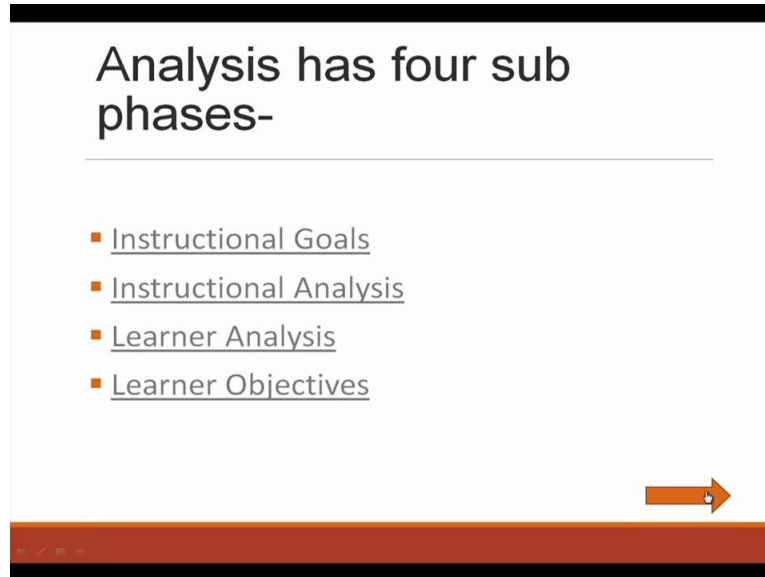
So, learner characteristics are the important aspects in the instructional design. The four major character categories of the learners, Characteristic is the cognitive that there is can be general, there can be the specific, there then the psychological, effective, social or the cognitive characteristics have three dimensions, okay. What is this you know not that the some dimensions the difference are there what is that? What is the similarities? What is differences you know in the are they changing or the stable?

The four dimensions in the cognitive characteristics each is different qualities and the implications for the instructional designers. So, the learner analysis is a important part in the analysis section. After analyzing the learner, the fourth point is the learners learning objective.

A learning objective is a statement of the (stu) what the student is wants to able to do and what they their skill set and what they have to complete after their instruction? What the learner can able to do? So, in that case the learning objective, it has three major components. What is that? A description of what the learner will do that is the performance component, right. Under what condition, the condition under which you know the student can perform their task so, that is the condition component. Up to what level that is the criterion component. So, these three parts are very important.

So, it is now it is clear that the analysis level has the four sub phases- instructional goals, instructional analysis, learner analysis and learner objectives.

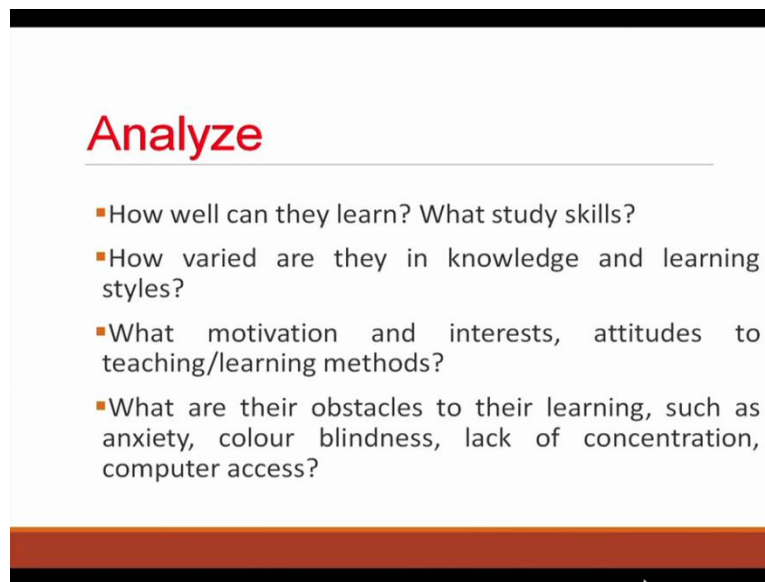
(Refer Slide Time: 14:13)



Now, the analyse phase is the foundation of all other phases in the instructional designs. So, first was we have to define the problem, identify the source of the problem and determine the possible solutions. So, in that case the phase may includes specific research technique, suppose needs analysis right. What is the job analysis, task analysis?

Those things you have to, this is the important phase and the outputs of these phase, it often include, the instructional goals and a list of tasks to be instructed. So, these outputs will be the inputs in the design phase because in the instructional or if the after the analyse what is the output is there that is the in the design phase ADD that is the design phase that the output is the inputs of the design phase.

(Refer Slide Time: 15:29)



Analyze

- How well can they learn? What study skills?
- How varied are they in knowledge and learning styles?
- What motivation and interests, attitudes to teaching/learning methods?
- What are their obstacles to their learning, such as anxiety, colour blindness, lack of concentration, computer access?

So, suppose the teacher want to understand the learner and thorough needs analysis the following information is very important your learners background what is their age, their education, their profession or their you know position (org) and their preferred learning styles and then their level of knowledge on that topic, their expectation from the training, so that is the what that expectation from the training? What relevant knowledge and skills do they need to learn and what do they already know? How will can they you know how well can they learn? You know what study skills or how varied are they in their knowledge and the learning styles because in the different learners are there.

What motivation and interest, attitudes to the teaching learning methods? What are the obstacles to their learning such as you know anxiety or their they have color and color blindness or not or the lack of concentration or the computer access whether they have any problem or these these things, first we have to analyse then only we can go to the design component, design part right. The design is how to teach right.

(Refer Slide Time: 17:02)

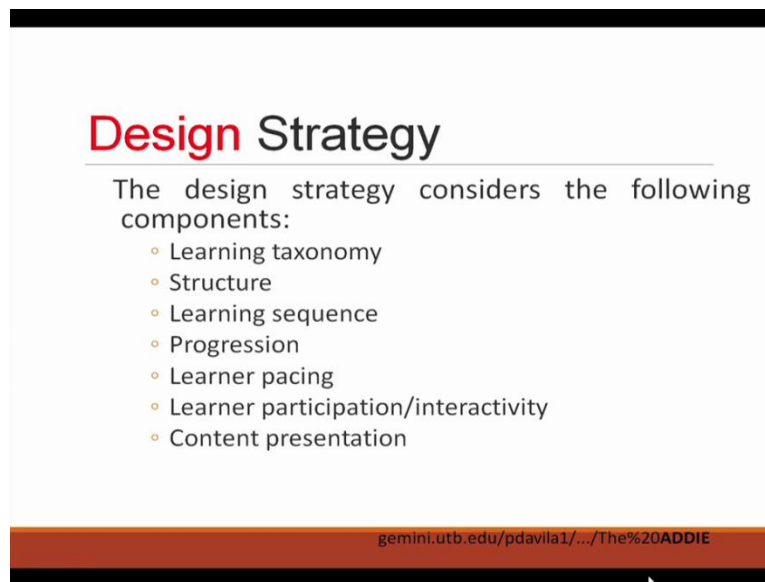
Design

The design strategy is focused at the **course level** and provides an approach to organizing and presenting content based on the level of the objective.

This strategy is necessary to maximize the transfer of learning from the instructional setting to the job.

So, the stage determines all the goals, tools to be used to gauge the performance, various tests, subject matter analysis, planning and resources. So, the design thing so in that case in that the focus is on the learning objectives. The content, the subject matter analysis, exercise, lesson planning, assessment this is very important in the design steps. So, the design strategy is focused on the course level in the course level and it provides an approach to organizing and presenting the content based on the level of the objective. If the objective clear how to present that the design thing and the strategy is necessary to maximize the transfer of learning from the instructional setting to the job.

(Refer Slide Time: 18:04)



Design Strategy

The design strategy considers the following components:

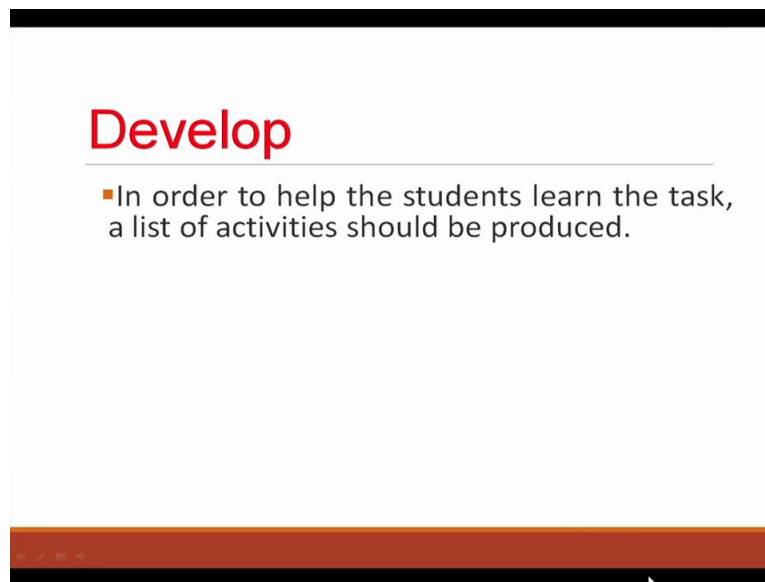
- Learning taxonomy
- Structure
- Learning sequence
- Progression
- Learner pacing
- Learner participation/interactivity
- Content presentation

gemini.utb.edu/pdavila1/.../The%20ADDIE

So, design strategy it considers the following components what are those? The learning taxonomy what taxonomy here, suppose the Bloom taxonomy or what is the structure? Learning sequence that if you under that in what learning sequence that is important right to design. So, what is the progression, learner pacing, learner participation, interactivity, content presentation how we will present the content? What is the learner feedback that is very important and the supplemental information. All these things are important in the design thing.

Now, the third part if the design the development. Development phase is addresses the tools to you to create the instructional material. In this process develop the producing the material needed to meet the goals and the objectives so that is how to develop it. In that case the phase is you know detailed plan want the list step by step, in this time this deadline we have to develop this course content.

(Refer Slide Time: 19:24)

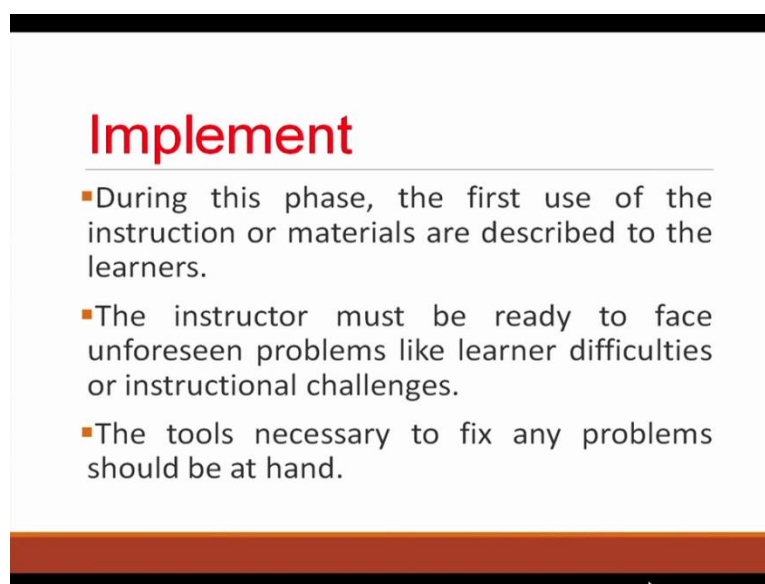


Develop

- In order to help the students learn the task, a list of activities should be produced.

So, the develop phase is the important part in order to help the students to learn the task, a list of activity should be produced. So, the delivery method should be chosen, whether in the video or the power point or lecture notes or simply blackboard how we will develop that is important and it is important to the view the previous material so that the information is not repeated and lastly, develop the instructional course work. So, develop is the third important phase is in the ADDIE model.

(Refer Slide Time: 20:04)



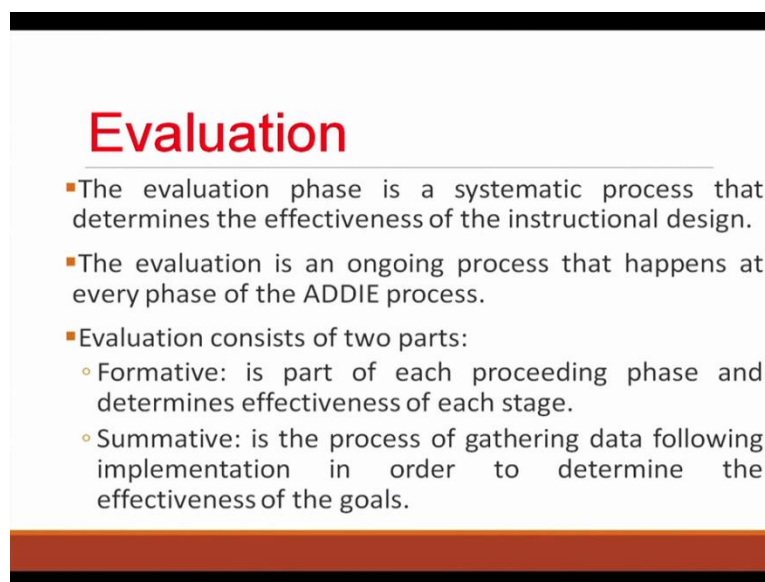
Implement

- During this phase, the first use of the instruction or materials are described to the learners.
- The instructor must be ready to face unforeseen problems like learner difficulties or instructional challenges.
- The tools necessary to fix any problems should be at hand.

The fourth is now implement it. Implement during the phase, the first use of the instruction or materials are describe to the learner and then the instruction must be ready to you know face unforeseen problem. The learner difficulties or the instructional challenges and the tools necessary to fix any problems should be at hand.

So, implementation means the time line must be establish the final product must be delivered. So, once the final product is ready the learning environment must be prepared. So, the learners must be prepared, which includes advising students on requirements, all the tools to be used you know must be ready. So, after the development after analyzing it we have to design that after design we have to develop it and after develop that we have to implement it and after implementation the last one is the evaluation right.

(Refer Slide Time: 21:36)



Evaluation

- The evaluation phase is a systematic process that determines the effectiveness of the instructional design.
- The evaluation is an ongoing process that happens at every phase of the ADDIE process.
- Evaluation consists of two parts:
 - Formative: is part of each proceeding phase and determines effectiveness of each stage.
 - Summative: is the process of gathering data following implementation in order to determine the effectiveness of the goals.

The evaluation process is the systematic process that determines the effectiveness of the instructional design. So, the evaluation is the ongoing process that happens at each phase (is the) in ADDIE model each phase you know we are but evaluation is the last one here, the two steps one is the formative evaluation and other is the summative evaluation.

Now, what is that formalative evaluation in each phase each class we are evaluating we are giving, asking them question, this a small small class test so, that is the formative but after doing the whole course we will give them to the total whenever that is the summative evaluation.

(Refer Slide Time: 22:24)

Evaluation

- Review and evaluate each phase to make sure it is accomplishing its goals.
- Perform external evaluations that will ensure that the information will be used properly.

So, it is the process of gathering data following implementation in order to determine the effectiveness of the goal what the goal is there with it effective or not so, in the last the total the summative evaluation we will do. So, review and evaluate each phase to make sure it accomplishing the goal. So, perform external evaluations that will ensure that information will be used properly. Revise the training system in order to make it better. So, this is the evaluation part.

Now, let us come to the learning theory what is that instructional theories always play an important role into design the instructional materials.

(Refer Slide Time: 22:53)

Learning Theory

- Learning theories are an organized set of principles explaining how individuals acquire, retain and recall knowledge.
- The principles of the theories can be used as guidelines to help select instructional tools, techniques and strategies that promote learning.

So, theories such as behaviorism, constructivism, the social learning and cognitivism help to shape and define the outcome of instructional materials. Now, in the here learning theories are organized the set of principles explaining how individuals acquire, retain and recall knowledge. So, the principles of the theories can be used as guidelines to help select instructional tools, technique, strategies that promote learning but here, I will just explain what the behaviorism three, one is the behaviorism what is that.

(Refer Slide Time: 23:40)

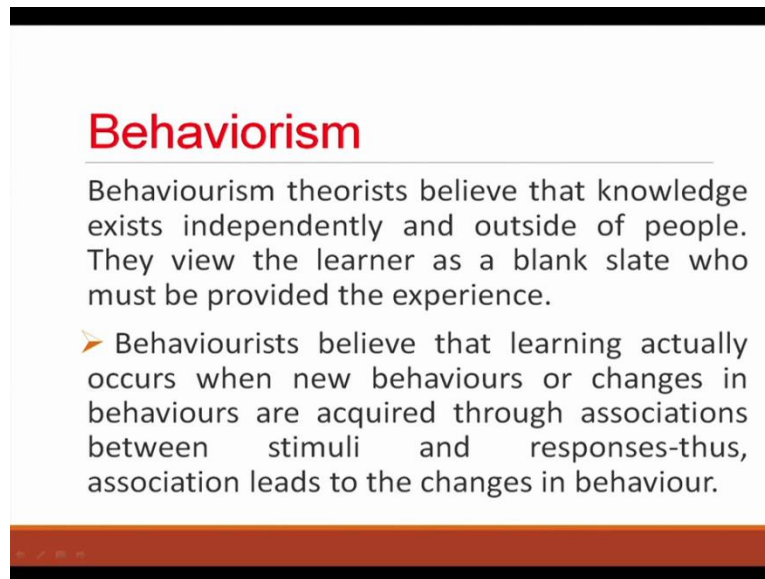
Behaviorism

New behaviours or changes in behaviours are acquired through association between stimuli and response.

Behaviourism stems from the work of B.F. Skinner.

New behaviors or changes in behaviors are acquired through association between stimuli and response. It is develop name the work is B. F. skinner but behaviorism is that (believed) the behaviorism theory is the believe that, that knowledge exist in independently and outside the people. So, they view that the learner as a blank slate who must be provided from the experiences you will get.

(Refer Slide Time: 24:25)



Behaviorism

Behaviourism theorists believe that knowledge exists independently and outside of people. They view the learner as a blank slate who must be provided the experience.

➤ Behaviourists believe that learning actually occurs when new behaviours or changes in behaviours are acquired through associations between stimuli and responses-thus, association leads to the changes in behaviour.

So, in that case, behavior is believe that learning actually occurs when new behavior or changes in behaviors are occurred through associations between the stimuli and response-thus, association leads to the changes in the behavior what is that, so that there just like a my blank slate so, in that case what the experiences they are learning.

So, the learning process is based on objectively observable change in behavior. So, in that case the theories the learning begins when cue or the stimulus from the environment is presented and the learner reacts and stimulus for some time or the response. So, the change in the behavior of the learner signifies that the learning has occurred.

(Refer Slide Time: 25:25)

Behaviourism-learning process

- The learning process is based on objectively observable changes in behaviour.
- The theory is that the learning begins when a cue or stimulus from the environment is presented and the learner reacts to the stimulus with some time of response.
- The change in the behaviour of the learner signifies that learning has occurred. Teachers use Behaviourism when they reward or punish student behaviour.

So, the teachers use the behaviorism when they you know if there you they reward them or the punish them you know from when from that reward and punishment they are learning. So, this is the behavior is concerned.

(Refer Slide Time: 25:45)

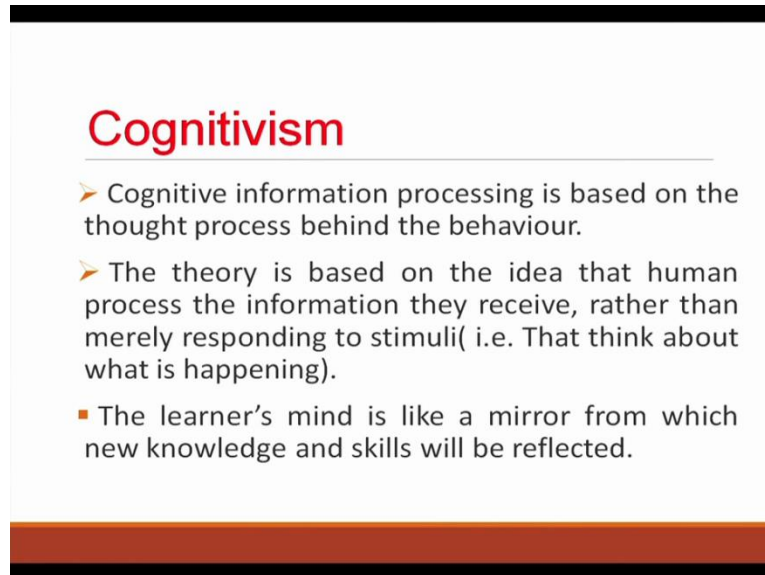
Behaviourism

Behaviourism instruction does not prepare the learner for problem solving or creative thinking. Learner do what they are told and do not take the initiative to change or improve things.

So, suppose the example is drill or wrote work or you know repetitive practice from there you are learning or the bonus point if you do this you will get this much bonus point. So, we learning from that or if you say a good jobs, you know it is a very good job the children okays (())(26:02)

good so they are doing this. So, in that case these things are important. So, behavior instruction, it does not prepare the learner for problem solving or creative thinking. So, learner do what they are told and do not take the initiative to change or improve things.

(Refer Slide Time: 26:35)

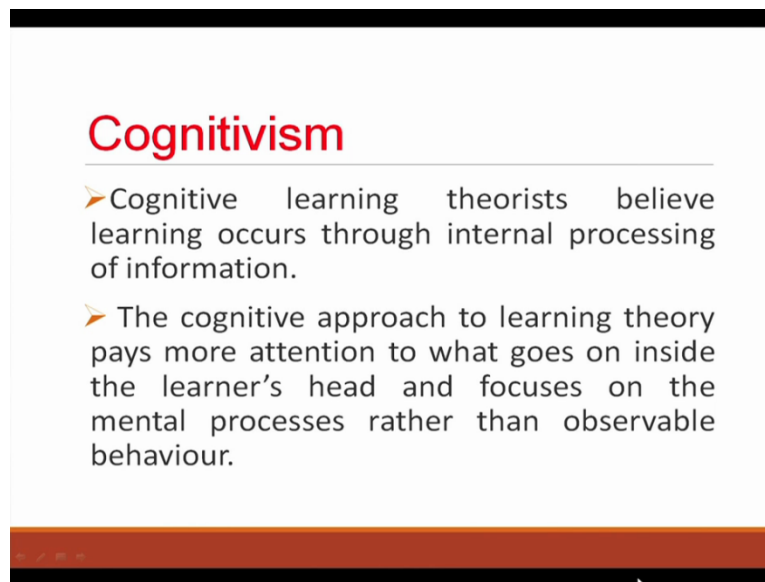


Cognitivism

- Cognitive information processing is based on the thought process behind the behaviour.
- The theory is based on the idea that human process the information they receive, rather than merely responding to stimuli(i.e. That think about what is happening).
- The learner's mind is like a mirror from which new knowledge and skills will be reflected.

Thus, after behaviorism, what is cognitivism? This is nothing but the process is based on the thought behind the behavior. The theory is based on the idea that the human process the information what they receive, rather than merely the stimuli that is they think about what is happening, cognitively they are thinking it. So, in that case the learner's mind is just like a mirror from which new knowledge and skills will be reflected. So, this is cognitivism.

(Refer Slide Time: 27:38)

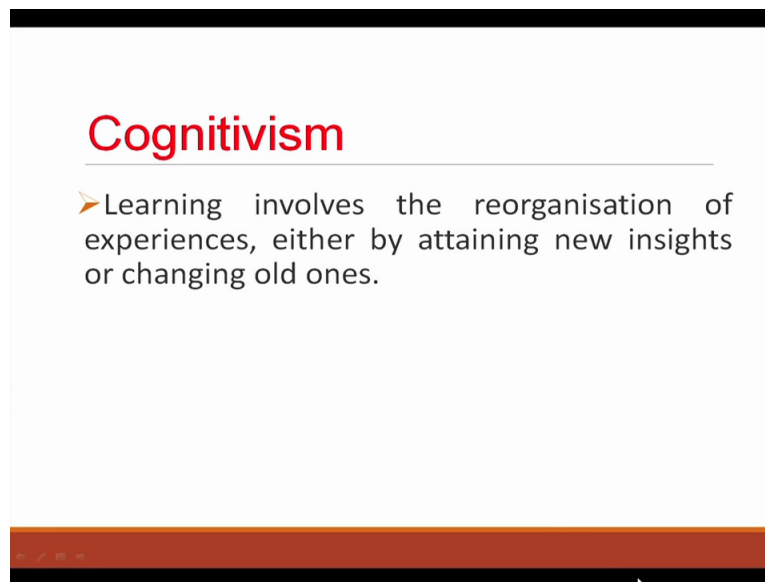


Cognitivism

- Cognitive learning theorists believe learning occurs through internal processing of information.
- The cognitive approach to learning theory pays more attention to what goes on inside the learner's head and focuses on the mental processes rather than observable behaviour.

So, cognition information processing is used when the learner plays an active role, in seeking ways to understand and process information that he or she receives and related to already known and store within the memory. So, cognitive theory stated by Jean Piaget and the cognitive learning theorists believe learning occurs through internal processing of information. So, the cognitive approach is the learning theory pays more attention that what goes inside the learner's head that is important and focuses where all the mental processes on the mental processes rather than the observable behavior.

(Refer Slide Time: 28:09)

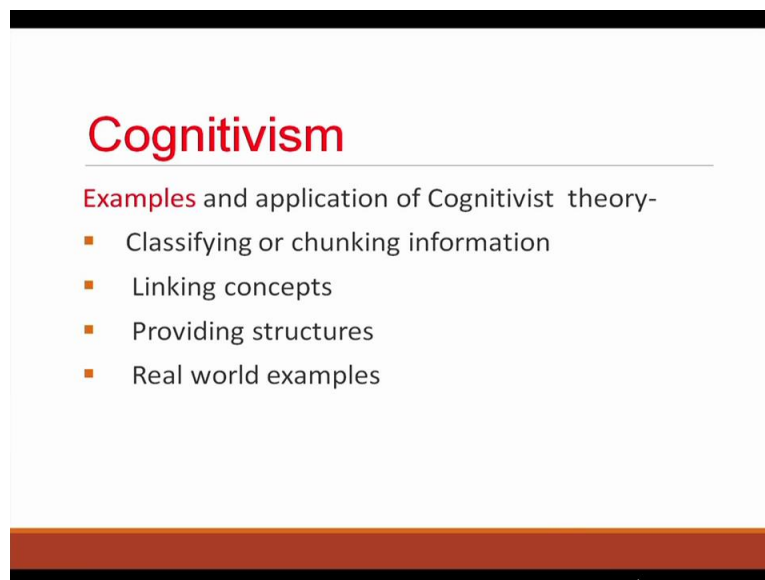


Cognitivism

➤ Learning involves the reorganisation of experiences, either by attaining new insights or changing old ones.

So, cognitivism is the learning involves the reorganization of the experiences either by attaining new incites or changing the old ones. Thus, learning is the nothing but the change in the knowledge which is stored in the memory and not just in the change in the behavior. So, that is the difference between the behaviorism and the cognitivism.

(Refer Slide Time: 28:38)



Cognitivism

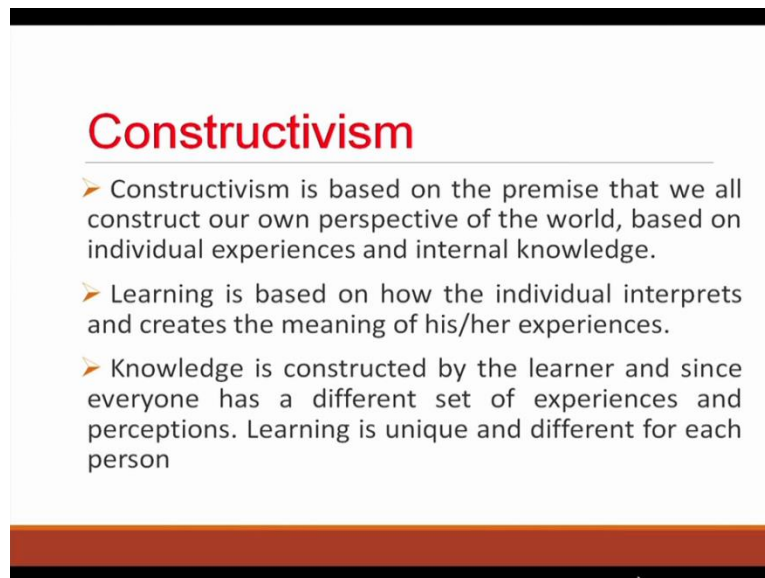
Examples and application of Cognitivist theory-

- Classifying or chunking information
- Linking concepts
- Providing structures
- Real world examples

Some example, classifying or chunking information, in the cognitive thing you are thinking it and then you can classify it. So, not from the behavior you are learning. So, the linking concepts

if you if the concepts if you can link it or providing some structure or real world example, you are thinking then only you can give some real world example, so that is the cognitivism and problem solving, you know that is very important in the cognitivism.

(Refer Slide Time: 29:37)



Constructivism

- Constructivism is based on the premise that we all construct our own perspective of the world, based on individual experiences and internal knowledge.
- Learning is based on how the individual interprets and creates the meaning of his/her experiences.
- Knowledge is constructed by the learner and since everyone has a different set of experiences and perceptions. Learning is unique and different for each person

Now, the last one is the constructivism what is that? It is based on the premise that we all construct our own perspective in the world based on the individual experiences and the internal knowledge. So, learning is based on how individual interprets or the creates meaning of his and her experiences. So, knowledge which is constructed by the learner and since, everyone has the different experiences and you know perceptions. So, learning is a unit and different for each person.

So, in the constructivism the constructive theories believed that learning is a process where individuals construct new ideas if they construct new ideas or the new concepts based on their prior knowledge and their experiences. So, we resolve the conflict we in the constructivism we resolve the conflict between the ideas and reflect on the theoretical explanations and the theory is based, the theory is used to focus on preparing people in problem solve.

(Refer Slide Time: 30:37)

Constructivism

Examples and application of Constructivist theory-

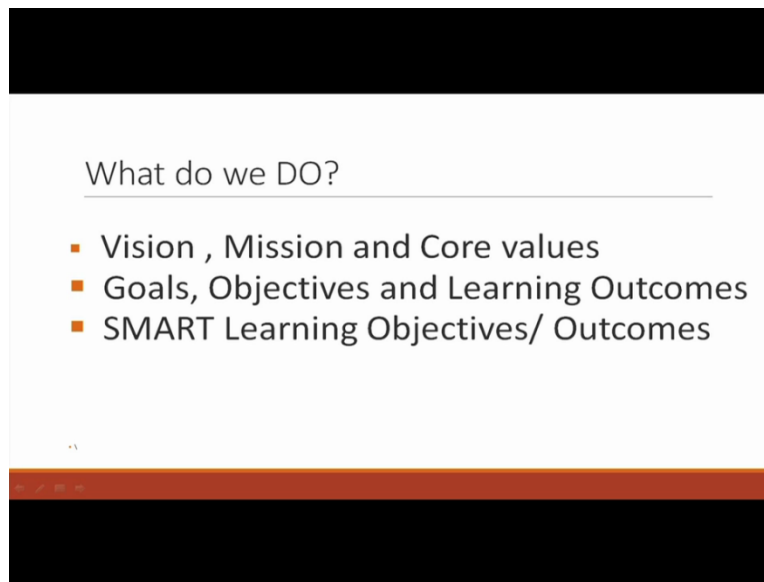
- Case studies
- Research projects
- Problem based learning
- Collaborative learning
- Brainstorming
- Discovery learning

So, the constructivism the example case studies different case studies and the views or the research projects you have to in the research projects you have to think after the research your conclusion so, that is the problem based learning. Suppose the active that collaborative learning, brainstorming, discovery learning these are the examples of the constructivism. So, these are the three learning theories, behaviorism, cognitivism and the constructivism. Thank you.

Outcome based Pedagogic Principles for Effective Teaching
Dr. Tamali Bhattacharyya
Center for Educational Technology
Indian Institute of Technology Kharagpur
Lecture 08
Outcome based Education

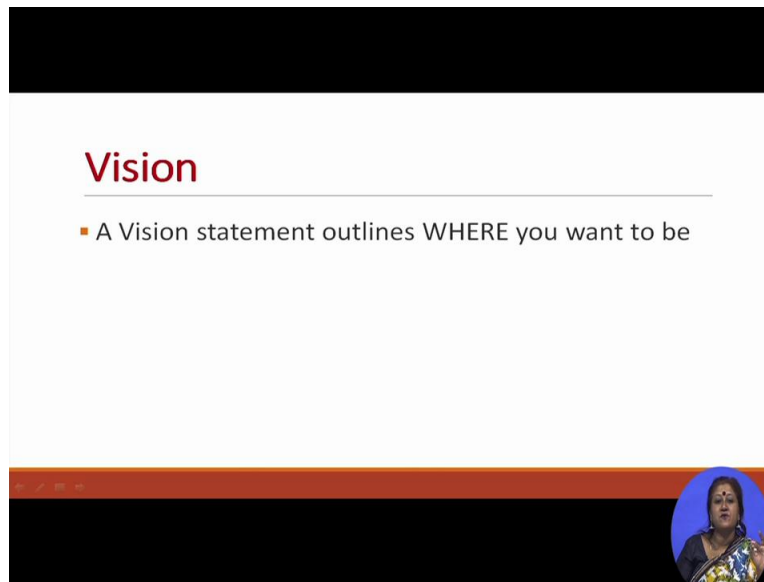
Outcome based education.

(Refer Slide Time: 0:22)



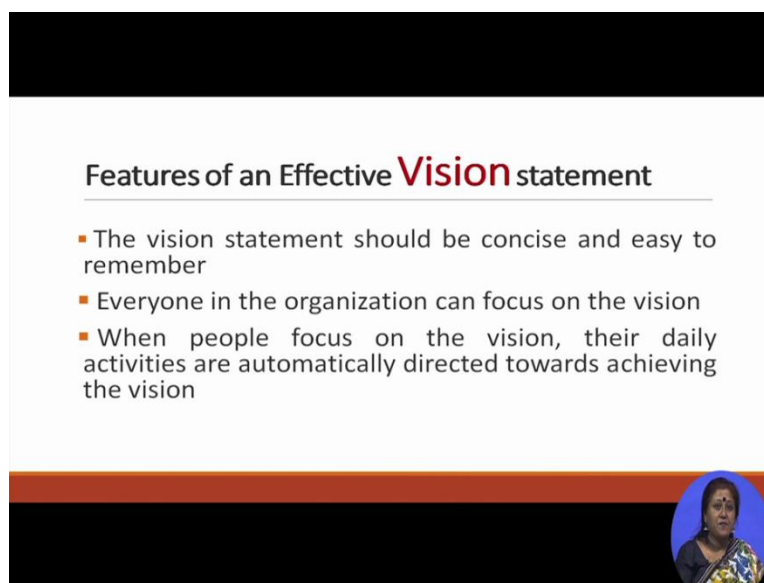
Today we will discuss vision, mission and core values. Goal objectives and learning outcomes and how to write SMART learning objectives or outcomes.

(Refer Slide Time: 0:34)



So, there is confusion between what is the vision and mission, okay.

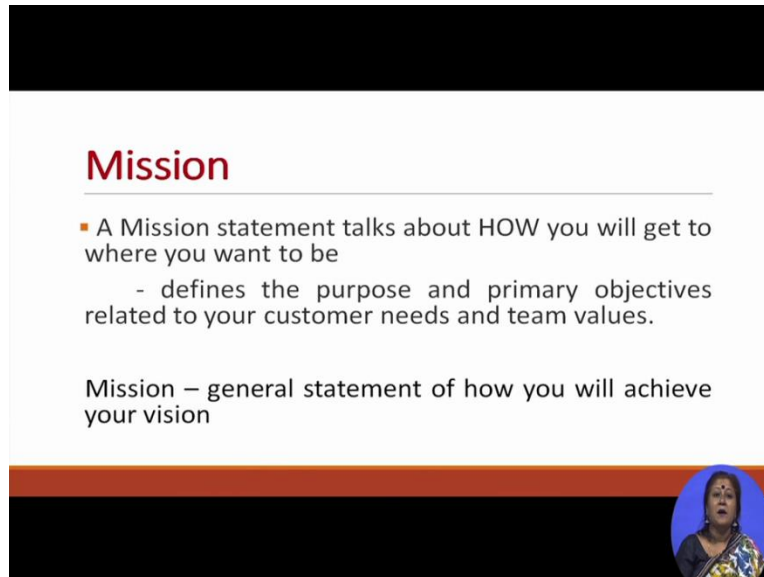
(Refer Slide Time: 0:41)



So, what is a vision? A vision statement outlines where you want to be, okay. So, in that case, it is a big picture idea of what you want to achieve over a long period of time that is the vision. So, it is just a future plan.

So, in that case features of that effective vision statement is that the vision statement should be concise and easy to remember. Everyone in the organization can focus on the vision, everyone. So, when people you know focus on the vision, their daily activities are automatically directed towards achieving the vision. So, if you know the vision then automatically we will go to the vision.

(Refer Slide Time: 1:37)



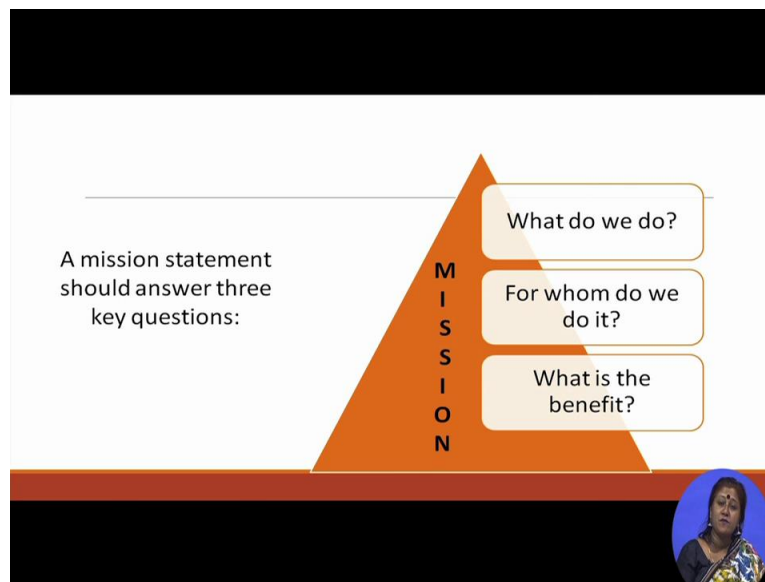
Mission

- A Mission statement talks about HOW you will get to where you want to be
 - defines the purpose and primary objectives related to your customer needs and team values.

Mission – general statement of how you will achieve your vision

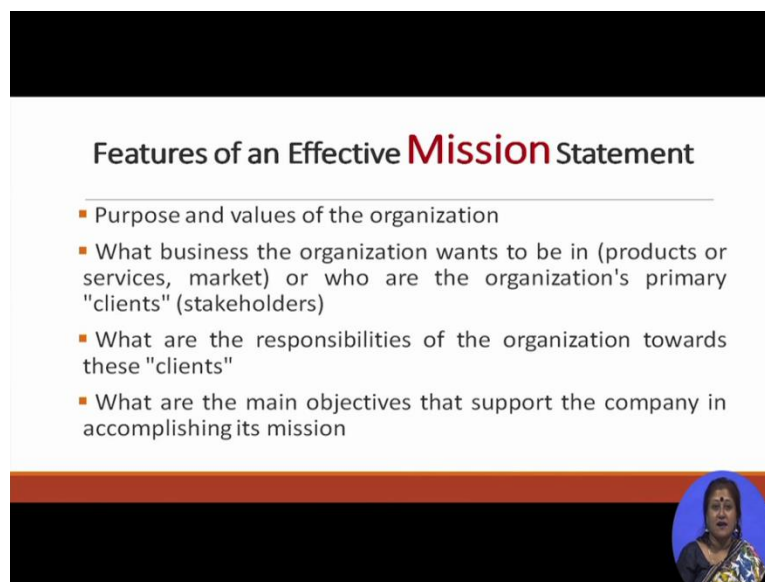
Now, what is mission? A mission statement talks about how you will get to where you want to be. If you know the vision you will go for the mission. So, it defines the purpose and primary objectives related to your customer needs and team values. So, mission is the general statement of how you will achieve your vision.

(Refer Slide Time: 2:11)



A mission statement should answer three key questions. What are those questions? What we do? For whom do we do? And where is the benefit?

(Refer Slide Time: 2:21)



So, the features of the effective mission statement, there is some purpose and values of the organization. What business the organizations want to be in the in the case of the products, services or market or who are the organizations primary clients, okay. So, in that case what are

the responsibilities of the organization towards these clients and what are the main objectives that support the company in accomplishing the mission.

(Refer Slide Time: 2:55)



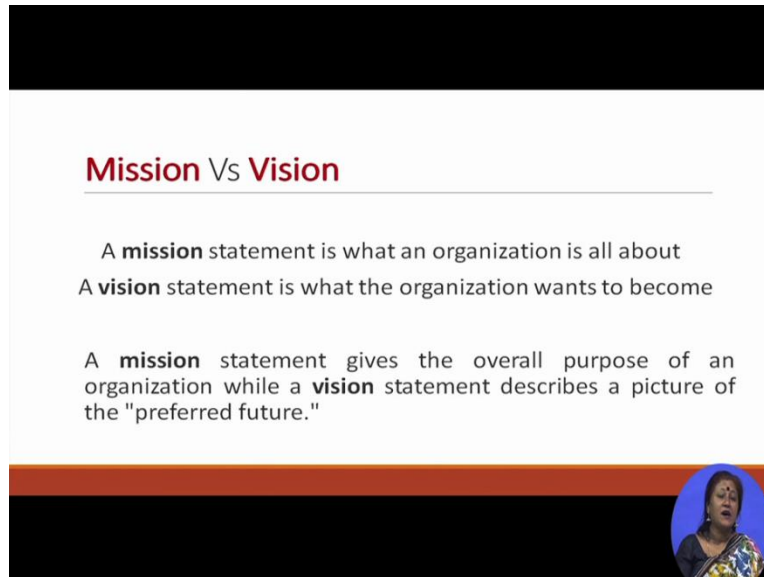
So, suppose IIT Bombay's vision is, to be the fountainhead of new ideas of innovators in technology and science.

(Refer Slide Time: 3:07)



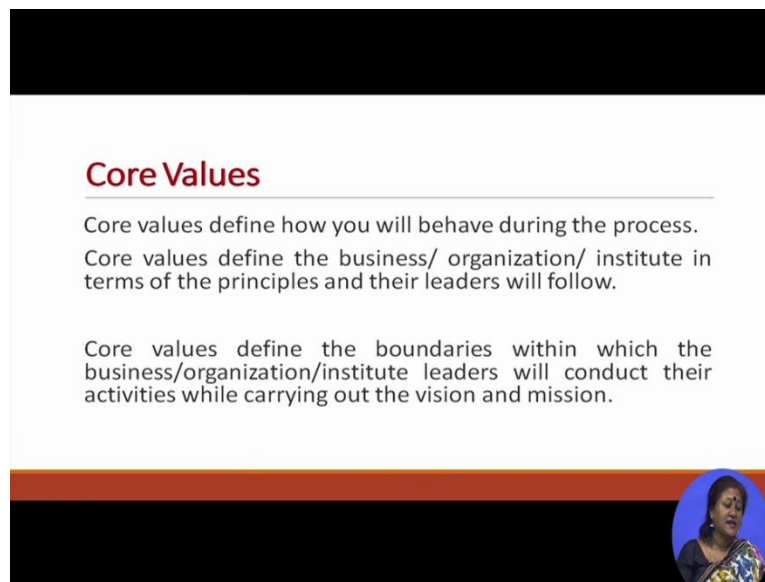
This is the vision and the mission to achieve the vision, the mission is to create an ambience in which new ideas, research and scholarship flourish and from which the leaders and innovators of tomorrow emerge. So, that is the mission.

(Refer Slide Time: 3:25)



So, what is the difference between vision and mission? A vision statement is what the organization wants to become it and a mission statement is what the organization is all about. So, a mission statements gives the overall purpose of an organization and a vision statement, it describes a picture of a perfect one preferred future that is the vision.

(Refer Slide Time: 3:59)



Core Values

Core values define how you will behave during the process.

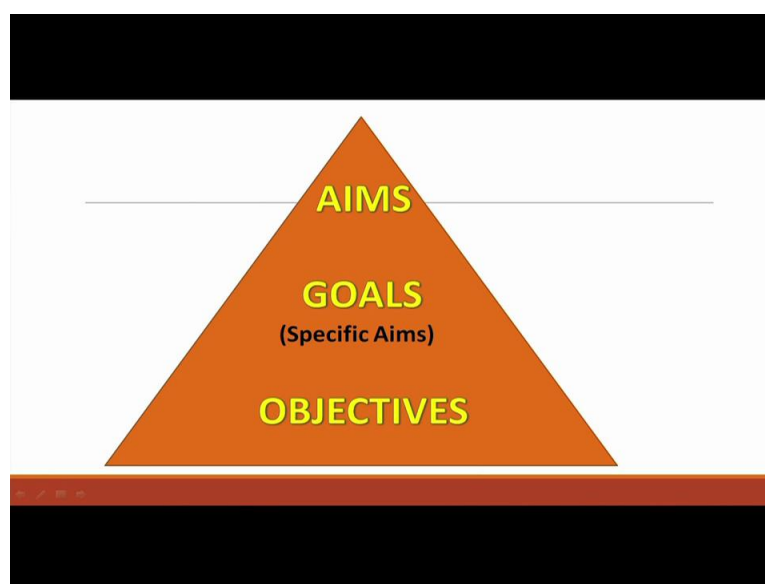
Core values define the business/ organization/ institute in terms of the principles and their leaders will follow.

Core values define the boundaries within which the business/organization/institute leaders will conduct their activities while carrying out the vision and mission.

A small circular icon of a woman speaking is located in the bottom right corner of the slide.

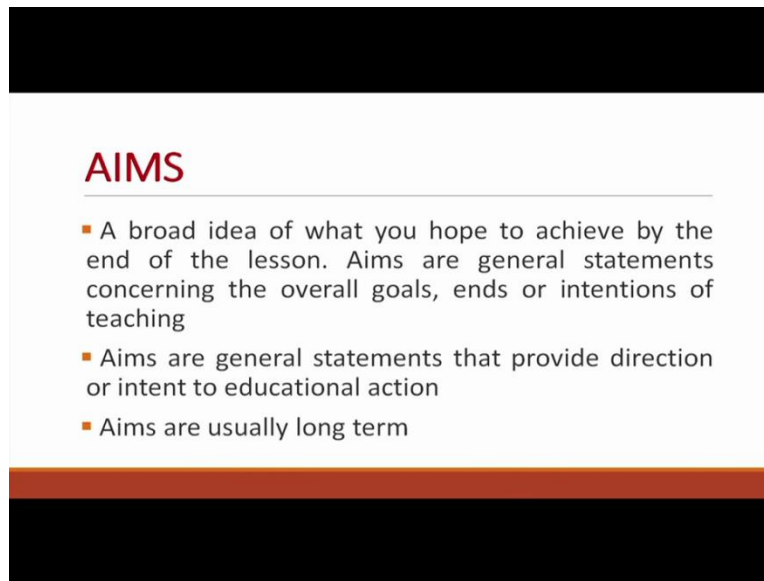
Now, if we know the mission and vision now we have to know what is the core values. Core values define how you will behave during the process. Core values define the business, organization, institute in terms of the principles and their leaders will follow. So, in that case core values defines the boundaries which the organization, institutes leaders will conduct, their activities while carrying out for the vision and mission. So, this is all about vision, mission and core values.

(Refer Slide Time: 4:35)



Now, we will explain what is the aims, goals and objectives.

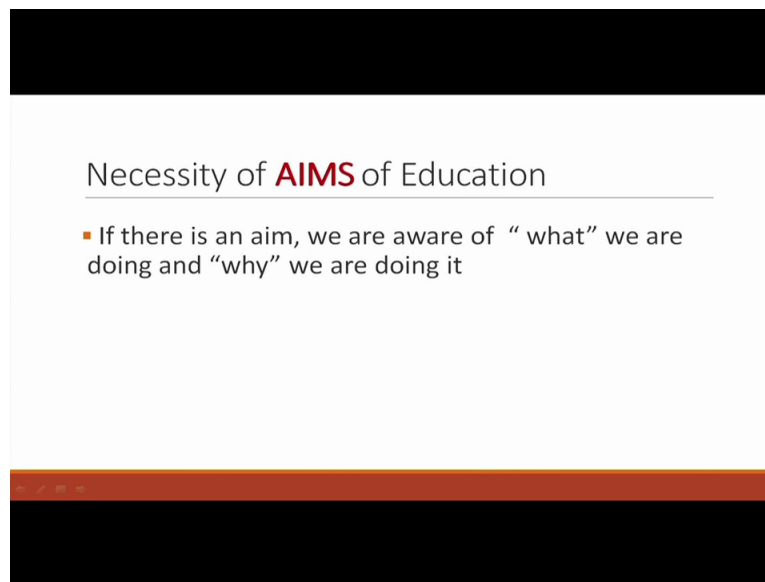
(Refer Slide Time: 4:39)



Now, what is an aim? Aim is a broad idea of what you hope to achieve by the end of the lesson. Aims are general statement. It concerning the overall goals, ends or intentions of teaching. Suppose, you want your learner will you want your learner after your teaching in achieve this goal, right. So, if you consider that there is an river and the opposite of the river the goal is there. So, the learner has to go and achieve that goal.

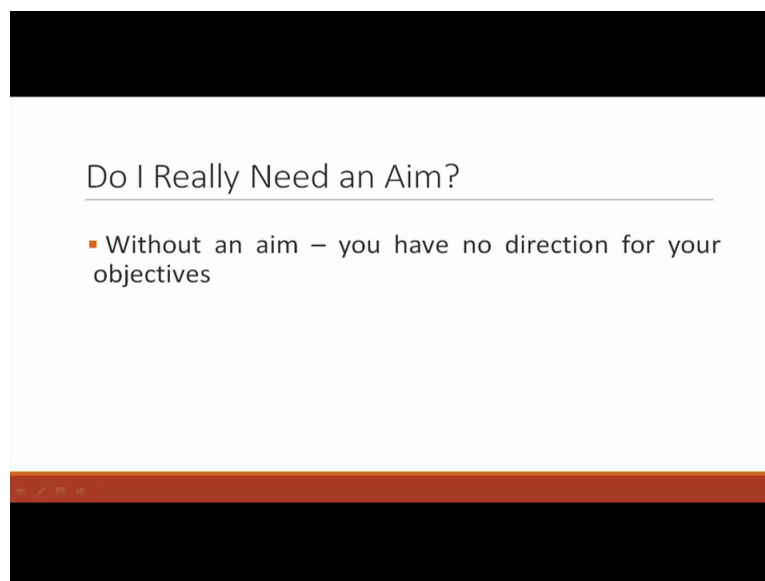
So, there is some stepping stones. So, right these stepping stones we call the objectives. So, that is the opposite side that goal that is the aim and the stepping stones is nothing but the objectives. So, in that case aims are general statements that provide direction okay and or intent to educational action, right. So, aims are usually long term. Long term, outcome is a mapping with that aims.

(Refer Slide Time: 5:54)



Now, is it necessary of the aims in education? If there is an aim we are aware of what we are doing and why we are doing it. So, there should be an aim. Aims are necessary to access the outcomes or results of the educative activity.

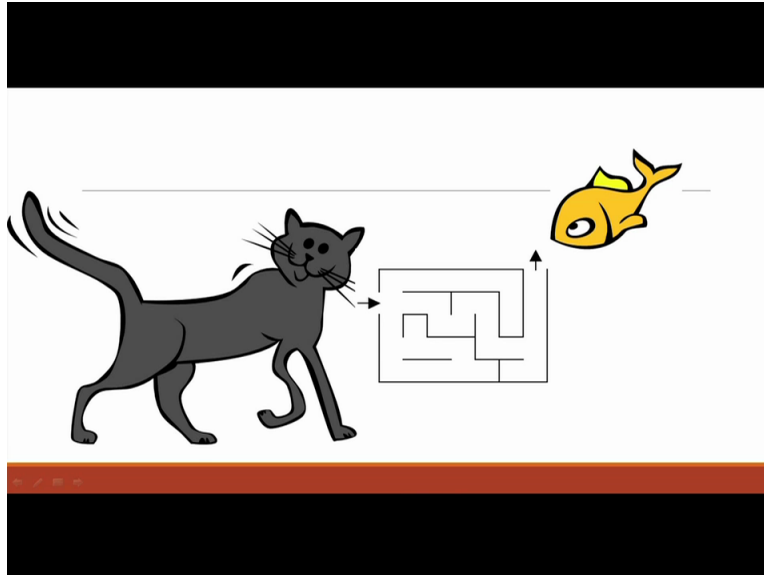
(Refer Slide Time: 6:19)



Now, do I really need an aim? Without an aim you have no direction for your objectives. So, you know to cross the river that is the aim and the in that case so, if you have aim then only you will get the objectives and you should decide on the aim of your lesson before writing the objective.

So, in a lesson what I want if I know what I want from the learner if I know that then it is easy for us , it is easy for the teacher to describe there was the objective is.

(Refer Slide Time: 7:00)




So, here in this picture watch there is one cat and other a fish. So, the cat he wants to eat that fish. So, fish to eat the fish is his aim and the cat is trying to cat is thinking how to go and catch the fish. So, then he will decide so that is his objectives and to eat the fish it is his aim.

(Refer Slide Time: 7:27)

OBJECTIVES

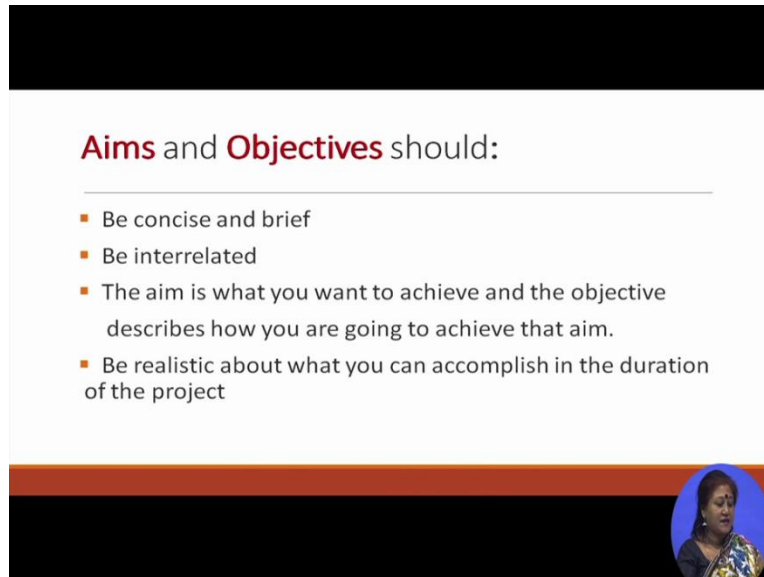
A specific and measureable milestone that must be achieved in order to reach the goal

Objectives are the individual stages that learners must achieve on the way in order to reach these goals. The step will take to achieve the aim



So, what is the objective? It is a specific and measurable milestone that must be achieved in order to reach the goal. So, objectives are the individual stages that learners must achieve on the way in order to reach these goals. So, the step we will take to achieve the aim.

(Refer Slide Time: 7:55)

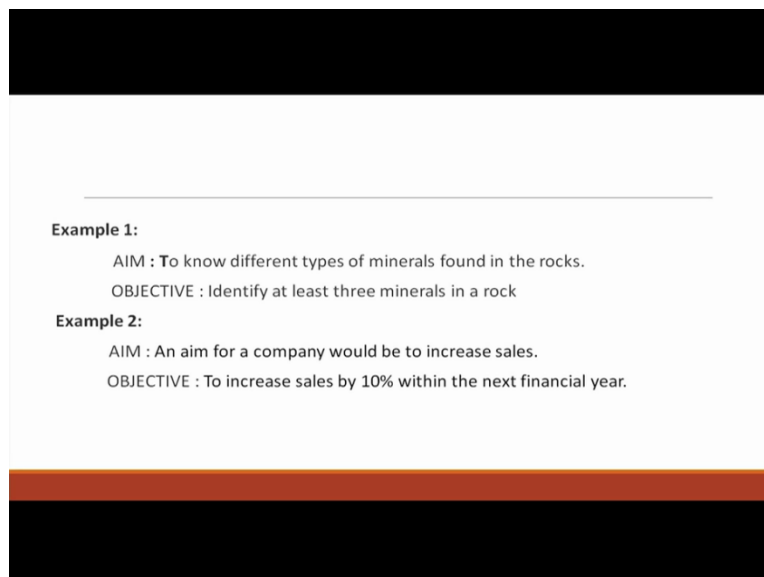


Aims and Objectives should:

- Be concise and brief
- Be interrelated
- The aim is what you want to achieve and the objective describes how you are going to achieve that aim.
- Be realistic about what you can accomplish in the duration of the project

Now, aims and objective should be it should be concise and brief, it should be interrelated. The aim is what you want to achieve and objective describes how you are going to achieve the aim. It should be realistic about what you can accomplish in the duration of the project.

(Refer Slide Time: 8:25)



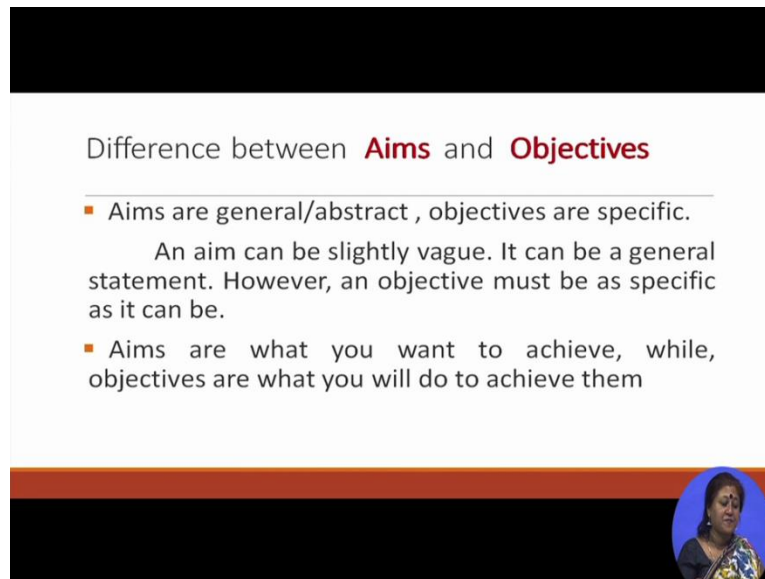
Example 1:
AIM : To know different types of minerals found in the rocks.
OBJECTIVE : Identify at least three minerals in a rock

Example 2:
AIM : An aim for a company would be to increase sales.
OBJECTIVE : To increase sales by 10% within the next financial year.

Suppose one example, aim to know the different types of minerals found in the rocks. This is the aim and objective I will say identify at least three minerals in a rock. The aim is identify to know different types of minerals found in the rocks, but what is the objective? We will in that case we will say identify at least three minerals in the rock.

Now, suppose example two, an aim for a company would be to increase sale. Increase sale is in a year increase sale this is the goal but what is the objective to increase sale by 10 percent within the next financial year that is more compact and that is more specific, right. So, there is a difference between aims and objectives.

(Refer Slide Time: 9:33)

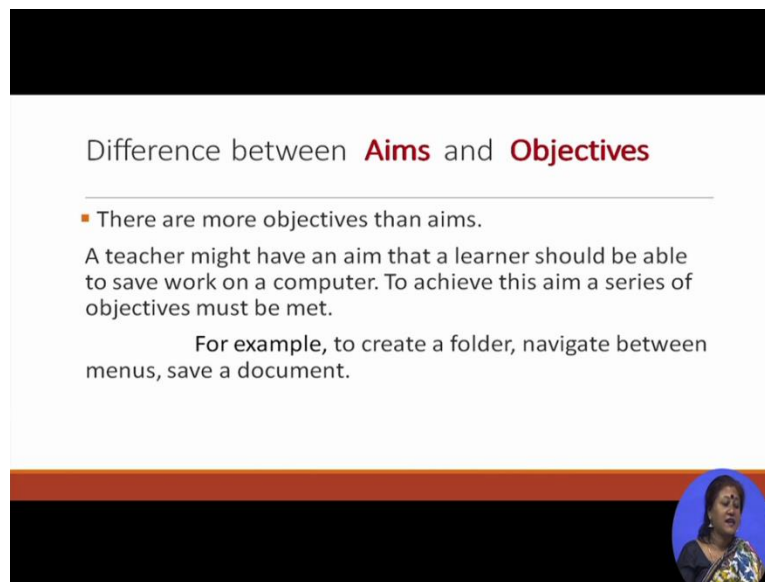


Difference between **Aims** and **Objectives**

- Aims are general/abstract, objectives are specific.
An aim can be slightly vague. It can be a general statement. However, an objective must be as specific as it can be.
- Aims are what you want to achieve, while, objectives are what you will do to achieve them

Aims are very general and abstract but objectives are very specific. Aims little bit slightly vague, this is the aim. It can be a general statement but objective it must be a specific that they the learner have to do this. So, it is very specific. Aims are what you want to achieve but objectives are what you will do it to achieve you have to don it in objective, right.

(Refer Slide Time: 10:00)



Difference between **Aims** and **Objectives**

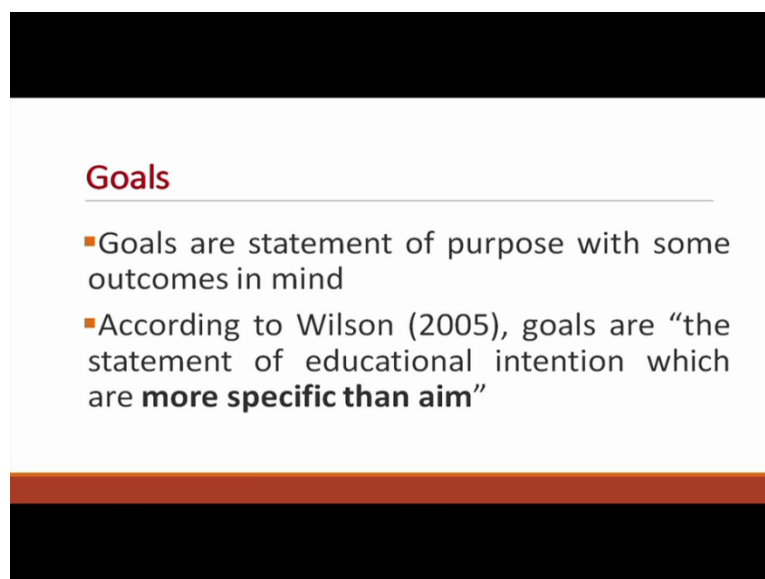
- There are more objectives than aims.

A teacher might have an aim that a learner should be able to save work on a computer. To achieve this aim a series of objectives must be met.

For example, to create a folder, navigate between menus, save a document.

So, there are more objectives than aim, suppose a teacher might have an aim that a learner should be able to save work in the computer. So, in that case the learner have to do, the learner have to create a folder, navigate between the menus, save a document, these things. So, these are objectives but the teachers aim that learner should save a work in a computer right. So, aims are like strategy and objectives are like tactics.

(Refer Slide Time: 10:30)

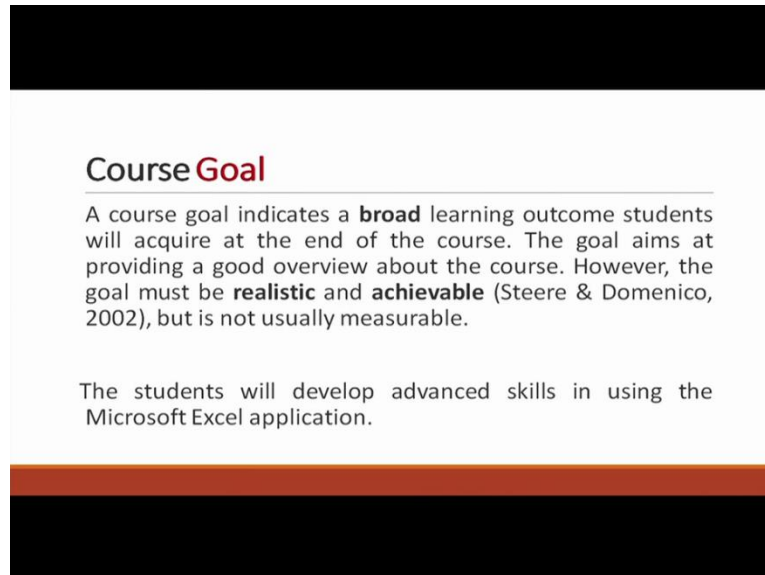


Goals

- Goals are statement of purpose with some outcomes in mind
- According to Wilson (2005), goals are “the statement of educational intention which are **more specific than aim**”

Now, goals what is goals? Goals is nothing but specific aims, goals are the statement of purpose with some outcomes in mind. So, according to Wilson, goals are the statement of educational institution which are more specific than the aims right.

(Refer Slide Time: 10:57)



Course Goal

A course goal indicates a **broad** learning outcome students will acquire at the end of the course. The goal aims at providing a good overview about the course. However, the goal must be **realistic** and **achievable** (Steere & Domenico, 2002), but is not usually measurable.

The students will develop advanced skills in using the Microsoft Excel application.

So, suppose a course goal, a course goal indicate a broad learning outcome students will acquire at the end of the course. At the end of the course this is the goal. The goal is at providing a good overview of that course however; the goal must be realistic and achievable but it is not usually measurable but objective is measurable but goal in that case, it is realistic and it should be achievable. You know you cannot, you know imagine that your learner will, if you do not you know at unrealistic you know, unrealistic goal you do not give them. So, course objective indicates a specific learning outcome which is derived from the course goal.

All course learning objective should be measurable which means that it is easy to observe when if students succeed or fail to learn a specific task. So, there is a difference between the goals and the objectives.

(Refer Slide Time: 12:10)

Difference between Goals and Objectives		
	GOALS	OBJECTIVES
Meaning	The purpose toward which an endeavour is directed	Something that one's efforts or actions are intended to attain or accomplish; purpose; target.
Principle	Based on Ideas	Based on Facts
Measure	Goals may not be strictly measurable or tangible.	Must be measurable and tangible
Orientation	Teacher-focused	Learner-centered
Action	Generic Action	Specific Action
Time Frame		

Goals from the meaning point of view, the purpose toward which an endeavor is directed. Objectives is something that one's effort or actions are intended to attain or accomplish purpose or target. So, from the principle point of view goals, it based on the ideas. Ideas of the teacher this is the goal and object is based on the facts whatever they have to do principle is based on the facts.

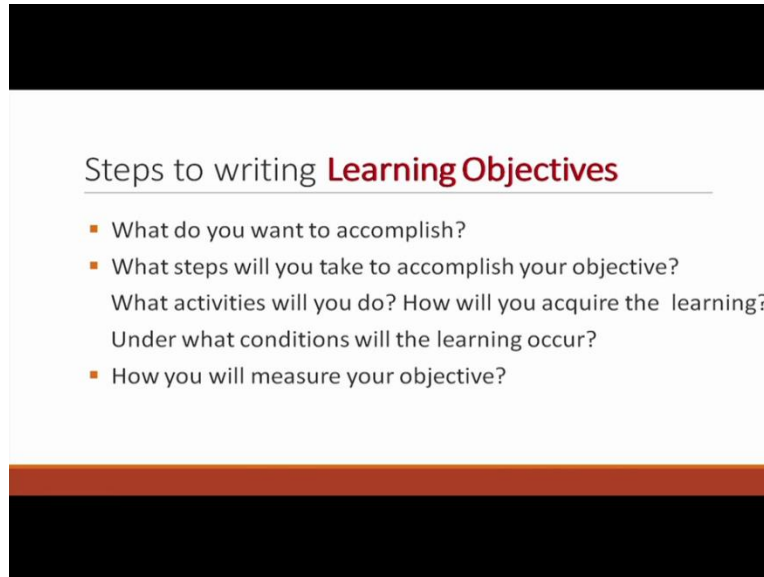
From the measure point of view, goals may be strictly measurable or tangible, but what is the difference between the goals and objectives. Now, from the meaning point of view, the goals is the purpose towards which an endeavor is directed that is the goals and object is something that one's efforts or actions are intended to attain or accomplish purpose that is the target. So, from the principle goals is based on the ideas but objective, it based on the facts.

From the measuring point of view, goals may not be strictly measurable. It is may not be strict it is the aim right, it is the goal of the teacher but what goal of the learner or the from the learner point of view from the instructors point of view but objective, it must be measurable and tangible.

From the orientation point of view I can say goal is teacher oriented but objective is learner oriented what the learner can do and in the goals means what the teacher wants. So, action it is generic action but in the objective it is specific action. Now, in the from the time frame, it is

longer term right goal, in the longer term the learner can achieve but objective it is mid to short term.

(Refer Slide Time: 14:28)



The slide features a white background with a black header bar at the top and a black footer bar at the bottom. A thin orange horizontal line separates the header from the main content area. The title 'Steps to writing Learning Objectives' is centered in the main area, with 'Learning Objectives' in a larger, bold, orange font. Below the title is a list of four questions, each preceded by a small orange square bullet point. The questions are: 'What do you want to accomplish?', 'What steps will you take to accomplish your objective?', 'What activities will you do? How will you acquire the learning?', and 'Under what conditions will the learning occur?'. The final question, 'How you will measure your objective?', is not preceded by a bullet point.

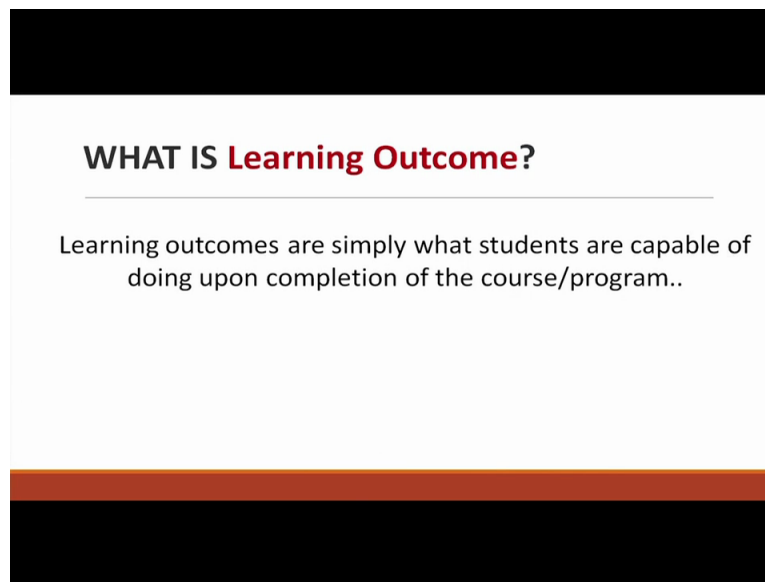
Steps to writing Learning Objectives

- What do you want to accomplish?
- What steps will you take to accomplish your objective?
What activities will you do? How will you acquire the learning?
Under what conditions will the learning occur?
- How you will measure your objective?

So, to there are some steps to writing the learning objectives and some question it will come when we will write we will check that whether it is you know this question always you when we will write the objective we will keep this in our mind what do you want to accomplish, right.

What steps will you take to accomplish your objective? What activities will you do? How we will acquire the learning? Under what condition will the learning occur? How will you how you will measure your objective right? So, what now these things when you will write the learning objective we will keep in our mind.

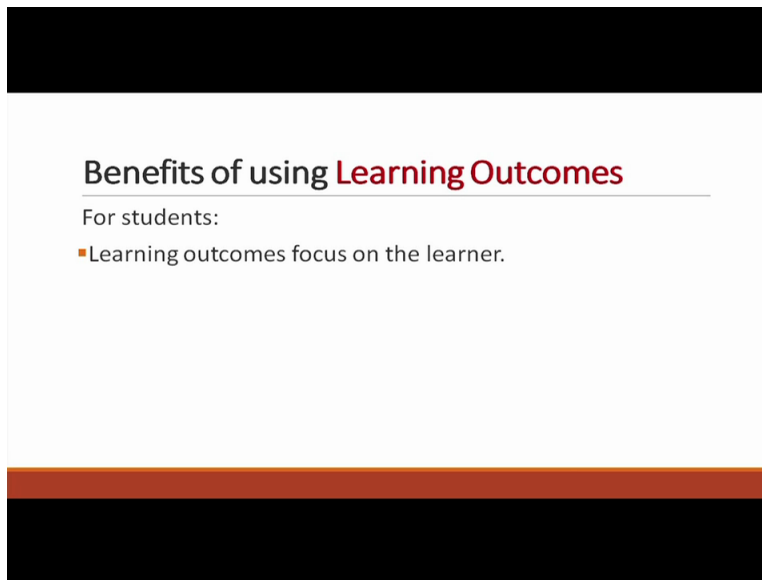
(Refer Slide Time: 15:11)



Now, what is learning outcome? What is learning outcome? Learning outcomes are simply what students are capable of doing upon completion of the course or the program.

A good learning outcomes states what a student will know or be able to do at the end of the instruction. At the end of the 40 hours of the course what the student can do it that is important not the route learning. So, it focuses on students' performance. So, what they can perform right. So, there are some benefits using learning outcome from students point of view what's that learning outcome, it focuses on the learner.

(Refer Slide Time: 15:55)



A presentation slide with a black header and footer, and a white central area. The title 'Benefits of using Learning Outcomes' is in black, with 'Learning Outcomes' in red. Below the title is a horizontal line. The text 'For students:' is followed by a single bullet point: 'Learning outcomes focus on the learner.'

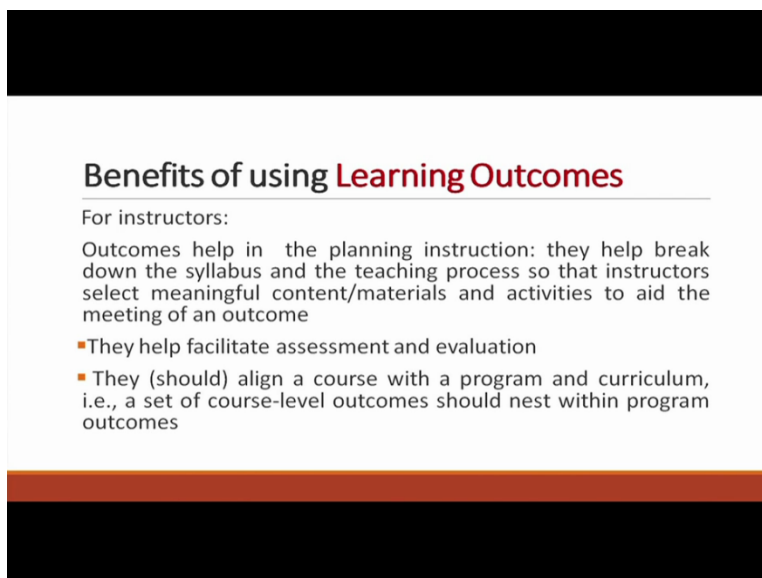
Benefits of using Learning Outcomes

For students:

- Learning outcomes focus on the learner.

Well-written learning outcomes should give student, precise statements of what is expected of them if the learning outcome is written so if they okay, after you know learning or after studying we will achieve this what the teacher wants that is the student can this is the learning outcome if they know, it is easy for them to learn on their own. Students can use the outcomes to measure and guide their own learning and determine how much support to ask for pursue.

(Refer Slide Time: 17:40)



A presentation slide with a black header and footer, and a white central area. The title 'Benefits of using Learning Outcomes' is in black, with 'Learning Outcomes' in red. Below the title is a horizontal line. The text 'For instructors:' is followed by a paragraph and two bullet points.

Benefits of using Learning Outcomes

For instructors:

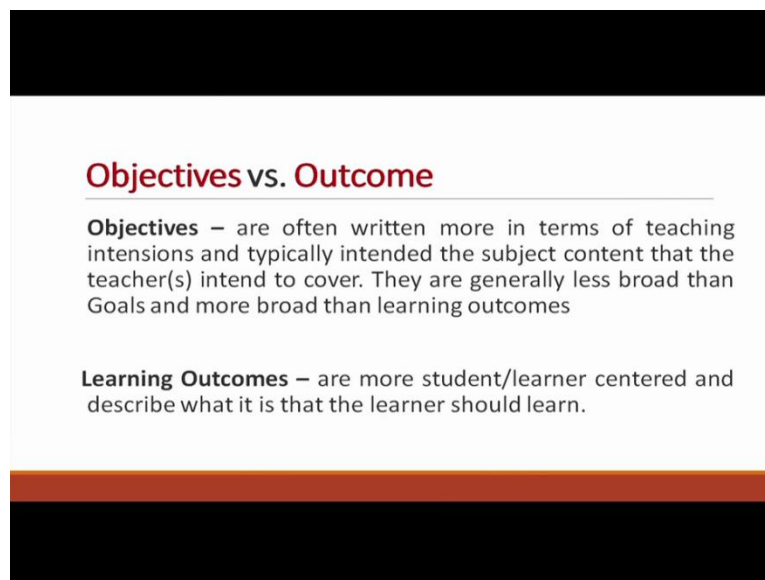
Outcomes help in the planning instruction: they help break down the syllabus and the teaching process so that instructors select meaningful content/materials and activities to aid the meeting of an outcome

- They help facilitate assessment and evaluation
- They (should) align a course with a program and curriculum, i.e., a set of course-level outcomes should nest within program outcomes

Benefits for of using learning outcome from the instruction point of view what is that, outcomes help in planning instruction right. They help the break down the syllabuses and the teaching processes. They can break down so that the instructor select some meaningful content or materials and activities to meet the meeting of an outcome.

So, they help facilitate assessment and evaluation was that if they know that this is the learning outcome and this the learner will get in that case they can make their question paper, assessment and evaluation paper according to that. So, they should align a course with a program and curriculum that is a set of course level outcome should met within the program outcome that we will discuss in our next lesson how they can that the assessment and evaluation they can do.

(Refer Slide Time: 17:46)



Objectives vs. Outcome

Objectives – are often written more in terms of teaching intentions and typically intended the subject content that the teacher(s) intend to cover. They are generally less broad than Goals and more broad than learning outcomes

Learning Outcomes – are more student/learner centered and describe what it is that the learner should learn.

Now, there is a difference between the objectives and outcomes. Now, what the objectives are often written mode in terms of teaching intentions right and typically intended the subject content that the teachers intent to cover what the amount the teacher intend to took cover it. They are generally less broad than goal if the goal you know, it is very broad. It is generally less broad than the goal but it is more you know broad than the learning outcomes. So, goal, objectives, learning outcome.

Now, learning outcome are most students or the learner centered and described what it is that the learner should learn. So, there is a difference between the objectives and the outcomes. So

objective something that owners effort or actions are intended to attain or accomplish purpose target after a given period of time but the outcomes something that owners, efforts or actions are intended to attain or accomplish but in a given period of time, okay. So, once the principle is based objective it based on the facts.

(Refer Slide Time: 19:09)

Difference between Objectives and Outcomes		
	OBJECTIVES	OUTCOMES
Meaning	Something that one's efforts or actions are intended to attain or accomplish; purpose; target after a given period of time	Something that one's efforts or actions are intended to attain or accomplish; purpose; target in a given period of time
Principle	Based on facts	Based on detailed facts
Measure	Must be measureable and tangible	Must be measureable and Tangible as per the objective
Plan	Medium plan	Narrow plan
Action	Specific Action	Specific Action on each topic
Time Frame	Mid to short term	Short term

An outcome it based on the detailed facts. Measure you know, it must be measurable and tangible but outcome, it must be measurable and tangible as per the objective if this objective is given so that learning outcome whether it is achieve or not that we have to see. The plan objective is medium plan but outcome is more narrow learning outcome is a narrow plan. Action, objective is a specific action but outcomes is the specific action of each topic right. So, time frame it is mid or short time but it is very short term right.

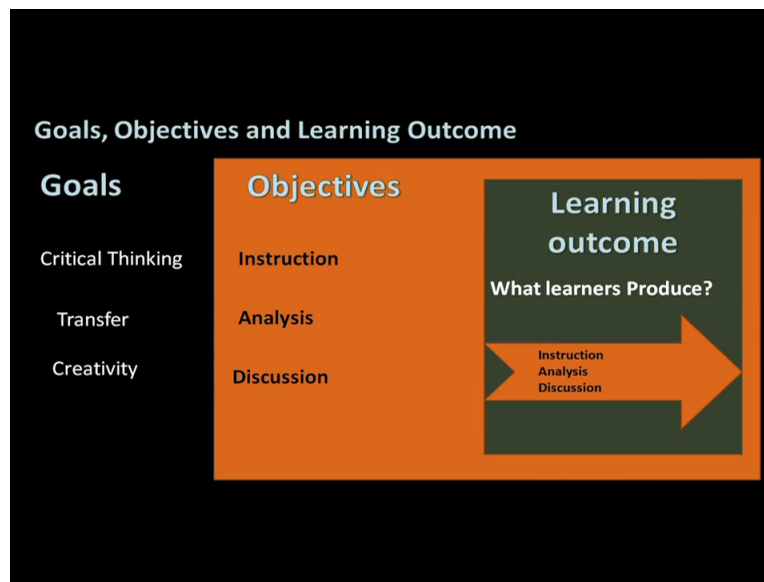
(Refer Slide Time: 20:01)

COURSE OBJECTIVES	COURSE LEARNING OUTCOME
What the teacher expects students to know and be able to do (as a whole) at the end of the instruction	What the students are able to do (specific) at the end of the instruction
Not behavioural in nature – Verbs: Know, Understand	Stated in behavioural terms – Verbs: Identify, Discuss, Evaluate
One course objective may generate several learning outcomes	Several learning outcomes are derived from one course Objective
Objectives are intended results or consequences of instruction, curricula, programmes or activities	Outcomes are achieved results or consequences of what was learned – evidence that some learning took place

So, course objectives and course learning outcomes, suppose what the teacher expect students to know and be able to do at the end of the instruction that is the course objective and learning outcome what the students are able to do so, it is specific do at the end of the instruction. Now, it is not course objective is not behaviorally in nature verbs is know, understand, you know I may not you may understand I may not one student can understand another may not but in the learning outcome, the action was the very selected identify this, discuss this, evaluate your answer, justify your answer so that is the learning outcome.

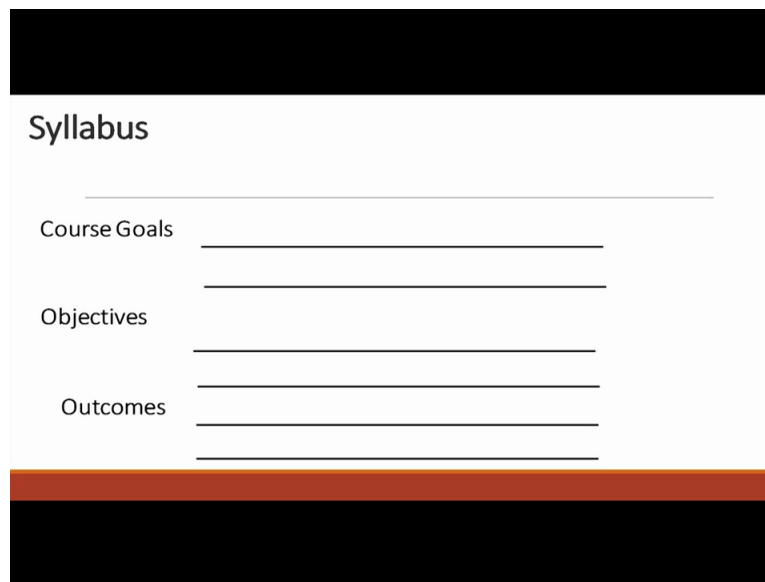
One course objective may generate several learning outcomes so right but learn goal several learning outcomes all together they are derived from one course objective. Now, objectives are intended results or consequences of instruction, curricula programs or activities but outcomes are achieve results of the consequences of what was learned. So, evidence that some learning took place that is the thing learning outcome.

(Refer Slide Time: 21:39)



So, this in this picture. The goal, goals is the broad thing, it will the critical thinking, transfer of fountains, creativity. So, this is the goals in that goals apart that is the objectives. Objective is the stepping stones to achieve that goal right. So, in that case the instruction you know analysis of the you know case studies, case discussion you know to achieve that goal the learner have to do the case studies, case instruction and what is the learning outcome using this instruction, analysis and discussion what the learner can produce right that is the learning outcome. So, that is the difference that is the, you know total picture you can I can say that the goals, objectives and learning outcome.

(Refer Slide Time: 22:37)



Syllabus

Course Goals _____

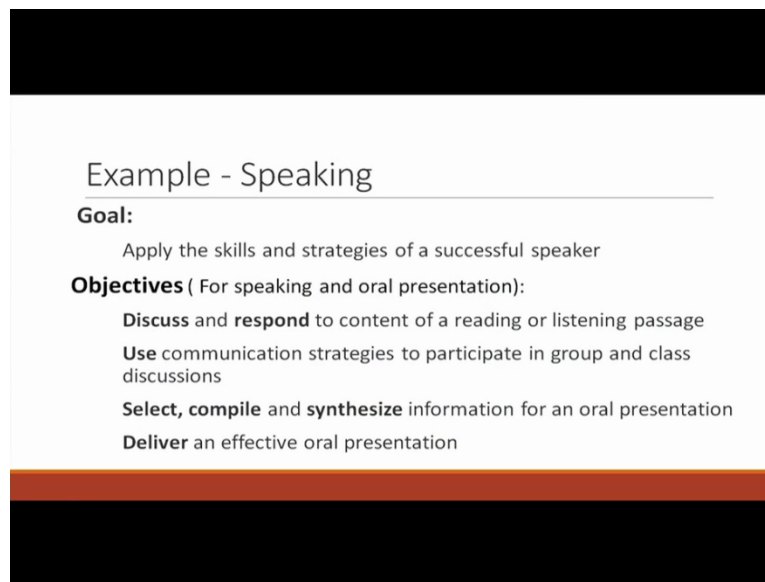
Objectives _____

Outcomes _____

Now, in the syllabus if I write what is the course goal as a teacher what is the course goal? What the objectives? What the learning outcome you want from your learner, right. If it is clear then it is easy for the learner to know okay, this teacher he wants that after 40 hours of lecture they wants that so that they can prepare you know on their own to achieve that in the class or they can you know concentrate so that they can get that learning outcome.

Now, suppose example one speaking we write the goal is the apply the skills and strategies of a successful speaker so that is the goal. Now, what is the objectives for speaking or oral presentations suppose discuss and respond to content of a reading or listening passage, right. Discuss respond it is important, use communication strategies to participate in group and class discussions.

(Refer Slide Time: 23:36)



Example - Speaking

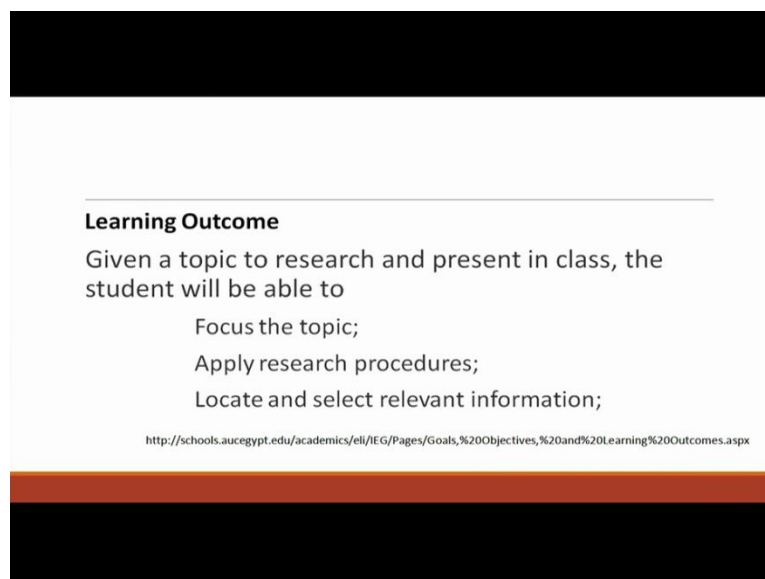
Goal:
Apply the skills and strategies of a successful speaker

Objectives (For speaking and oral presentation):

- Discuss** and **respond** to content of a reading or listening passage
- Use** communication strategies to participate in group and class discussions
- Select, compile** and **synthesize** information for an oral presentation
- Deliver** an effective oral presentation

Select compile and synthesize information for an oral presentation and deliver an effective oral presenter. So, that is the objectives the teacher thinks.

(Refer Slide Time: 24:07)



Learning Outcome


Given a topic to research and present in class, the student will be able to

- Focus the topic;
- Apply research procedures;
- Locate and select relevant information;

<http://schools.aucegypt.edu/academics/eli/IEG/Pages/Goals,%20Objectives,%20and%20Learning%20Outcomes.aspx>

So, what is the learning outcome? Given a topic to research and present in class. The student will be able to focus on the topic, apply research procedures and locate and select relevant information. So, that is the things goals, objectives and outcomes.

(Refer Slide Time: 24:19)



SMART Learning Objectives/Outcomes

Learning objectives should be – **SMART**

- S - Specific**
- M - Measureable**
- A - Achievable**
- R - Relevant**
- T - Time Related**

Now, I will how to write a SMART learning objectives or outcome. Learning objective should be SMART. What's that SMART S for specific, M for measurable A for achievable, R for relevant and T for time related right.

(Refer Slide Time: 24:41)



SMART Learning Objectives/Outcomes - **Specific**

S: What is specific about the goal?

Is It Specific?

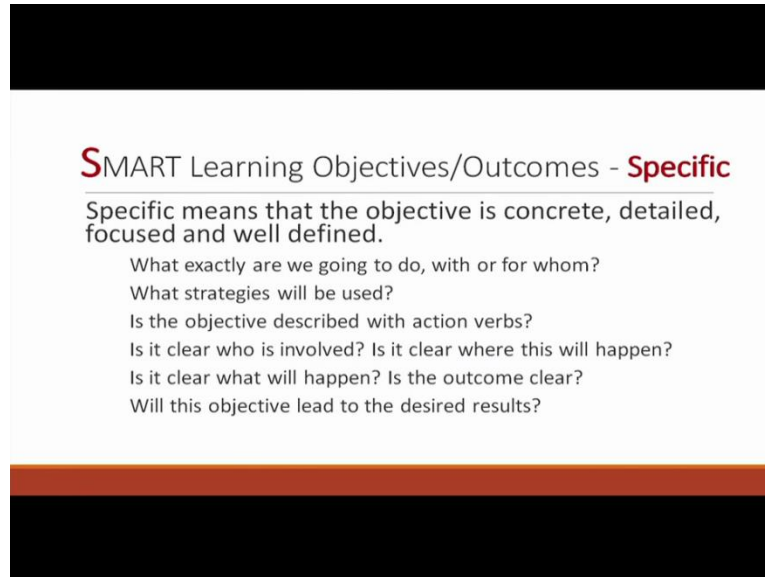
- Encourage more people to join the Sports Centre
Increase membership of the Sports Centre
- Conduct research
Formulate plans for research on topic X

https://www.wcasa.org/file_open.php?id=910

So, smart learning objective the first S specific. What is specific about the goal is first, encourage more people to join the spots center, is it specific? Now, increase membership of the sports center. So, encourage you know that is the increase it so just very specific, okay conduct

research, is it more specific? Number, formulate plan for research on topic X. so, this is more specific. So, specific means that the objective is concrete detailed focused and well defined right.

(Refer Slide Time: 25:22)



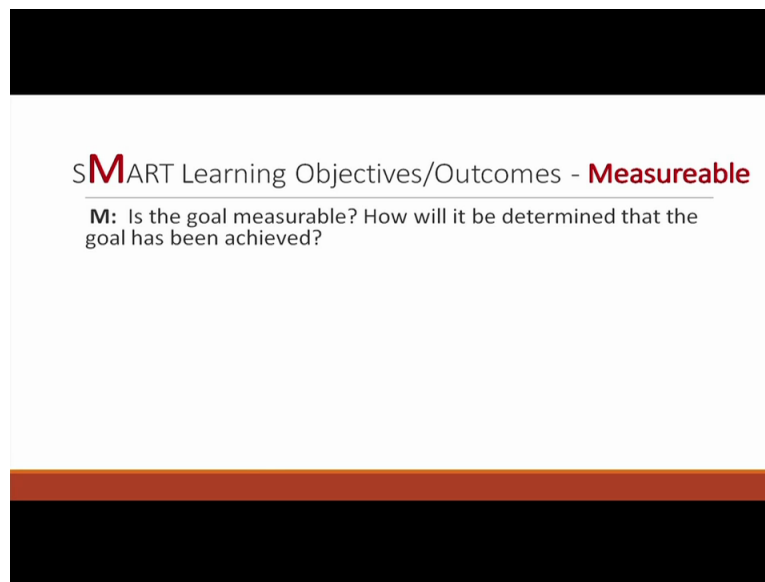
SMART Learning Objectives/Outcomes - Specific

Specific means that the objective is concrete, detailed, focused and well defined.

- What exactly are we going to do, with or for whom?
- What strategies will be used?
- Is the objective described with action verbs?
- Is it clear who is involved? Is it clear where this will happen?
- Is it clear what will happen? Is the outcome clear?
- Will this objective lead to the desired results?

So, some question you know you will think that when there is a specific when write the objective or outcome. What exactly are we going to do, with or for whom? What strategies will be used is the objective described with action verbs? Is it clear who is involved? Is it clear where this will happen? Is it clear what will happen? Is the outcome clear? So, will the objective lead to the desired results? So, it should be very when we will write the learning objective and outcome, it should be very specific.

(Refer Slide Time: 26:05)

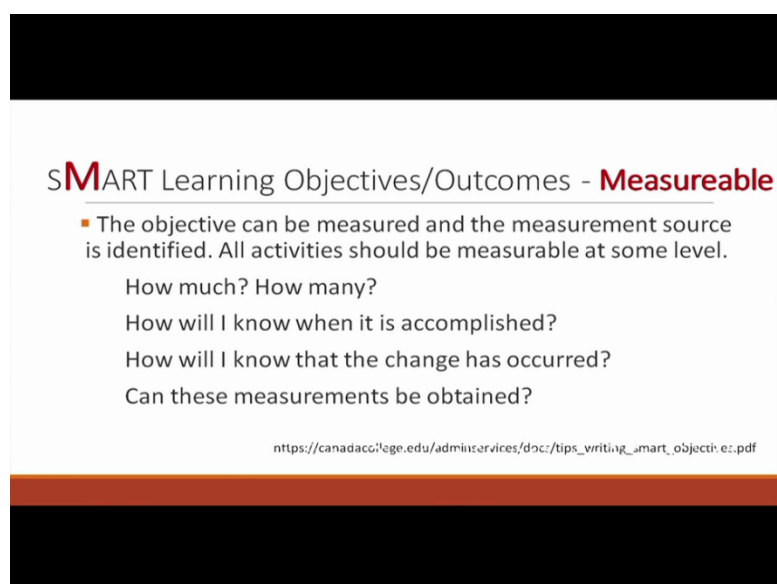


SMART Learning Objectives/Outcomes - **Measureable**

M: Is the goal measurable? How will it be determined that the goal has been achieved?

Now, the M for the measurable. M is the goals measurable how we will be determine that the goal has been achieved. So, it should be measurable. So, increase membership of the sports center but is it measurable? No. Increase membership of the sports center by suppose 10 percent. So, 10 percent you know it is measurable right. Formulates plans for the research topic X but here, formulate plans for the research on topic X and submit grant application to X research council. So, it is measurable.

(Refer Slide Time: 26:56)



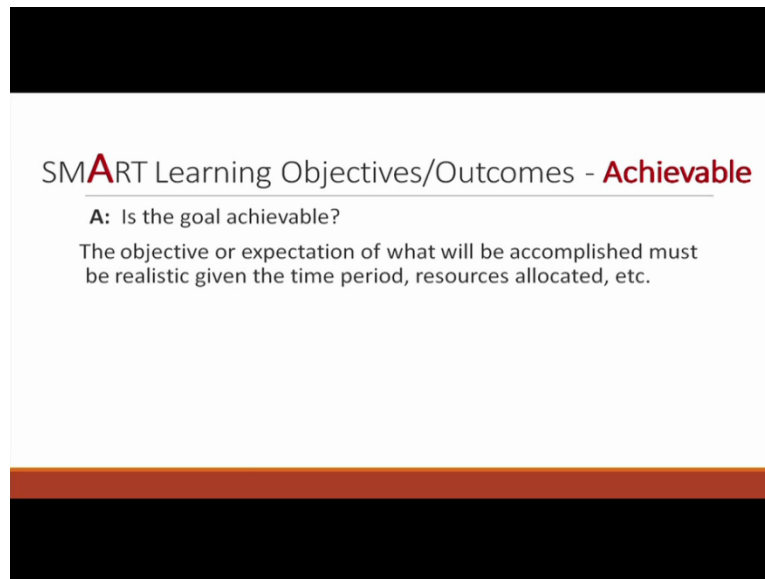
SMART Learning Objectives/Outcomes - **Measureable**

- The objective can be measured and the measurement source is identified. All activities should be measurable at some level.
 - How much? How many?
 - How will I know when it is accomplished?
 - How will I know that the change has occurred?
 - Can these measurements be obtained?

https://canadacollege.edu/adminservices/docs/tips_writing_smart_objectives.pdf

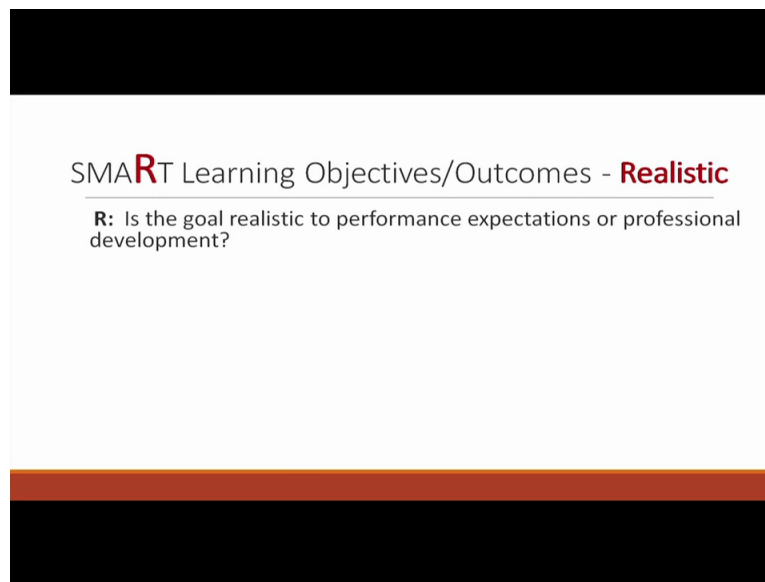
So, the objective can be measured and the measurement source is identified right. All activities should be measured at some level. How much? How many? How will I know when it is accomplished? How will I know that the change has been occurred right? Can these measurements be obtained? So, all these you know we will when we will write is it measurable that point we should keep it in our mind.

(Refer Slide Time: 27:21)



SMART it should be A, A for achievable. Is the goal achievable? So, the objective if I say a expectation of what accomplish must be realistic you know within the time period. So, is it really achievable? So, can we you know if I think that they can do that, it is you know our , problem. So, in that case what the objective is achievable or not that we have to take. So, can we get it done in the proposed time frame? Do I understand the limitations and constraints? Has anyone else done this successfully is this possible? So, this is for the achievable part that SMART A.

(Refer Slide Time: 28:07)



SMART Learning Objectives/Outcomes - **Realistic**

R: Is the goal realistic to performance expectations or professional development?

The slide features a white central area with a thin orange border. It is framed by a thick black bar at the top and a thick orange bar at the bottom, which is itself above a thick black bar.

What is R? R is the goal realistic to performs performance expectations or professional development to be realistic. It must represent an objective toward believe you are both willing and able to work your objective is probably realistic if you truly belief that it can be you have to believe that okay, it can be achievable so, it should be realistic. Objective should be challenging but achievable they should not be unrealistic, suppose if I think that you know that it is my plan is to lose 10 pounds in weight but it is unrealistic to plan if I lose 10 pounds you know in one week, it is very difficult. So, this is the plan should be very realistic.

(Refer Slide Time: 29:08)

SMART Learning Objectives/Outcomes – **Time Bounded**

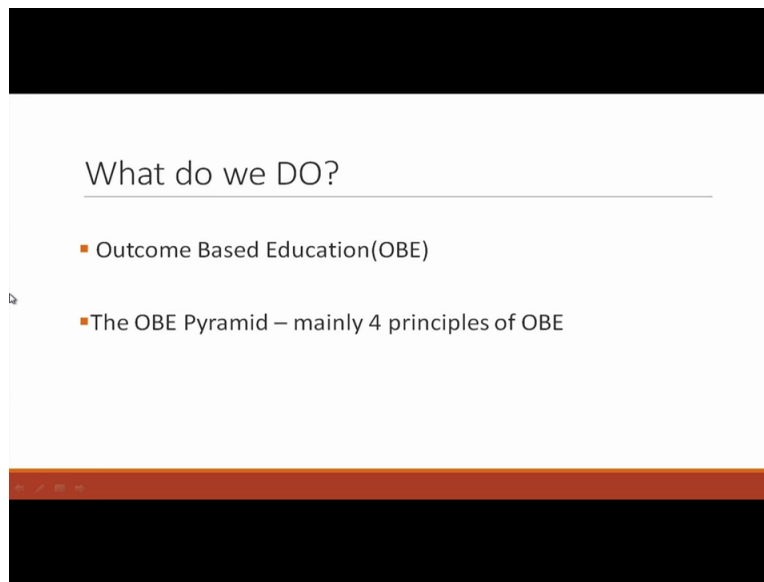
- Once a month, update all library web pages and printed guides
- Circulate minutes of Committee Y within **five days of the meeting.**

T is for time bounded, increase membership of the sport center by 10 percent the previous but increase membership of the sports center by 10 percent over the next six months. So, that is the time period we should maintain. Formulate plans for the research topics X and submit grant application to X research council but by 1st June 2009, so this 1st June 2000 that time bounded. Once a month, update all library web pages and guides once a month. Circulate minutes of committee Y within 5 days of the meetings. So, five days of the meeting is important. So, that in the SMART we should be when we will write the learning objectives and learning outcome we will very we will think this five points carefully and then only we will write the learning objectives. Thank you.

Outcome based Pedagogic Principles for Effective Teaching
Dr. Tamali Bhattacharyya
Center for Educational Technology
Indian Institute of Technology Kharagpur
Lecture 09
Outcome based Education (Contd.)

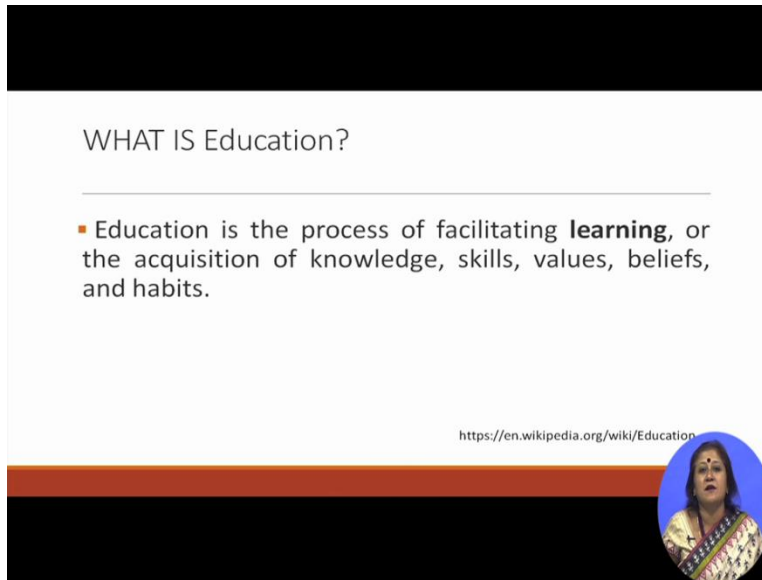
Outcome based education.

(Refer Slide Time: 0:24)



Today what we will do we will do what is that outcome education and I will teach you the OBE pyramid mainly the four principles of OBE.

(Refer Slide Time: 0:37)



WHAT IS Education?

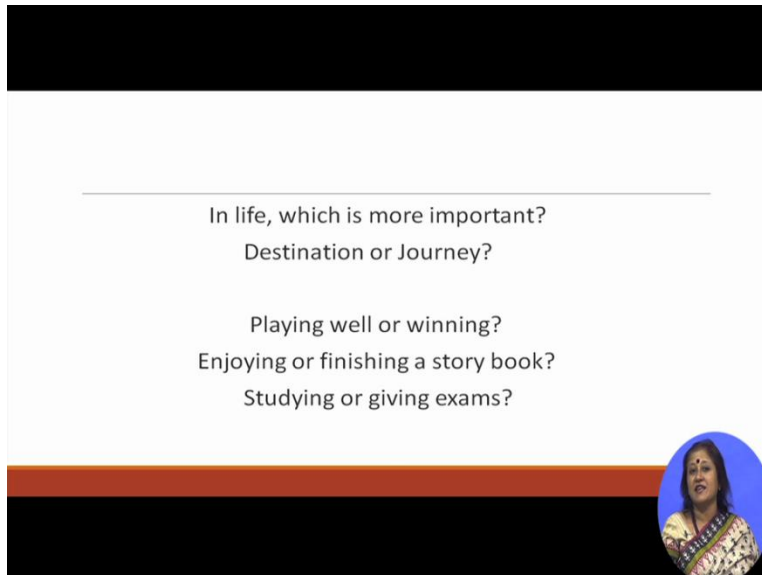
- Education is the process of facilitating **learning**, or the acquisition of knowledge, skills, values, beliefs, and habits.

<https://en.wikipedia.org/wiki/Education>



Now, before starting the outcome based education, it is better to learn what is education. Education is the process of facilitating learning or the acquisition of knowledge, skills, values, beliefs and habits according to the Wikipedia. Here, the main component here is learning, rather than the acquisition of knowledge.

(Refer Slide Time: 1:03)




In life, which is more important?

Destination or Journey?

Playing well or winning?

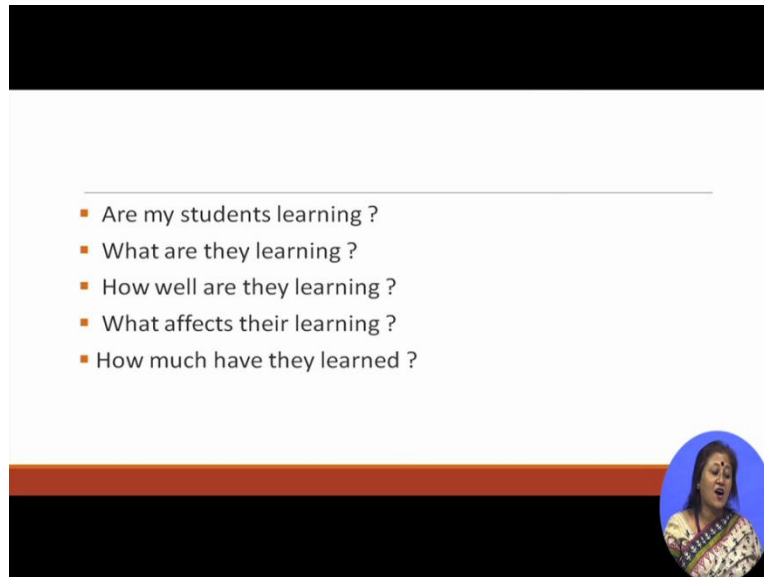
Enjoying or finishing a story book?

Studying or giving exams?



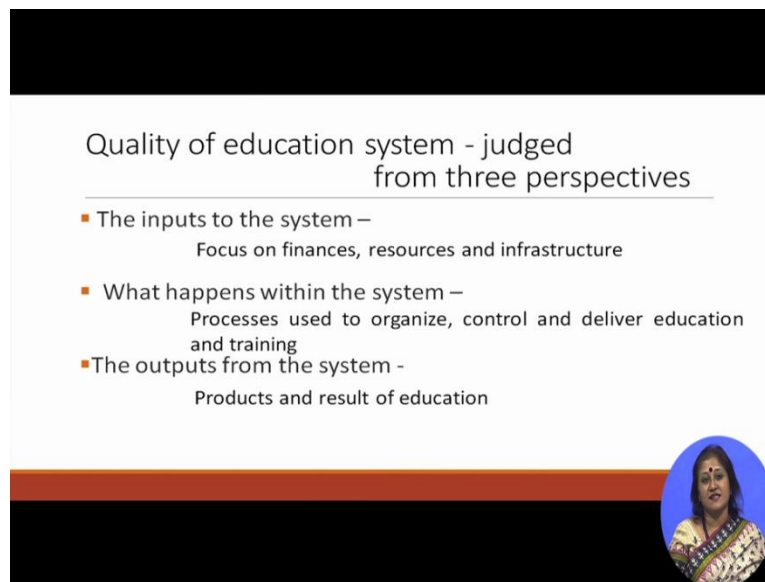
Now, let us come to some philosophical question. In life, which is more important? Destination or journey? Playing well in a game or winning the game which one is important? Enjoying a story book or just finish the story book? Studying it or giving exams?

(Refer Slide Time: 1:52)




So, nowadays what we notice that the students, they just do not want to come to the class. So, some questions always in the teachers mind that, are my students learning? What are they learning? How well are they learning? What affects their learning and how much have they learned? So, all these questions the teachers think and so, the priority of teaching you know the priority now, it moves to the learning rather than the teaching. So, the main focus is on the outcome based learning.

(Refer Slide Time: 2:16)



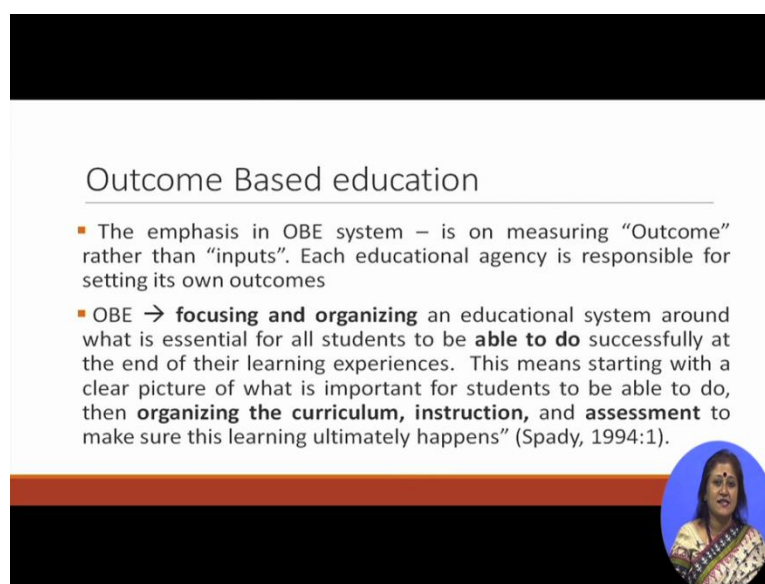
Quality of education system - judged from three perspectives

- The inputs to the system –
Focus on finances, resources and infrastructure
- What happens within the system –
Processes used to organize, control and deliver education and training
- The outputs from the system -
Products and result of education




Now, quality of education system judged from three perspectives what is the one-the inputs to the system, what happens within the system and the outputs from the system. The inputs to the system mainly focus on the finances, resources and infrastructure of the institution and what happens within the system? Processing used to organize, control and deliver education and the training and outputs of the system is the products and the result of education. So, the output is very very important.

(Refer Slide Time: 2:59)



Outcome Based education

- The emphasis in OBE system – is on measuring “Outcome” rather than “inputs”. Each educational agency is responsible for setting its own outcomes
- OBE → **focusing and organizing** an educational system around what is essential for all students to be **able to do** successfully at the end of their learning experiences. This means starting with a clear picture of what is important for students to be able to do, then **organizing the curriculum, instruction, and assessment** to make sure this learning ultimately happens” (Spady, 1994:1).



Outcome based education- it emphasis on measuring outcome rather than the inputs and each educational agency is responsible for setting its own outcomes. So, in that case, according to the Spady the definition is focusing and organizing an educational system around what is essential for all students to able to do, the do component is very important.

Able to do successfully at the end of their learning experiences. This means starting with a clear picture of what is important for the students to be able to do and then organizing the curriculum, instruction and assessment to make sure this learning ultimately happens.

(Refer Slide Time: 3:59)



Different views of OBE

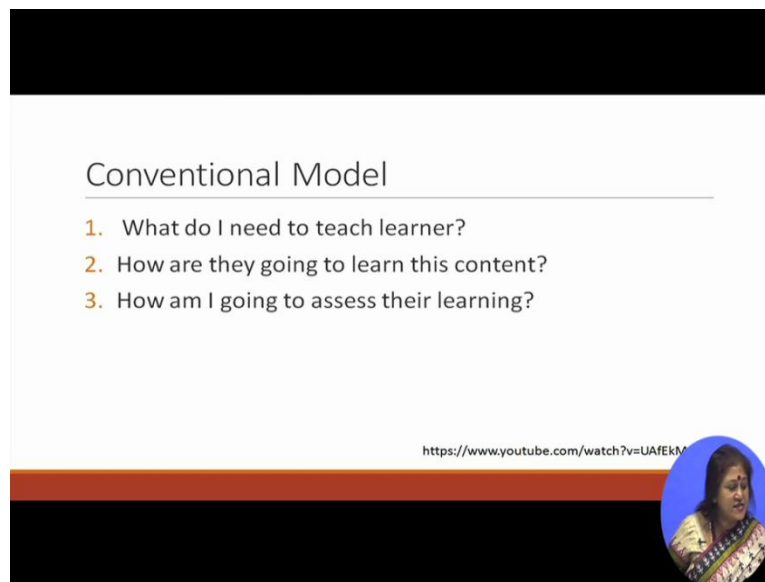
- As a theory of Education
- As a systematic structure for Education
- As a classroom practice

William Spady is regarded as
OBE's leading advocate -
A PARADIGM PIONEER

The slide features a portrait of William Spady, a man with a receding hairline wearing a light-colored button-down shirt. In the bottom right corner, there is a small circular inset showing a woman with dark hair wearing a colorful patterned sari. The slide has a white background with a black header and footer, and a thin orange horizontal line above the footer.

So, different view of OBE is a, as a theory of education, as a systematic structure for education, as a classroom practice and William Spady is regarded as the OBE's leading advocate A PARADIGM PIONEER.

(Refer Slide Time: 4:18)



Conventional Model

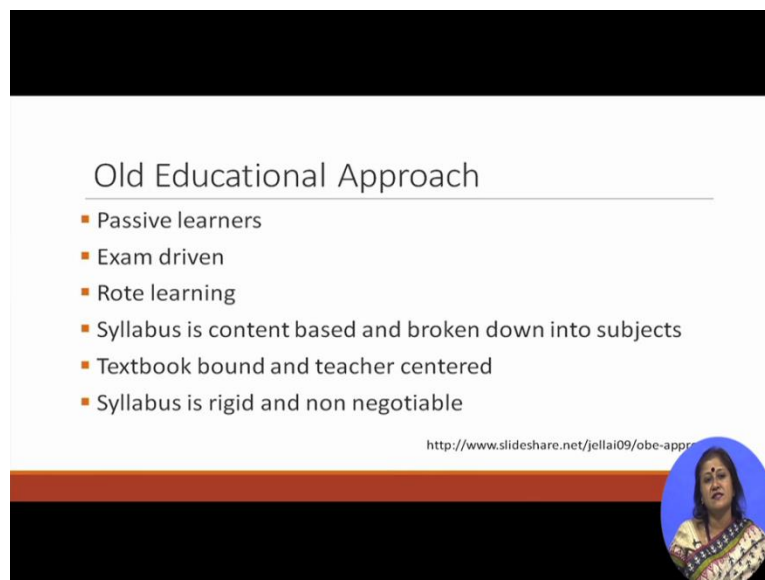
1. What do I need to teach learner?
2. How are they going to learn this content?
3. How am I going to assess their learning?

<https://www.youtube.com/watch?v=UAFekM>

A circular inset image of a woman with dark hair, wearing a colorful patterned sari, is positioned in the bottom right corner of the slide.

The conventional model mainly we three things that you know questions that what do I need to teach learner, according to the conventional thing and how are they going to learn this content and how am I going to assess this their learning. So, here the main component is the content. What the content and after that what the learning thing right.

(Refer Slide Time: 4:48)



Old Educational Approach

- Passive learners
- Exam driven
- Rote learning
- Syllabus is content based and broken down into subjects
- Textbook bound and teacher centered
- Syllabus is rigid and non negotiable

<http://www.slideshare.net/jellai09/obe-appro>

A circular inset image of a woman with dark hair, wearing a colorful patterned sari, is positioned in the bottom right corner of the slide.

So, in that case in the old educational approach, the learners are the passive learners. So, what the teachers are teaching the learners they are passive learners they are listening. So, an it is

mainly the exam driven and whatever they have to for the teachers, they follow some textbook and when they are follow the textbook the main importance you know to cover the textbook. So, it is in the not the breadth think but not the depth of the topic. So, mainly it is focusing to the rote learning that means the teachers the students, the learners they are memorize something and give the exam. So, it is the rote learning type.

Syllabus that is why it is content based and Brocken down into subjects. Textbook bound that I already measured and the teacher centers whatever when we were in our child, at that time whatever my teachers is teaching because we do not have any other option, you know just to listen the teachers things and we take the notes and give the exam.

Sometimes we go to the library and take the reference book but we do not have any internet facility. So, we cannot compare that suppose in NPTEL lectures or this is (the) for the mooc lectures, I learn something you know that but that is absent at that time. So, it is totally a textbook bound and teacher centered and syllabus that was rigid and it is non-negotiable.

(Refer Slide Time: 6:39)

Outcome Based Model

1. What will learners able to do?
2. How can we assess their ability to do it?
3. What content do we need to teach for learners to demonstrate their learning?

<https://www.youtube.com/watch?v=UAFekM>

Teachers are only responsible for learning, motivation depends upon the personality of the teachers, some they are excellent teachers still you know it is in our mind that how good that teacher is. Emphasis on teacher's hopes to achieve, content placed into rigid time frame, in this

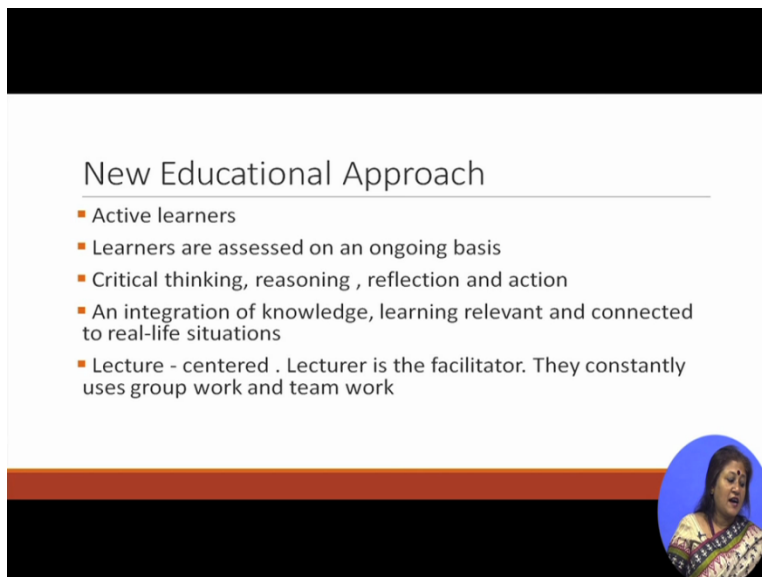
time frame I have to complete this course, curriculum development process is not open to the public comment.

Nowadays you know in the suppose in the mooc if you giving the lecture's the public comment is there that we have to cater or we have to know okay and in that way we can improve oor teaching method or teaching lectures. So, but at that time, it was absent. So, the focus of attention is now outcome based model.

Outcome based model means it is total what will learners able to do, so the do component is very important that means the able what that is the skillset what they know, knowing thing is important but the thing is that where they can do it? What they can apply it or can they analysis it that is very important.

So, here an how can we assess the ability to do it and what content do we need to teach for learners to demonstrate their learning's. So, in that case, the thing is that it is the phase the content it comes later. So, what the learner will do it comes fast and then (comp) and each learners are different some are deep learners, some are surface learner according to that how they will teach they can decide on the and they can learn on their own pace.

(Refer Slide Time: 8:43)



New Educational Approach

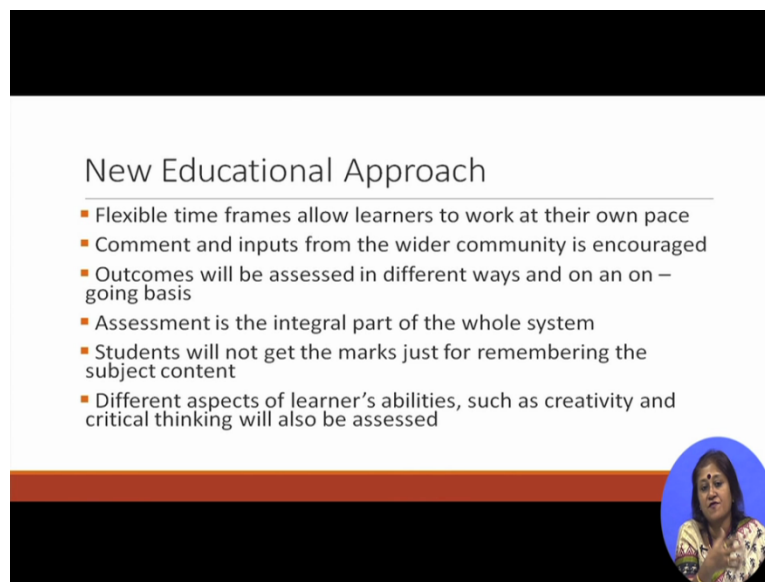
- Active learners
- Learners are assessed on an ongoing basis
- Critical thinking, reasoning , reflection and action
- An integration of knowledge, learning relevant and connected to real-life situations
- Lecture - centered . Lecturer is the facilitator. They constantly uses group work and team work

So, the new educational approach used you is a active learners, it is not passive the learner becomes active. Learner are assessed on an ongoing basis after the class some discussion they

and one that the flip teaching is also there. They learn from the internet various sources and then in the class, they can come and they can discuss. So, learners are assessed on ongoing basis. So, there is a scope for critical thinking, reasoning reflection and action. They can they can analyse it, they can synthesize the content.

An integration of knowledge, learning relevant and connected to the real life situation. So, how if they know the subject and if they can apply it or can they analysis, they then only they can solve the real life problem. So, it is a lecture centered, lecturer here is the facilitator. They constantly so the lecture center here, they constantly uses the group work, team work. They can do the lecturer will give them the teachers will give them the case studies and if they can solve the case studies in that case, it is it is easy for them to learn this you know, in on an in the whole life they can learn this one. Emphasis is on outcomes that the what the learner do.

(Refer Slide Time: 10:30)



New Educational Approach

- Flexible time frames allow learners to work at their own pace
- Comment and inputs from the wider community is encouraged
- Outcomes will be assessed in different ways and on an on – going basis
- Assessment is the integral part of the whole system
- Students will not get the marks just for remembering the subject content
- Different aspects of learner’s abilities, such as creativity and critical thinking will also be assessed

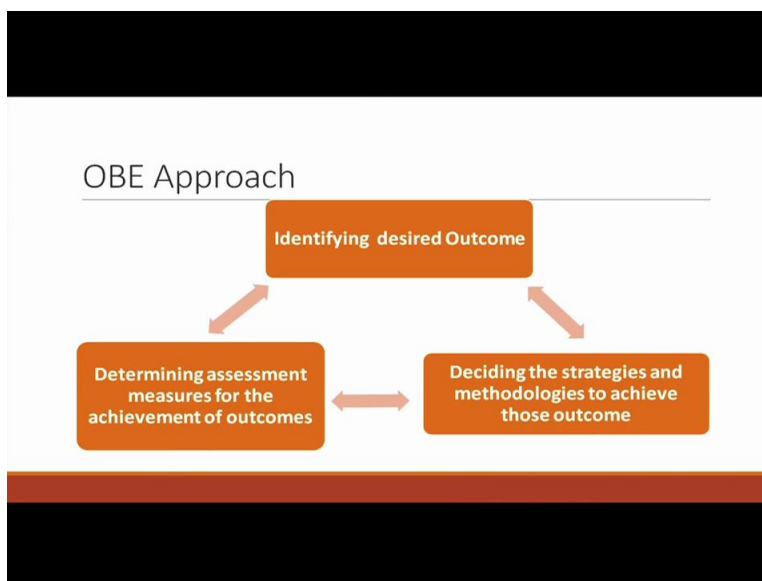
Flexible time frames allow learners to work at their own pace when they have time they can see the content A and they can learn on their own. So, flexible time is a good is a important thing. Comment and inputs from the wider community is encouraged. Of course, if we get the comment and inputs from the community then only the teachers also, we can improve ourselves.

Outcomes will be assessed in different ways and on an ongoing basis not you know after only the some or in the mid sem or in end sem always you know the outcome, it will assessed every day

in the discussion method, case study method like that if we discuss then the outcome, it will be already assessed every day. Assessment is the integral part of the whole system.

Students will not get the marks just for remembering the subject content not for the rote learning, students will get the mark if they can analyse it or some creative thing or can they apply it then only they can get the marks. So, from the teacher's point of view we have to change our perspective. So, different aspect of learners abilities such as creativity and critical thinking will be also be assessed. So, students should think you know critical thinking that is really very important.

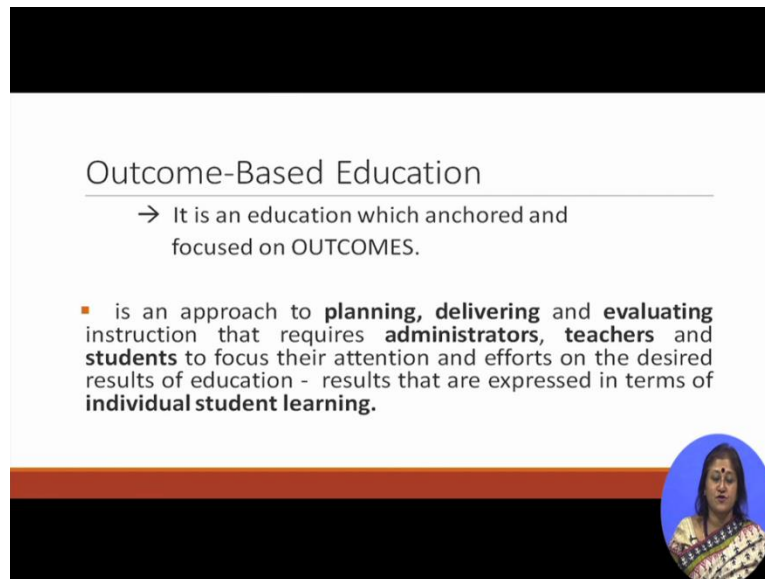
(Refer Slide Time: 12:15)



So, the outcome based approach the first the teacher have to identify or the students also that what is the desired outcome the teacher have to identify that this is the desired outcome from this class I want this. If the desired outcome is fixed then, it is easy to decide the strategies and the methodologies to achieve those outcomes. So, there is a link between this these identifying desired outcome and deciding the strategies and methodologies. There is another component that is the determining assessment measures for achievement of outcome. Of course, so whatever the strategy whatever the methodology the teacher is using with that they can give the assessment thing.

So, if the teacher think that my objective is to give application I will teach up to application level, in that case the assessment also should be up to application level not analysis or synthesis level. So, there is a relation that this is identifying (the) and if the assessment is measures are you know from there, it will go to the desire. So, there is a link between the assessment and the desired outcome.

(Refer Slide Time: 13:52)




The slide is titled "Outcome-Based Education" and is set against a white background with a black header and footer. A horizontal line is positioned below the title. The content includes a definition starting with a right-pointing arrow and a bullet point that describes the approach to instruction.

Outcome-Based Education

→ It is an education which anchored and focused on OUTCOMES.

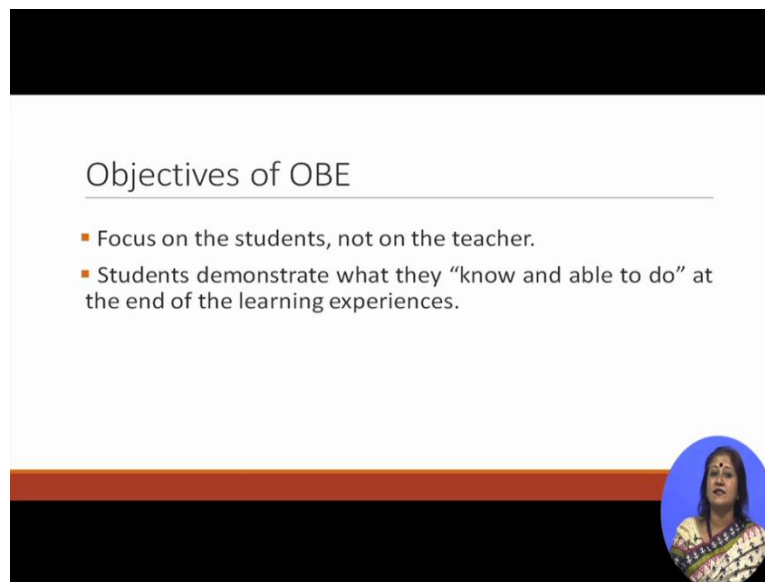
- is an approach to **planning, delivering** and **evaluating** instruction that requires **administrators, teachers** and **students** to focus their attention and efforts on the desired results of education - results that are expressed in terms of **individual student learning**.



So, the main thing is outcome based education and it is that education which anchored and focused on outcomes. So, it is an approach to planning, delivering and evaluating instruction that requires administrators, teachers and students to focus their attention and efforts on the desired result of education-results that are expressed in terms of individual student learning. Here, individual student learning each students are different.


So, it focus the outcome based education focus to the individual learner and there should be a marriage between the industry and the academics and only the outcome based education can solve this problem because whatever the industry they want that thing the academics if it is matched then only there total development of the learner because if they know the learner knows in the they something but if they cannot apply it in the industry, there is no use.

(Refer Slide Time: 15:11)



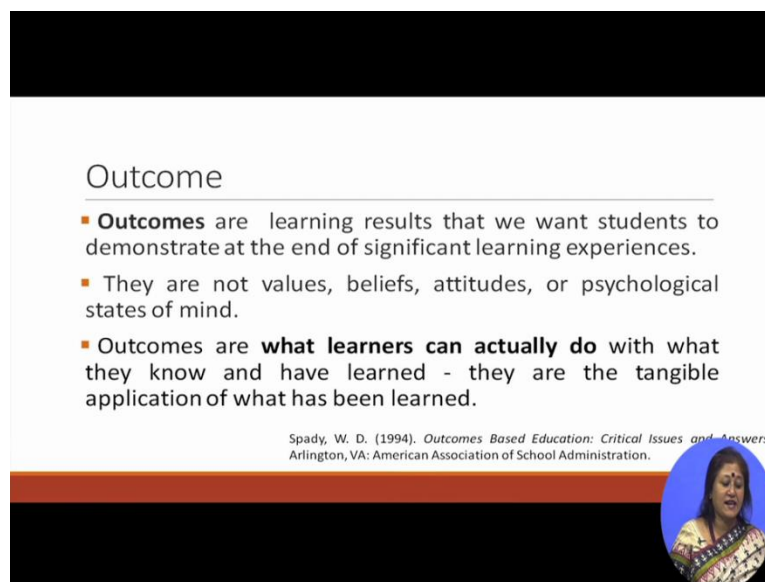
Objectives of OBE

- Focus on the students, not on the teacher.
- Students demonstrate what they “know and able to do” at the end of the learning experiences.



So, the objectives of OBE is focus on the students, not to the teacher. Students demonstrate what they know and able to do at the end of the learning experiences.


(Refer Slide Time: 15:25)



Outcome

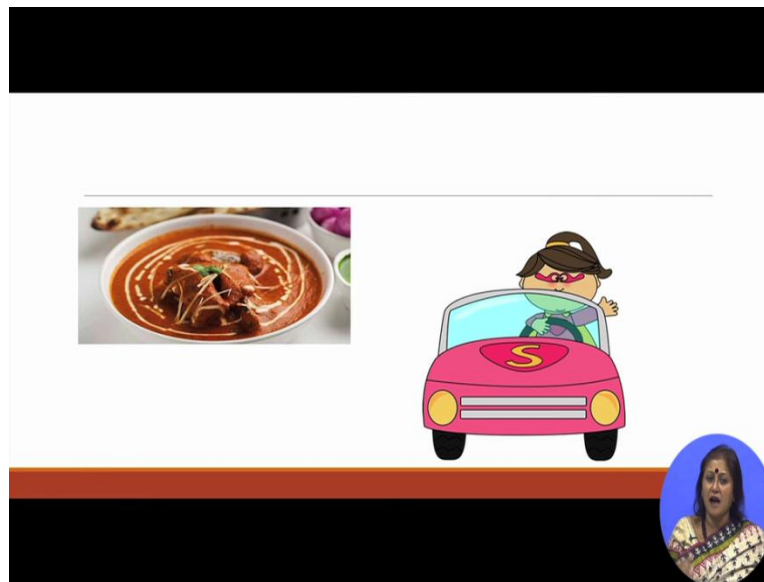
- **Outcomes** are learning results that we want students to demonstrate at the end of significant learning experiences.
- They are not values, beliefs, attitudes, or psychological states of mind.
- Outcomes are **what learners can actually do** with what they know and have learned - they are the tangible application of what has been learned.

Spady, W. D. (1994). *Outcomes Based Education: Critical Issues and Answers*. Arlington, VA: American Association of School Administration.



So, outcomes are learning results that we want student to demonstrate at the end significant learning experiences. They are not values, beliefs, attitudes or psychological states of mind. Outcomes are what learners are actually do with what they know and have learned. They are the tangible application of what has been learned.

(Refer Slide Time: 15:59)



So, here it is a the picture of butter chicken masala if you know only the recipe of the butter chicken masala you learnt it but you cannot make the butter chicken masala then there is no use. So, outcome is to make the butter chicken masala. Suppose you have a driving license but you cannot drive the car you cannot drive the car properly then there is no use, the outcome is you have to drive the car if you have a learning license, it does not imply that the you are you can drive it right. So, (you) that is why the outcome to drive the car is very important.

(Refer Slide Time: 16:43)

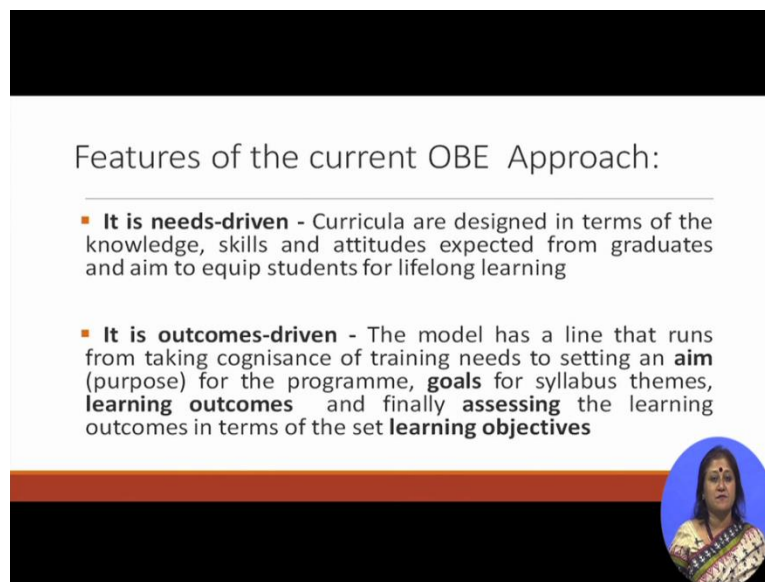
A slide with a black header and footer. The main content area is white. The title "Definition of Outcome" is centered and underlined. Below the title, there are three bullet points. In the bottom right corner, there is a small circular inset video of a woman with dark hair wearing a colorful patterned sari.

Definition of Outcome

- Clear learning results that learners have to demonstrate, what learners can actually do with what they know and have learned (Butler,2004)
- “actions, products, performances that embody and reflect a learner’s competence in using content, information, ideas and tools successfully”(Geyser,1999)
- Culmination demonstration of learning, not curriculum content(Spady, 1994)

So, the definition of outcome is according to Butler clear learning results that learners have to demonstrate what learners can actually do with what they know and have learned. Actions, products, performances that embody and reflect a learners come competence in using content, information, ideas and tools successfully according to Geyser and according to Spady, culmination demonstration of learning, not curriculum content. So, the learning not the curriculum content.

(Refer Slide Time: 17:25)



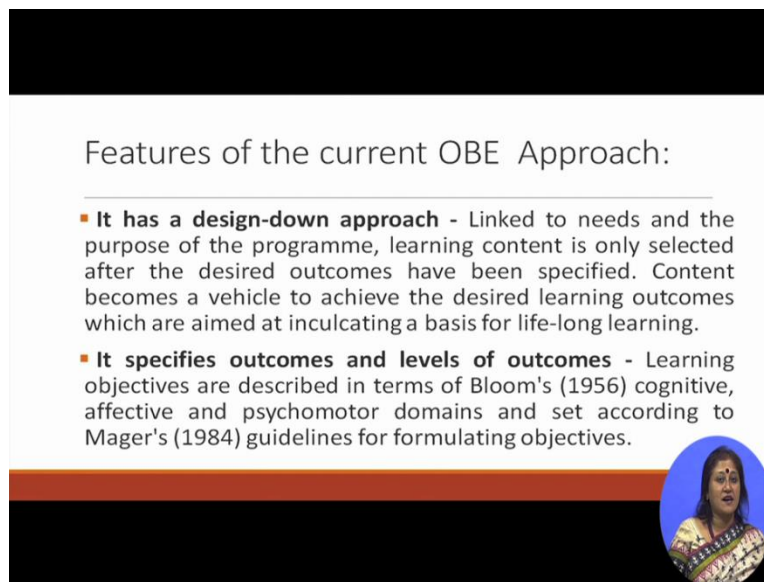
Features of the current OBE Approach:

- **It is needs-driven** - Curricula are designed in terms of the knowledge, skills and attitudes expected from graduates and aim to equip students for lifelong learning
- **It is outcomes-driven** - The model has a line that runs from taking cognisance of training needs to setting an **aim** (purpose) for the programme, **goals** for syllabus themes, **learning outcomes** and finally **assessing** the learning outcomes in terms of the set **learning objectives**

So, features of the current outcome based education approach is, it is need driven what is that? Curricula are designed in terms of the knowledge, skills, attitudes expected from the graduates and aims to equip students for lifelong learning that means they can learn the on their you know that the whole life, all the curricula it is such design in such a way so that in the life they can apply.

It is outcome driven-the model has a line that runs from talking cognisance of training needs to setting an aim the purpose of the program, goals for the syllabus themes things, the learning outcome and finally assessing and learning outcomes in terms of learning objectives. In the next lecture I will explain what is these goals learning (of) outcome as the learning objectives various things. So, the but the main thing is it is outcome what is the learning outcome that is the main features.

(Refer Slide Time: 17:57)



Features of the current OBE Approach:

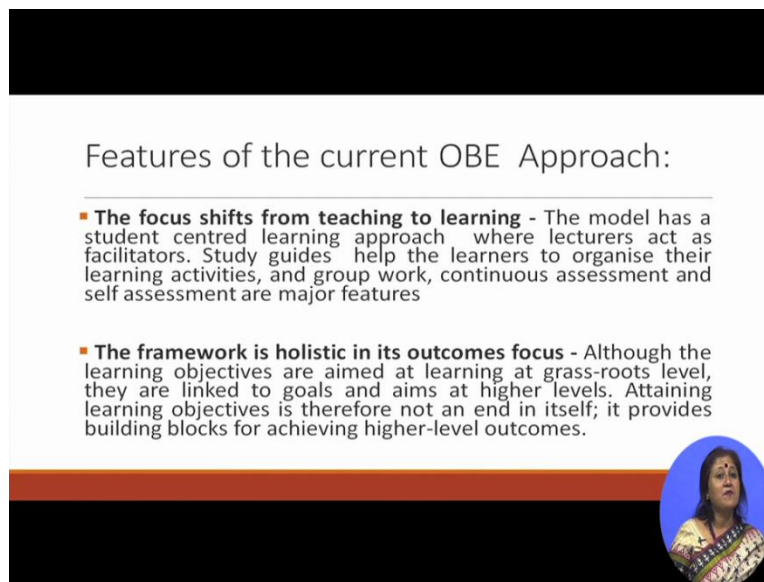
- **It has a design-down approach** - Linked to needs and the purpose of the programme, learning content is only selected after the desired outcomes have been specified. Content becomes a vehicle to achieve the desired learning outcomes which are aimed at inculcating a basis for life-long learning.
- **It specifies outcomes and levels of outcomes** - Learning objectives are described in terms of Bloom's (1956) cognitive, affective and psychomotor domains and set according to Mager's (1984) guidelines for formulating objectives.

Third is, it is a design-down approach what is that? It links to the needs and the purpose of the programme, learning content is only selected after the desired outcome have been specified if the desired outcome is specified according to that you know, the content or these things we have to learn. So, content becomes it is a just vehicle to achieve the desired learning outcomes which are aimed at including a basis for life-long learning.

The fourth component is, it specifies outcomes and level of outcomes. Learning objectives are described in terms of blooms cognitive, affective and psychomotor domains and set according to Manger's guidelines for formulating the objectives. In the blooms things, there are knowledge level, comprehension level, application level, analysis level, synthesis level and evaluation level from the cognitive point of view.

So, in which level where you know that is very is important that is whether the learner can go to the analysis level or in the synthesis or they can create it or they can you know justify anything that is really very important. So, and the outcome based education only help the learner to get into that steps.

(Refer Slide Time: 20:15)



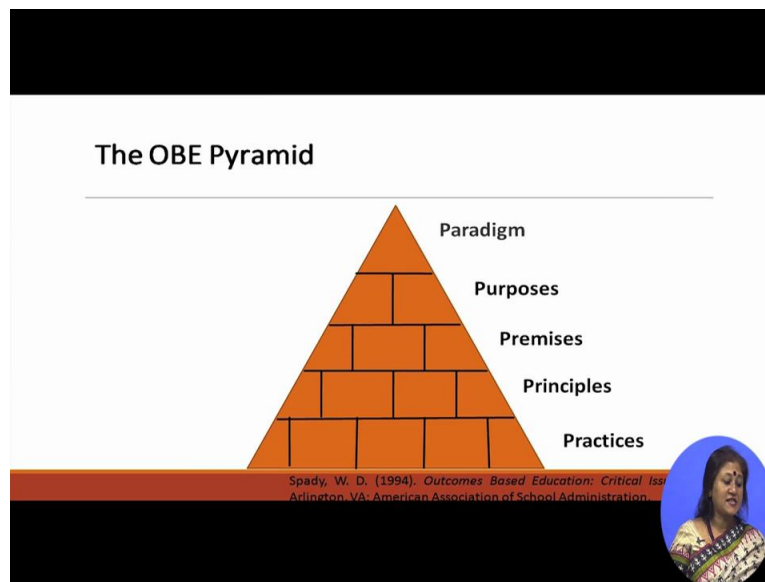
Features of the current OBE Approach:

- **The focus shifts from teaching to learning** - The model has a student centred learning approach where lecturers act as facilitators. Study guides help the learners to organise their learning activities, and group work, continuous assessment and self assessment are major features
- **The framework is holistic in its outcomes focus** - Although the learning objectives are aimed at learning at grass-roots level, they are linked to goals and aims at higher levels. Attaining learning objectives is therefore not an end in itself; it provides building blocks for achieving higher-level outcomes.

So, the focus it shifts from teaching to learning. The model has a student centered learning approach where the lecturers act as a facilitator but study guides helps the learners to organize their learning activities and group work, continuous assessment and self-assessment are major features and the frame work is a total is holistic in outcomes focus means although the learning objectives are aimed at learning at grass-root levels, they are linked to the goals and aims at higher level.

So, attaining learning objective attaining in the analysis, synthesis in that the level, it therefore not an end in it-self; it provides a building blocks for achieving you know higher-level outcome. The main thing is to go to the higher-level outcome.

(Refer Slide Time: 21:17)



Now, this is a OBE's pyramid by Spady. In this OBE outcome based education pyramid, there is one paradigm, two purposes, three premises, four principles and five practices.

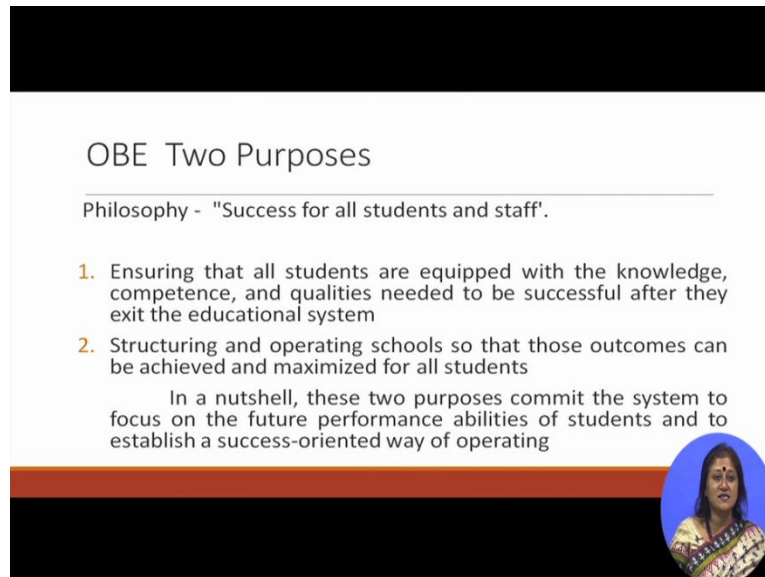
(Refer Slide Time: 21:35)

The slide is titled "OBE One Paradigm". Below the title, there is a list of two bullet points. The first bullet point is "OBE paradigm - shapes decision making and patterns of concrete action". The second bullet point is "View-point → WHAT and WHETHER students learn successfully is more important than WHEN and HOW they learn something". In the bottom right corner of the slide, there is a small circular inset image of the same woman from the previous slide, speaking.

Now, what is the OBE one paradigm? The paradigm is shapes decision making and patterns of concrete action. The view point is WHAT and the WHETHER students learn successfully is more important than WHEN and HOW they learn something. When they are learning depends

on the learner? How they are learning that is also depends on the learner but what they are learning and whether they are learning is not, that is important.

(Refer Slide Time: 22:16)



OBE Two Purposes

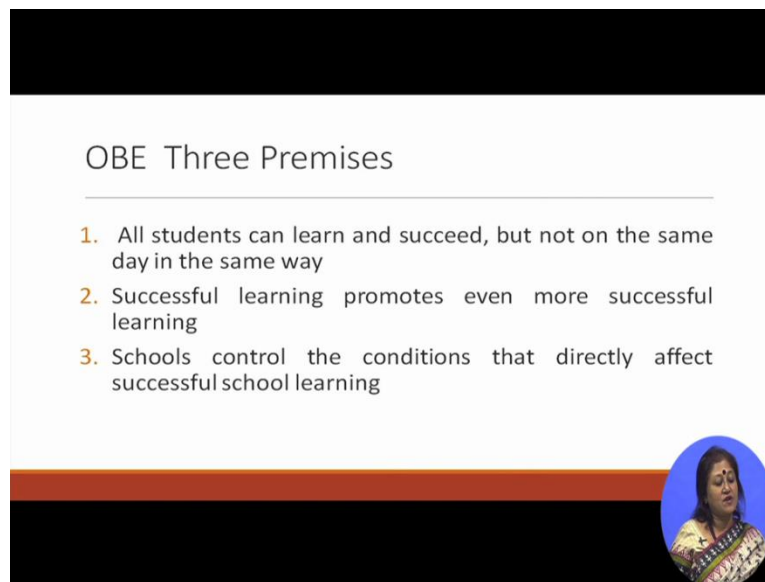
Philosophy - "Success for all students and staff".

1. Ensuring that all students are equipped with the knowledge, competence, and qualities needed to be successful after they exit the educational system
2. Structuring and operating schools so that those outcomes can be achieved and maximized for all students

In a nutshell, these two purposes commit the system to focus on the future performance abilities of students and to establish a success-oriented way of operating

The OBE has two purposes what. Ensuring that all students are equipped with the knowledge, competence and qualities needed to be successful after they exit the educational system whether the success it or not. Structuring and operating schools so that those outcome can be believed and maximized for all students that means the basic philosophy is success for all students and staff. So, in a nutshell, two purposes commit the system to focus one is the future performance abilities, in the future whatever the learning in the student life, in the future how much they can perform? Future performance abilities of the students and establish a success oriented way of operating.

(Refer Slide Time: 23:10)



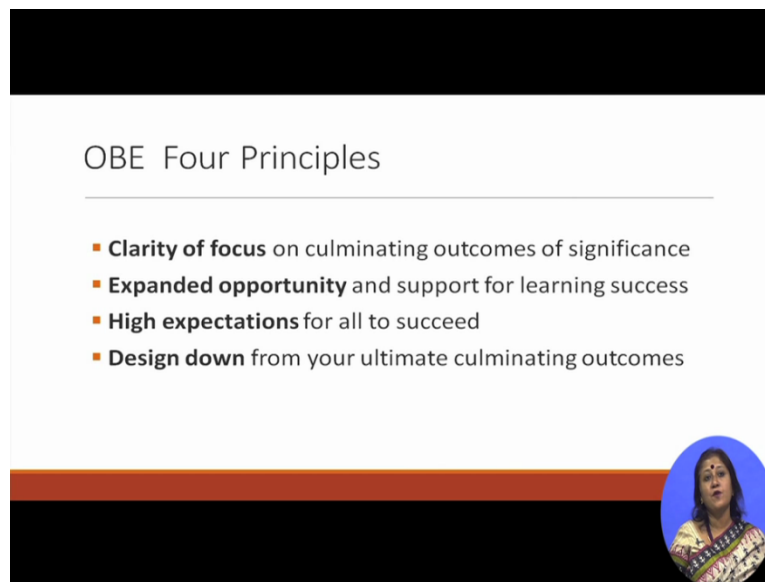
OBE Three Premises

1. All students can learn and succeed, but not on the same day in the same way
2. Successful learning promotes even more successful learning
3. Schools control the conditions that directly affect successful school learning

An OBE has three premises; all students can learn and succeed, but not at the same day in the same way, some are very very you know in the class only they learn very quickly but some, they have they may take two days like that but they learn. The main thing is all students can learn and succeed but not the same day that the teacher as a teacher we have to remember that.


Successful learning promotes even more successful learning if the learner is successful, you know that only encourage them to be more successful learning. So, as a teacher it is always, it is a good to motivate the learners so that they can you know learn more successfully. Schools only control the conditions that directly affect successful school learning. So, three premises are there in the outcome based education.

(Refer Slide Time: 24:19)



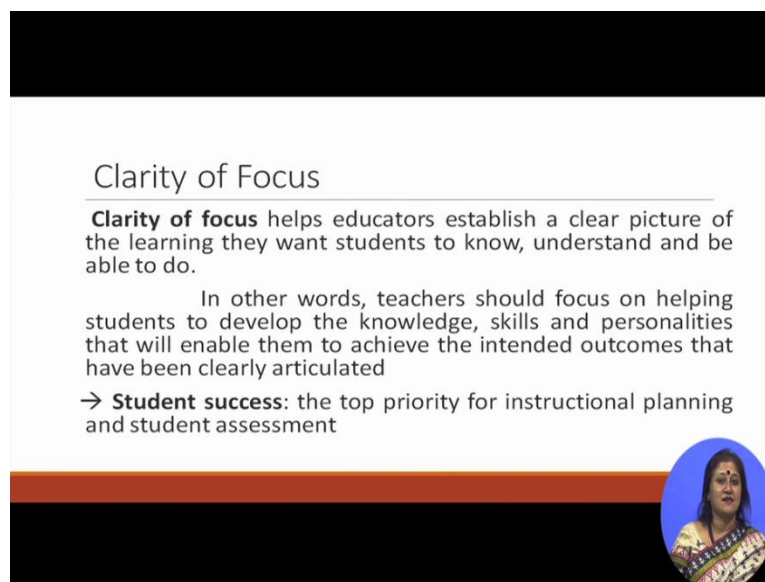
OBE Four Principles

- **Clarity of focus** on culminating outcomes of significance
- **Expanded opportunity** and support for learning success
- **High expectations** for all to succeed
- **Design down** from your ultimate culminating outcomes



OBE has four principles; one is the clarity of focus, expanded opportunity, high expectations and design down. Clarity of focus on culminating outcomes of (signi).

(Refer Slide Time: 24:40)




Clarity of Focus

Clarity of focus helps educators establish a clear picture of the learning they want students to know, understand and be able to do.

In other words, teachers should focus on helping students to develop the knowledge, skills and personalities that will enable them to achieve the intended outcomes that have been clearly articulated

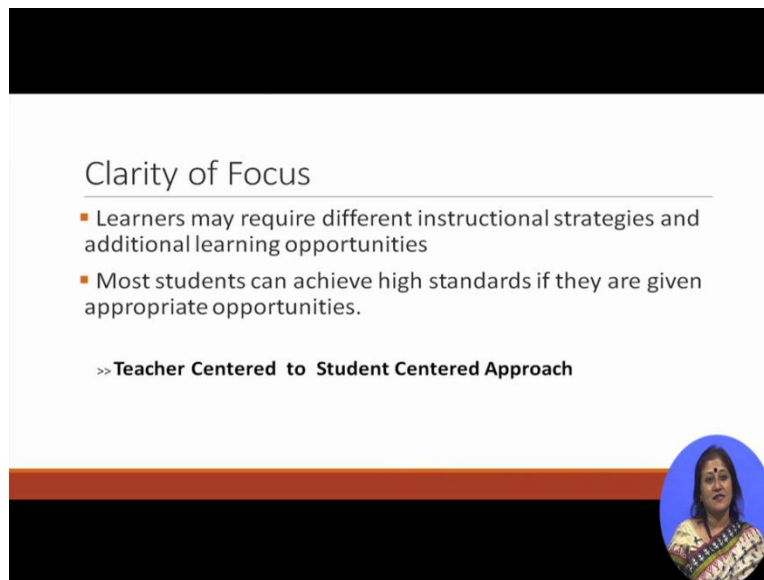
→ **Student success:** the top priority for instructional planning and student assessment



It is better you know clarity of focus helps educators establish a clear picture of the learning they want students to know, understand and be able to do that means the teacher should know this things my learner should learn.

In other words teacher should focus on helping student to develop the knowledge, it is teachers work to help them to develop their knowledge, to develop their skills and not only skills their personalities that will enable them to achieve the intended outcome that have been clearly articulated. So, that focus that clarity of the focus, it should be the focus is the for the teacher point, it is really the clarity should be there. So, the student success the top priority for instructional planning and student assessment.

(Refer Slide Time: 25:41)



The slide is titled "Clarity of Focus" and is set against a white background with a black header and footer. It features two bullet points: "Learners may require different instructional strategies and additional learning opportunities" and "Most students can achieve high standards if they are given appropriate opportunities." Below these points is a transition arrow pointing from "Teacher Centered" to "Student Centered Approach". A small circular inset in the bottom right corner shows a woman speaking.

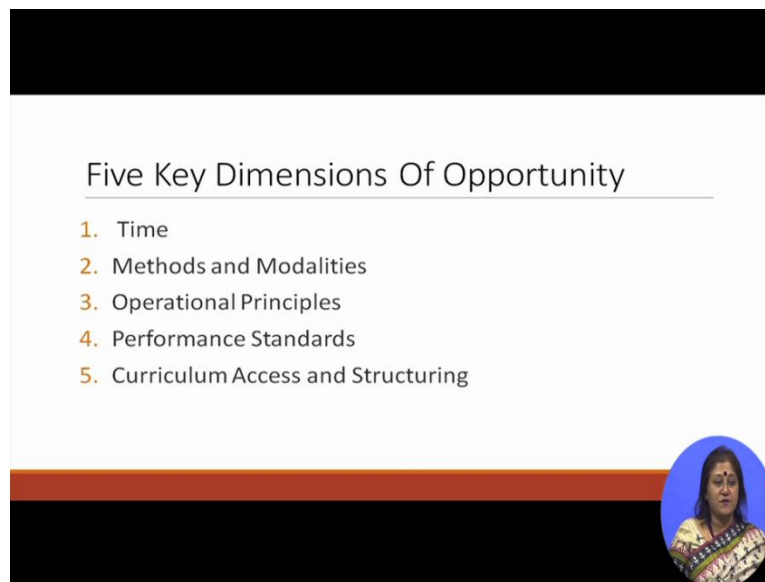
Clarity of Focus

- Learners may require different instructional strategies and additional learning opportunities
- Most students can achieve high standards if they are given appropriate opportunities.

>> **Teacher Centered to Student Centered Approach**


So, the clarity of focus learners may require different instructional strategies and additional learning opportunities. Most students can achieve high standards if they are given appropriate opportunities. So, that means we have to give the appropriate opportunities to the learners. So, the it becomes you know it moves from the teacher centered to the student centered approach.

(Refer Slide Time: 26:06)



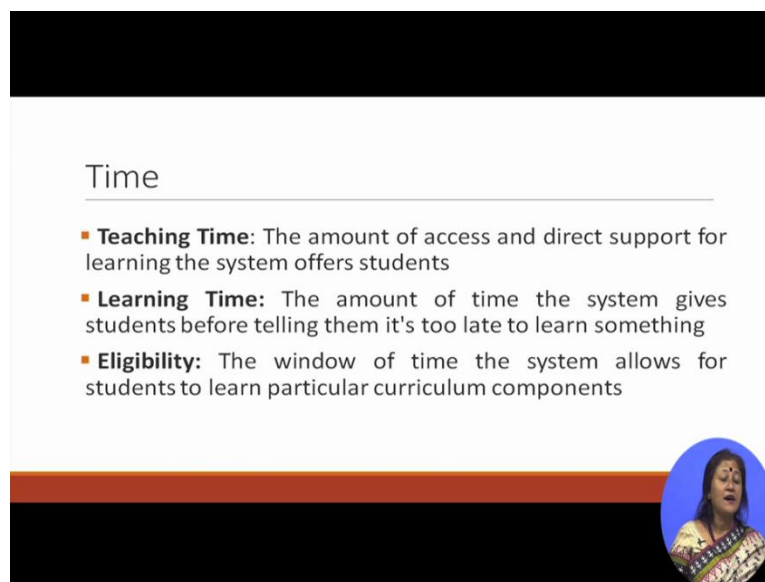
Five Key Dimensions Of Opportunity

1. Time
2. Methods and Modalities
3. Operational Principles
4. Performance Standards
5. Curriculum Access and Structuring




Five key dimensions of the opportunity; time, methods and modalities, operational principles, performance standards and curriculum access and structuring.

(Refer Slide Time: 26:15)



Time

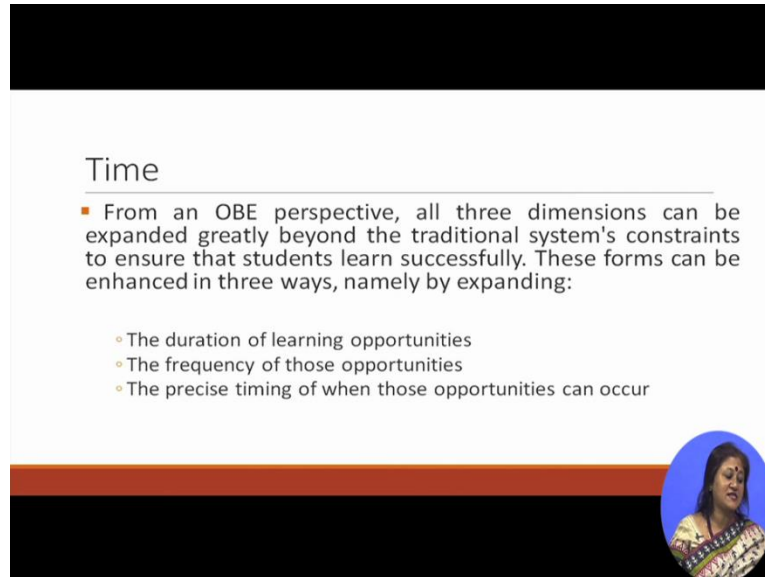
- **Teaching Time:** The amount of access and direct support for learning the system offers students
- **Learning Time:** The amount of time the system gives students before telling them it's too late to learn something
- **Eligibility:** The window of time the system allows for students to learn particular curriculum components



Time teaching time the amount of access and direct support for learning the system offers students. Learning time, the amount of time the systems gives students before telling them, it is too late to learn the okay. In this topic, in two days at least you have to learn. So, that is the

learning time. Eligibility the window of time the system allows for students to learn particular curricular components.

(Refer Slide Time: 26:51)



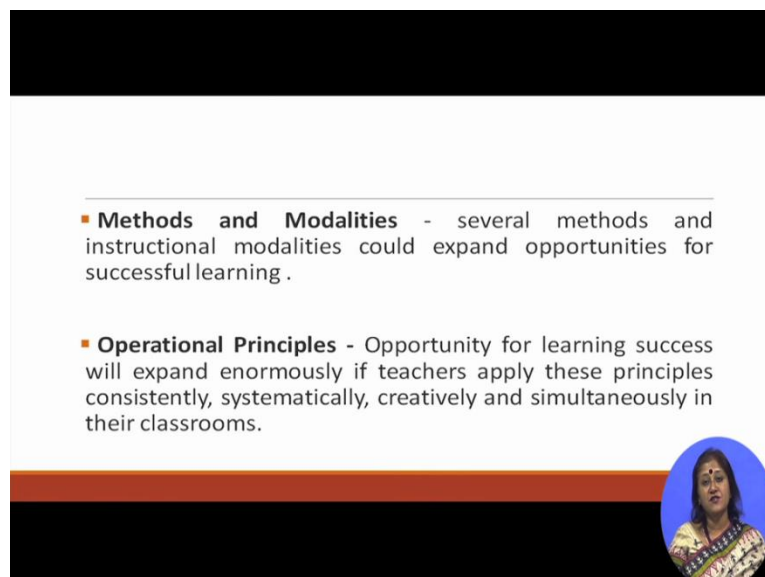
The slide is titled "Time" and is set against a white background with a black header and footer. A red horizontal bar is positioned below the title. The main content is a list of points. A small circular inset in the bottom right corner shows a woman with dark hair, wearing a colorful patterned top, speaking.

Time

- From an OBE perspective, all three dimensions can be expanded greatly beyond the traditional system's constraints to ensure that students learn successfully. These forms can be enhanced in three ways, namely by expanding:
 - The duration of learning opportunities
 - The frequency of those opportunities
 - The precise timing of when those opportunities can occur

So, from an OBE perspective all three dimensions can be expanded greatly beyond the traditional system constraints to ensure that the students learn successfully. So, these form can be enhance in three ways, namely the duration of learning opportunities, the frequency of those opportunities and the precise timing of when those opportunities can occur.

(Refer Slide Time: 27:18)



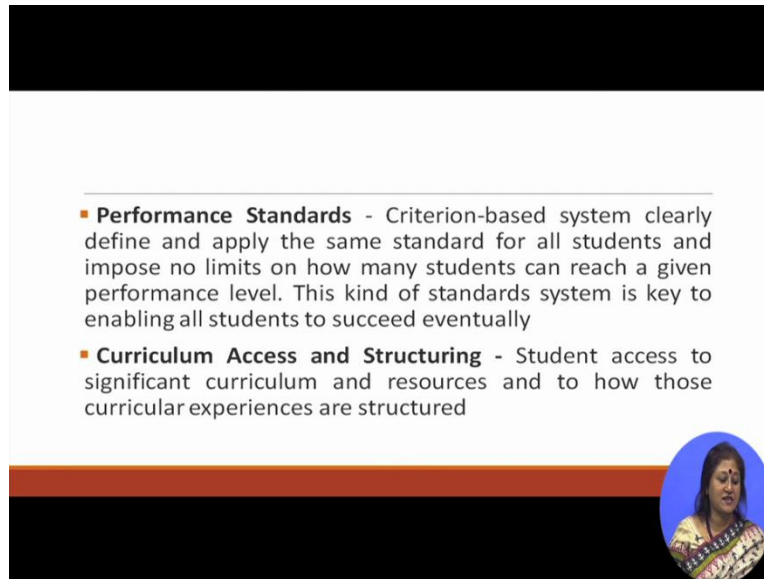
The slide has a white background with a black header and footer. A red horizontal bar is positioned below the title. The main content consists of two bullet points. A small circular inset in the bottom right corner shows the same woman from the previous slide, speaking.

Methods and Modalities

- **Methods and Modalities** - several methods and instructional modalities could expand opportunities for successful learning .
- **Operational Principles** - Opportunity for learning success will expand enormously if teachers apply these principles consistently, systematically, creatively and simultaneously in their classrooms.

Methods and modalities, several methods and instructional modalities could expand opportunities for successful learning we will explain that operational principles, opportunity for learning success will expand enormously if teachers apply these principles consistently, systematically, creativity and simultaneously in the classroom. So, the teacher have a very great responsibility that the how they to you know to motivate the learners.

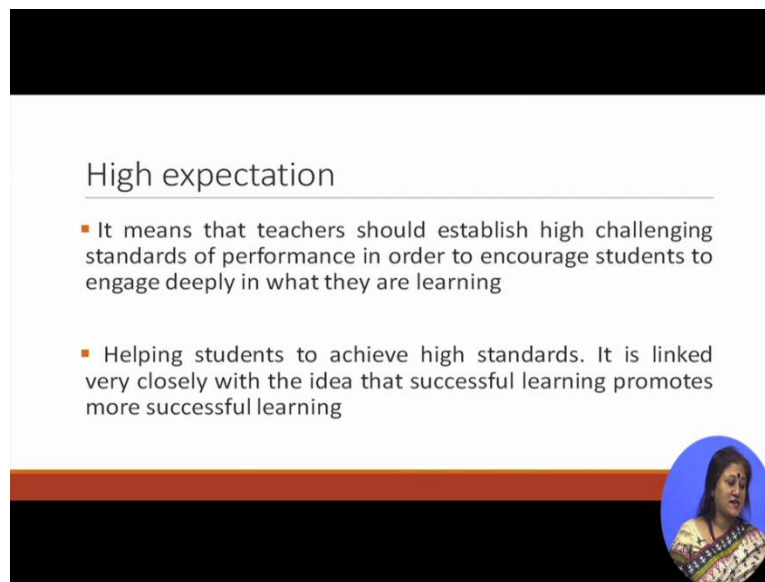
(Refer Slide Time: 27:55)



- **Performance Standards** - Criterion-based system clearly define and apply the same standard for all students and impose no limits on how many students can reach a given performance level. This kind of standards system is key to enabling all students to succeed eventually
- **Curriculum Access and Structuring** - Student access to significant curriculum and resources and to how those curricular experiences are structured


Performance standards, criterion based system is clearly define and apply same standard for all students not you know few students for all students if they use the criterion based approach and impose no limits on how many student can reach in given performance level. So, this kind of standard system is the key to enable all students to succeed eventually. The last component is the curriculum access and structuring that is student access to significant curriculum resources and to how those curricular experiences are structured.

(Refer Slide Time: 28:37)



High expectation

- It means that teachers should establish high challenging standards of performance in order to encourage students to engage deeply in what they are learning
- Helping students to achieve high standards. It is linked very closely with the idea that successful learning promotes more successful learning



High expectation it means that teacher should establish high challenging standard of performance in order to encourage students to engage deeply what they are learning. So, the expectation should be high then only they can achieve. So, helping and the teacher's job is to helping the students to achieve that high standards. So, it is linked very closely with the idea that successful learning promotes more successful learning.

(Refer Slide Time: 29:10)



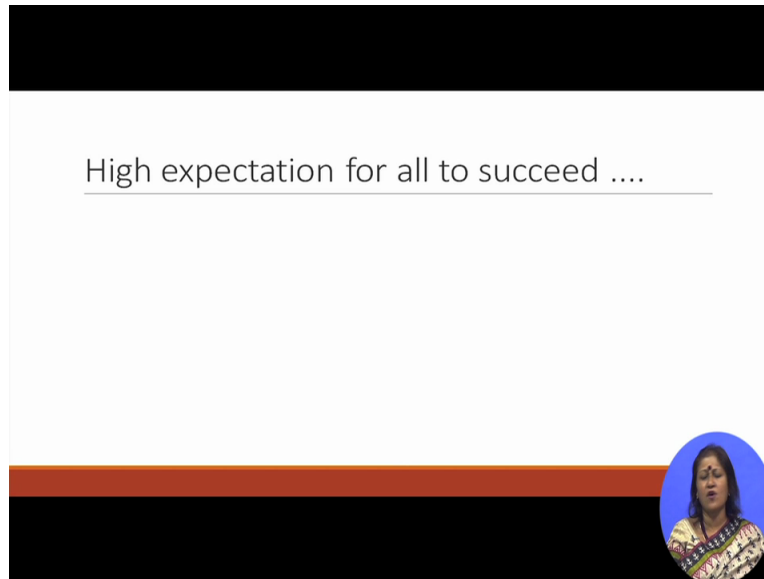
Key dimensions Of High Expectations

- Raising Standards of Acceptable performance
- Eliminating Success Quotas
- Increasing access to high level Curriculum



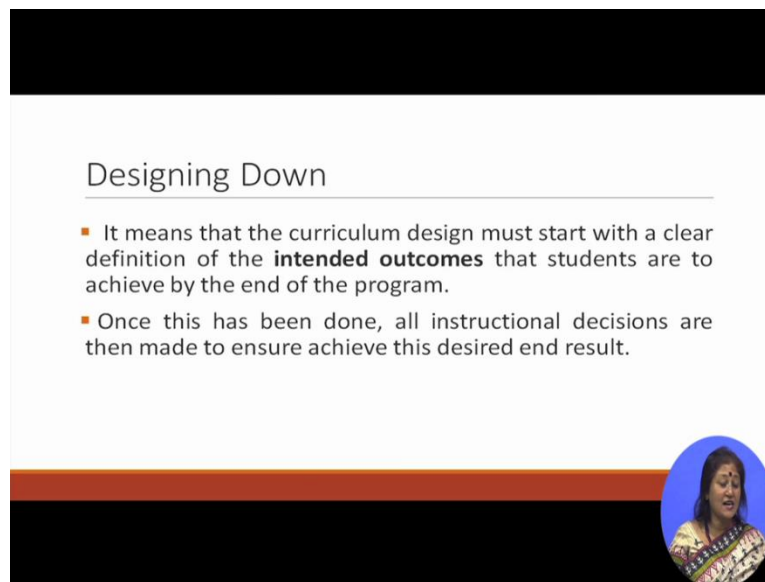
So, key dimensions of high stand expectation, raising students of acceptable performance, eliminating success quotas that means if the teacher thinks in my class my students are very intelligent rest of that it is no. Now, we have to they eliminate that is the all can do very good. So, the outcome based learning promote that. Increasing access to high level curriculum then only they can go to the high level curriculum.

(Refer Slide Time: 29:43)



So, high expectation for all to succeed. Most students can achieve high standards if they are given appropriate opportunities then only most of the students be feel that they can achieve high standards.

(Refer Slide Time: 30:02)



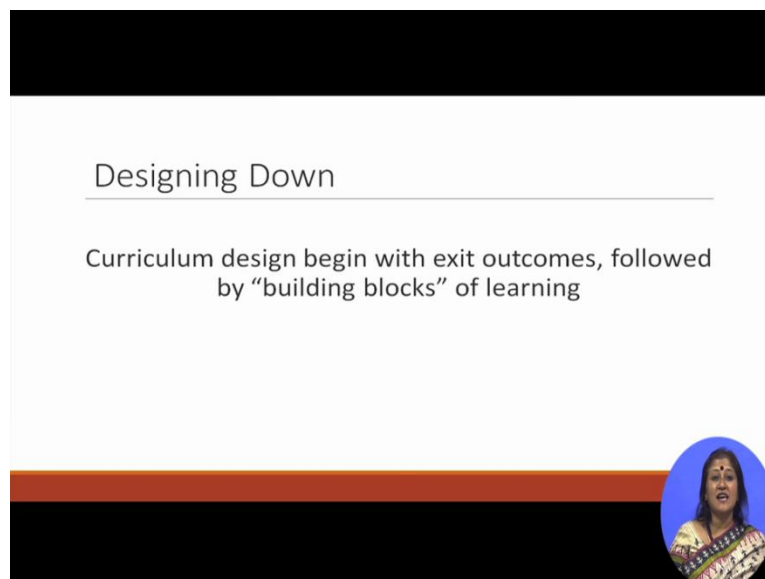
The slide has a black header bar. Below it, the title "Designing Down" is centered and underlined. Two bullet points follow: "It means that the curriculum design must start with a clear definition of the **intended outcomes** that students are to achieve by the end of the program." and "Once this has been done, all instructional decisions are then made to ensure achieve this desired end result." The slide has a black footer bar with a thin orange line above it. A circular inset in the bottom right shows a woman with a bindi and a colorful sari.

Designing Down

- It means that the curriculum design must start with a clear definition of the **intended outcomes** that students are to achieve by the end of the program.
- Once this has been done, all instructional decisions are then made to ensure achieve this desired end result.

Designing down, the last thing it means that the curriculum design must start with the clear intended outcome. The students are to be achieve by the end of the program. Once this has been done, all instructional decisions are then made to ensure achieve the desired result.

(Refer Slide Time: 30:24)



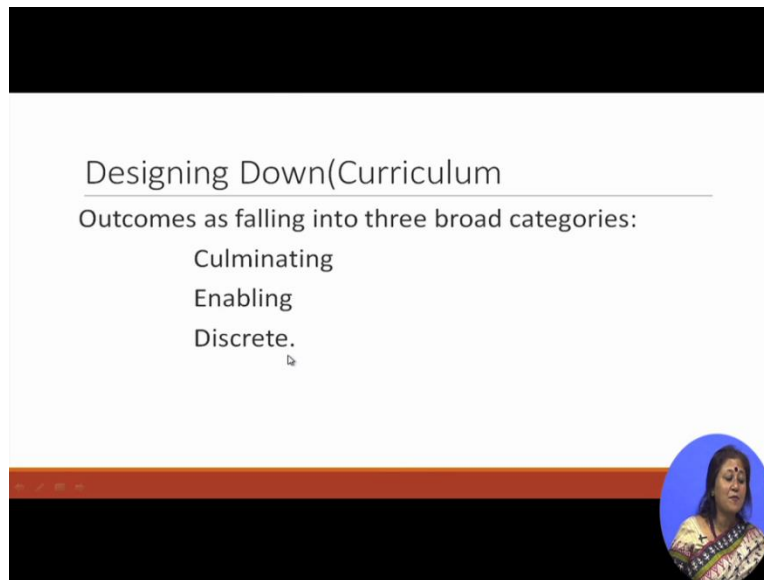
The slide has a black header bar. Below it, the title "Designing Down" is centered and underlined. A single line of text follows: "Curriculum design begin with exit outcomes, followed by 'building blocks' of learning". The slide has a black footer bar with a thin orange line above it. A circular inset in the bottom right shows a woman with a bindi and a colorful sari.

Designing Down

Curriculum design begin with exit outcomes, followed by "building blocks" of learning

So, designing down means curriculum begin and exit with outcome but followed by the building blocks is nothing but the learning.


(Refer Slide Time: 30:38)



Designing Down(Curriculum)

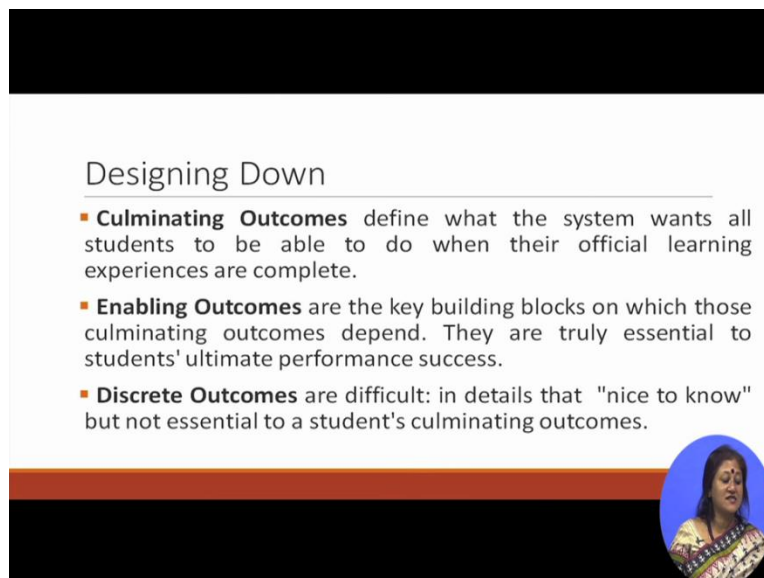
Outcomes as falling into three broad categories:

- Culminating
- Enabling
- Discrete.




So, the designing it three broad category it is a categories culminating, enabling and discrete.

(Refer Slide Time: 30:45)



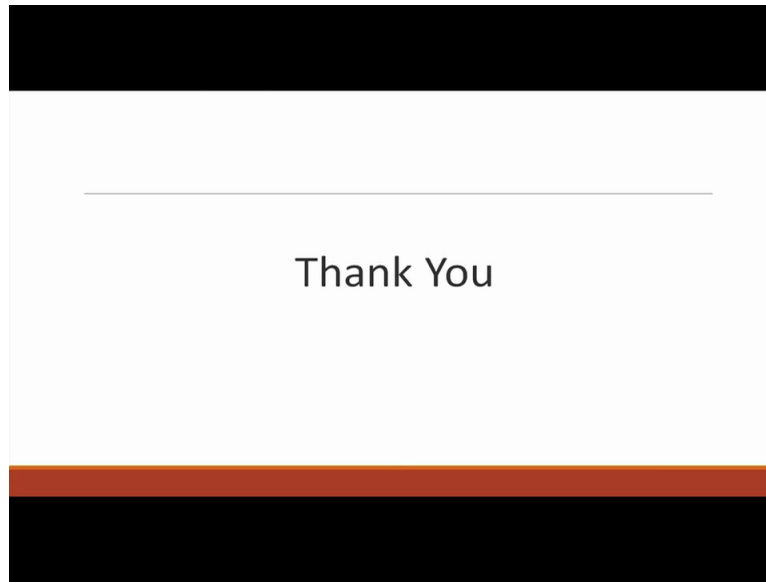
Designing Down

- **Culminating Outcomes** define what the system wants all students to be able to do when their official learning experiences are complete.
- **Enabling Outcomes** are the key building blocks on which those culminating outcomes depend. They are truly essential to students' ultimate performance success.
- **Discrete Outcomes** are difficult: in details that "nice to know" but not essential to a student's culminating outcomes.



Culminating outcomes define what the system wants all students to be able to do when their official learning experiences are complete. Enabling outcomes are the key building blocks on which those culminating outcomes depends they are truly essential ton the students ultimate performance success. So, that is the enabling outcome. The last one is the discrete outcome are difficult; in details that it is nice to know but not essential to a student’s culminating outcomes.

(Refer Slide Time: 31:28)

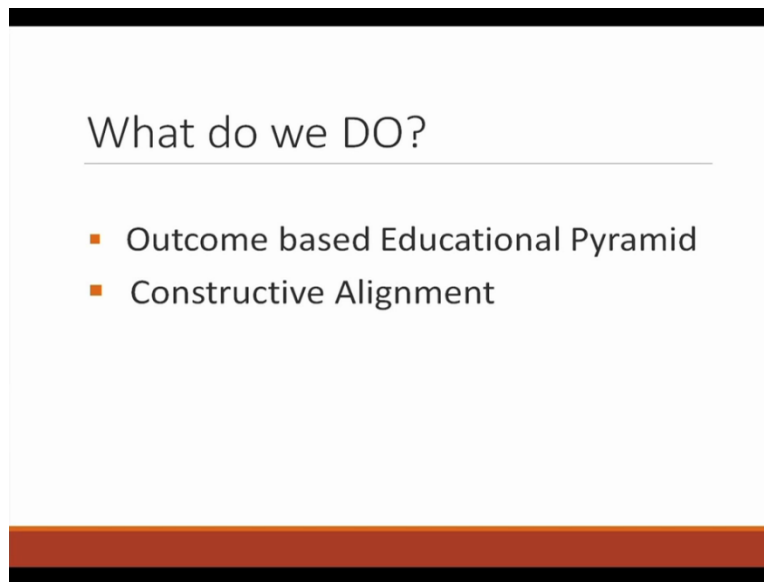


So, in the next day I will teach you all the aims, mission, vision and learning outcome and learning objectives of the outcome based model. Thank you.

Outcome based Pedagogic Principles for Effective Teaching
Dr Tamali Bhattacharyya
Center for Educational Technology
Indian Institute of Technology Kharagpur
Lecture 10
Outcome based Education (Contd.)

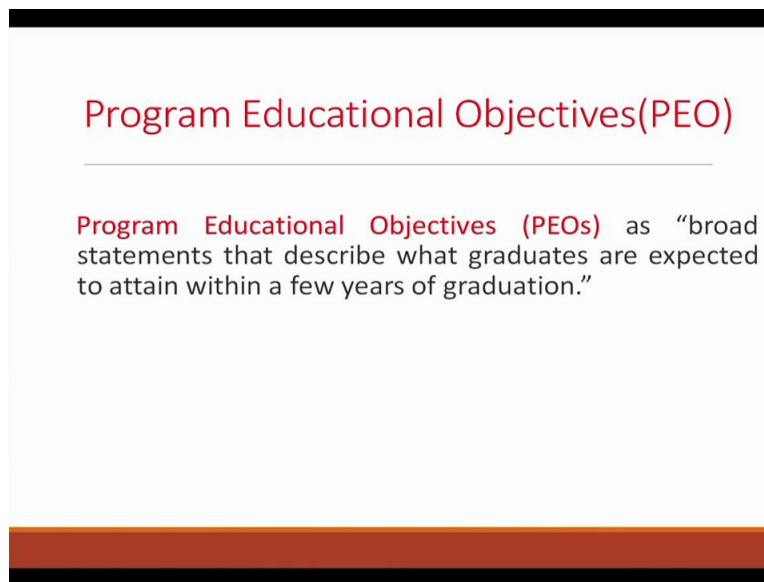
Good afternoon.

(Refer Slide Time: 0:24)



Outcome based Education, today actually we will cover the Outcome based Educational Pyramid and Constructive Alignment.

(Refer Slide Time: 0:32)

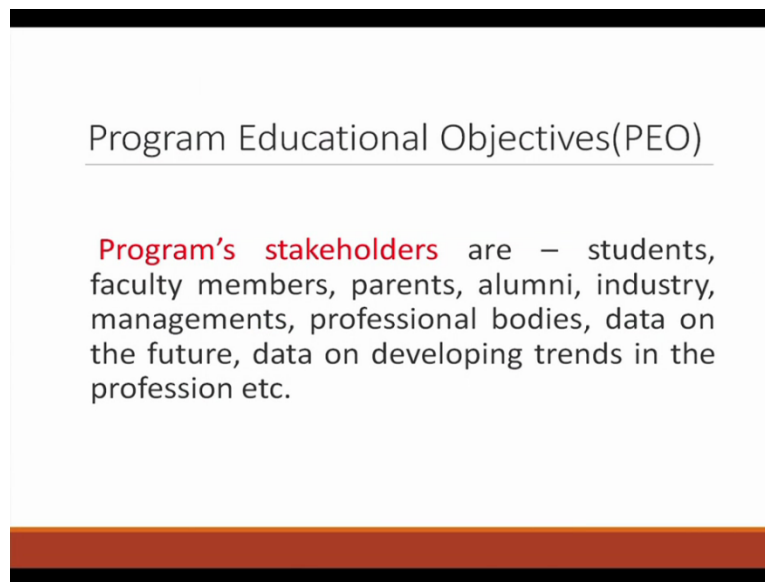


Now in that Outcome based Educational Pyramid, before that I will...what is the Program Educational Objectives? Program Objectives. First, Program Educational Objectives, a broad statement that describe what graduates are expected to attain within a few years of graduation. That is the Program Educational Objectives.

Input from the students, parents, faculty, alumni, employers and managements is used to validate the definition of the program educational objectives as wells as assess their achievements. So the program at educational objectives, the guidelines for the PEOs are:

1. PEOs should be consistent with the mission of the institution – So what is the mission of this institution, the program educational objective, there should be a relation. So the number of PEO should be manageable, not too much PEOs. So it they it should be manageable.
2. PEO should be achievable by the program – so whatever we expect, it should be achievable.
3. PEO should be specific to the program and not too broad. Okay.
4. And PEO should be based on the needs of the constituencies.

(Refer Slide Time: 1:58)

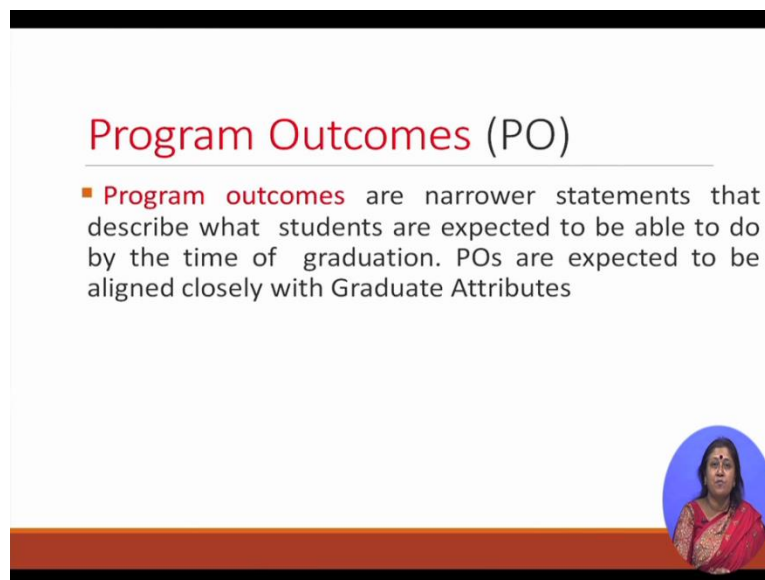


Program Educational Objectives(PEO)

Program's stakeholders are – students, faculty members, parents, alumni, industry, managements, professional bodies, data on the future, data on developing trends in the profession etc.


So this is the program educational objectives. So what are the stakeholders are, already I mentioned that the students, faculty members, parents, alumni, industry managements; that is very important, professional bodies, data on the future, data on developing trends in the profession, etcetera.

(Refer Slide Time: 2:21)



Program Outcomes (PO)

- **Program outcomes** are narrower statements that describe what students are expected to be able to do by the time of graduation. POs are expected to be aligned closely with Graduate Attributes



Now Program Outcomes: Program outcomes, this is the narrower statement. Program educational objectives is a broad statement. So outcomes are the narrower statement that describe

what students are expected to be able to do by the time of their graduation. POs are expected to be aligned closely to the graduate attributes. Okay.

Program outcomes, it should be very specific and it should be measurable and it is achievable. Program outcomes transform the POs into specific student performance and behaviors that demonstrate learning knowledge and skill development. Engineering undergraduate programs must demonstrate that the students attain the following outcomes. What are the 11 outcomes?

(Refer Slide Time: 3:47)

Engineering UG programme must demonstrate that the students attain the following Outcomes -

- ability to apply knowledge of math, science, and engineering
- ability to design and conduct experiments and interpret data
- ability to design a system, component, or process to meet needs
- ability to function on multi-disciplinary team

Prof V.V Rao (2015). Outcomes Based Education and Accreditation

One is the ability to apply knowledge of mathematics, science and engineering; ability to design and conduct experiments and interpret the data; ability to design a system, component or process to meet these needs; ability to function on multidisciplinary things; ability to identify, to formulate and to solve all the different engineering problems; not only to know if they to solve it or to formulate it that the engineering students should do.

Understanding of professionals and ethical responsibility not only the knowledge, not the the ethical responsibility and the impact of engineering solutions in the global, the social context. So in the global, the ethical, they should they should help you know in the society. Ability to communicate effectively and the motivation and ability to engage a lifelong learning. Knowledge of contemporary issues and the ability to use the (tendent) the techniques, skills and modern engineering tools necessary for engineering practice.

So all these are learning what learning these are 11 outcomes where in these things they can achieve one or two points. Now the course or the subject objectives, these are the statements that describe what students are expected to attain in terms of specific knowledge, skills and attitudes after completing the course or the subject. Course or the subject objectives are based on the syllabus content of the course and the subject. So these are all the teacher-centered. Right?

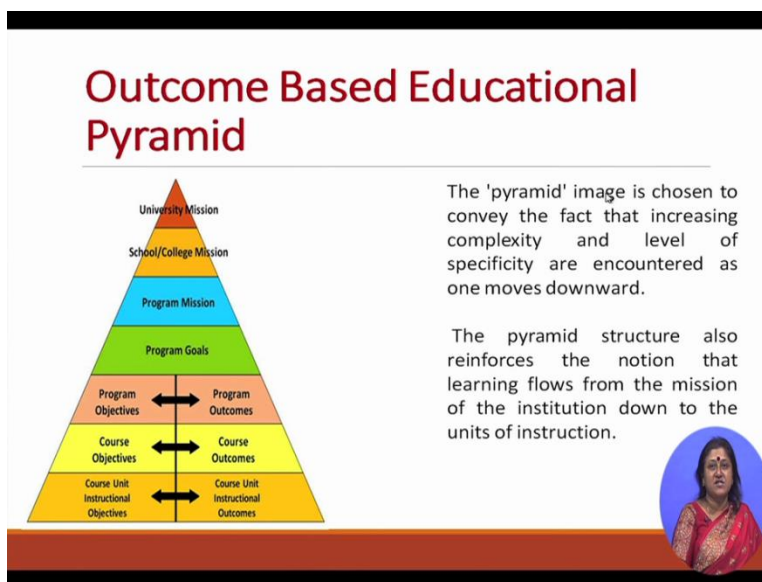
But course or the subjective outcomes, it describes that what students are expected to know and be able to do at the time of the completion of the course. So this is not the teacher-centered; this is the learner-centered. So these relate to the, to the skills, knowledge and behavior or attitudes that the students or the learners acquire as they progress through the course or the subject. So these are very specific; they are measurable and of course they are student or the learner-centered.

Points to be remembered while setting the course outcome: It should be student-focused not the....Or the faculty-focused, it's not that because we are focusing the student here. Align the course, program and the institution level – whatever the institution objective, there is there should be a balance in the program and the course. State in terms of the knowledge, skills, attitude and ability that the student will acquire and it express in terms of a measurable and observable behavior.

Need to reflect the objectives, outcomes and mission of the academic program. So in the pyramid only in the picture, you can understand. Focus on the aspects that will encompasses student's new mode of thinking – what the student is thinking the new mode of thinking, that's the outcome base; the course outcome should focus on that.

Limit to the manageable number, three to four – not more than that to be accomplished with the course or the semester. And it begin with the action verb, already the action verb but always try to avoid here the verbs such as you know, know, understand. These are this way... these are not...So the proper action verb, design, evaluate, justify, these type of action verbs.

(Refer Slide Time: 8:08)



Now here, here you can see on this pyramid... In this pyramid, in the top, university mission, school or college university mission and their school or college mission, already I explained you the vision and mission. In the top is the university mission. And then, there is school or the college mission. After the school college mission that the program mission, program mission.


In the program mission that send me the program goals. So here, program objectives and the program outcomes, there should be a balance in the program objectives and the program outcomes. Under the program, the course, course objectives and course outcome. And in the course, lots of different units are there – so course unit instructional objectives and course unit instructional outcome.

So the it is a pyramid structure. So the pyramid image is chosen to convey the fact that increasing complexity and the level of specificity are encountered as one moves downward. So the pyramid structure also reinforces the notion that learning flows from the mission...From the top, mission of the institution down to the units of instruction. University, school, program and in the top, in the bottom that the unit level. So this is the outcome based educational pyramids.

(Refer Slide Time: 12:20)

Role of Faculty Members

- Create a positive environment in which students know that they will be helped in their learning, no matter how easy or difficult they might find the learning process.
- Help students understand what they have to learn, why they should learn it and how they will know when they have learned it.
- Coordinate with industry and get their feedback and input in curricular development.



To sum up, program educational objectives are to be limited to three to five. Program outcomes are minimum one to eleven or more. Program objectives are limited to two to five. And according to the course objects, sorry, course objectives is two to five. And course outcomes are limited to also two to five because there should be a match between the objectives and the outcome.

Outcomes are broken down into one to four objectively measurable performance criteria. Now, I will explain what is the role of the faculty members: Take responsibility as a mentor, counselor, facilitator, guide, learner, and finally as a teacher in the outcome based educational system; introduce research activity for students in the undergraduate and the postgraduate levels; prepare the student adequately so that they can succeed; create the positive environment, you have to create a positive environment in which the students know that they will be helped in their learning no matter how easy or difficult they might find the learning process.

The main thing is a, you have, as a faculty you have to create an environment. Help students understand what they have to learn, why they should learn it and how they will know when they have learned. So there is a coordinate – you should coordinate as a faculty. You should coordinate with industry and get their feedback and input in the curriculum development, then only the total development can possible.

(Refer Slide Time: 12:55)



Role of Faculty Members

- Improve placements by introducing OBE sincerely at all levels of the programme.
- Involve all faculty in the program, course and assignment design
- Provide faculty development programs to improve and update the quality of pedagogy.
- Provide modern tools to teaching and learning methods

Improve placement by introducing outcome based education system sincerely at all levels of the program. Involve all the faculty members of the program, course and the assignment design, then only the total development can possible. And provide faculty development programs, that is very important to improve and update the quality of pedagogy. Provide modern tools to teaching and learning methods. So these are the role of the faculty members.

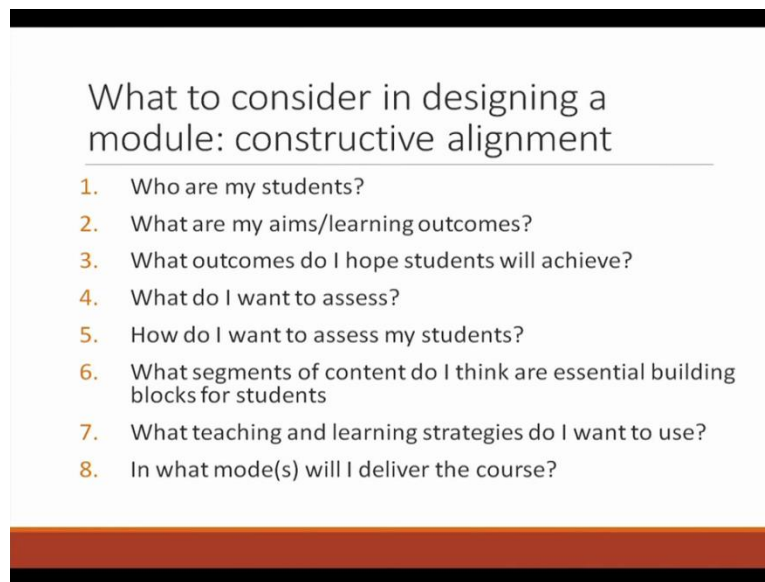
(Refer Slide Time: 13:04)



Constructive Alignment

Now the Constructive Alignment. There should be alignment.

(Refer Slide Time: 13:13)



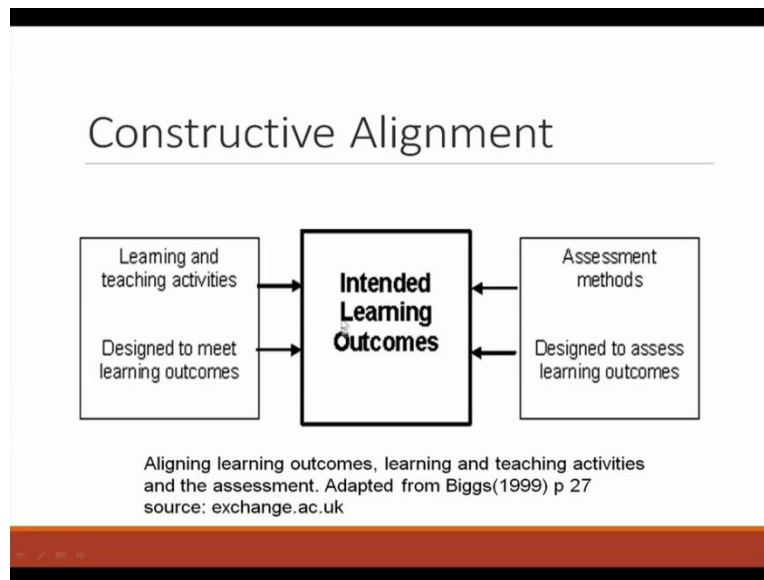
What to consider in designing a module: constructive alignment

1. Who are my students?
2. What are my aims/learning outcomes?
3. What outcomes do I hope students will achieve?
4. What do I want to assess?
5. How do I want to assess my students?
6. What segments of content do I think are essential building blocks for students
7. What teaching and learning strategies do I want to use?
8. In what mode(s) will I deliver the course?

What is that? First, some courses comes to our mind. What to consider in designing a module: Who are my students? What are my aims or the learning outcomes? What outcomes do I hope students will achieve? What do I want to assess? How do I want to assess my students? What segments of content do I think are essential building blocks for students? What teaching and learning (act) strategies do I want to use? In what modes will I deliver the course? So these all questions as a teacher it comes to our mind.

So the main, that the constructive alignment is developed by Biggs in the year of 1999. He mentioned that it is a theory of learning that begins with the premise that the learner constructs his or her own learning through relevant learning activities, according to Biggs.

(Refer Slide Time: 14:29)



So here in this picture, it is also developed by, adapted by Biggs in the 1999, here just see here the intended learning outcome where there is a learning and teaching activities and the assessment method, there is a link. Designed to meet the learning outcome and designed to assess the learning outcome, so the intended learning outcome is the important thing and there should be alignment.

(Refer Slide Time: 15:02)

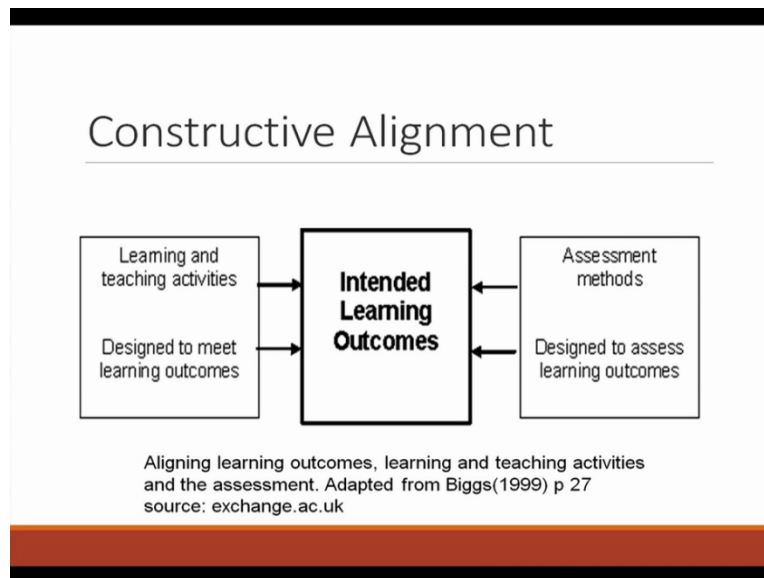
Constructive Alignment

- The key to achieving this goal is that all components in the teaching system (i.e., each aspect from inception to completion) are aligned to each other to facilitate the achievement of the intended learning outcomes.

<http://www.ucd.ie>

Now what is alignment? First, I will see the the constructive alignment. The key to achieving the goal is that all components in the teaching system, each aspect from the inception to completion, there are aligned to each other to facilitate the achievement of the intended learning outcome.

(Refer Slide Time: 15:22)



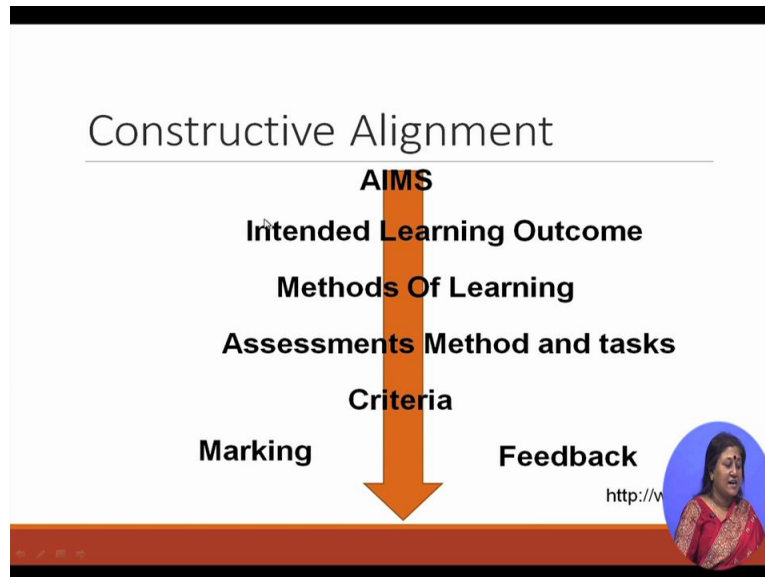
So in the in the picture you can notice that there is an there is an alignment, right? So what is that? Thus, the curriculum, the intended aim, learning outcomes, teaching methods, and resources what we are using and the assessment tasks and criteria for evaluating all, are all aligned. So alignment is very important. So alignment is the central to effective assessment. So there should be a clear relationship between the learning outcomes and the assessment. So there should be an alignment.

So here, the advantages of this constructive alignment is that this is obvious learning activity being aligned towards and the needs of learners and the needs of the assessment allows the students while the advantage so the students progress successfully. So a classroom either online or blended or traditional method, it is would be chaotic.

So if the teacher choose intentionally to allow learners learn on their own and assess in another, so it means that during the journey, during the learning journey student will rightly experience a

wide variety of teaching methods, assessment methods and the learning activities. But Biggs proposes that generally learning and assessment that should be aligned.

(Refer Slide Time: 17:12)

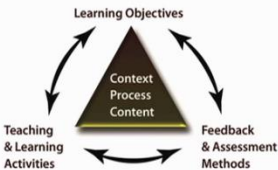


So first, just see here, this is the alignment. So first the aims and the aims, the intended learning outcome. So methods of learning, assessment methods and tasks, criteria, here marking and the feedback. So what is the first? Defining the first, the intended learning outcome that is the aim. Choosing teaching or learning strategy likely to lead the help and encourage the students to attend those objectives is the second part.

Third one is engaging the students in these learning activities through teaching process. As a teacher, you should engage the students. Assessing the student's learning outcome using methods that enable students to demonstrate the intended learning and evaluating how well they match and what was the intended. So that is an arriving in the final grade and perhaps in the case of the formative assessment giving feedback to help the students to improve their learning. So this is the in the picture, in this picture it is very clear.

(Refer Slide Time: 18:36)


Constructive Alignment



Constructive Alignment is an approach to course design which begins with the end in mind (i.e. what should students know and be able to demonstrate at the end of the course).

It assumes that when learning objectives, assessment methods, and teaching and learning activities are intentionally aligned, that the outcomes of learning are improved substantially (Blumberg, 2009).

<https://natashakenny.wordpress.com/2012/03/14/lets-not-take-the-constructive-out-of-constructive-alignment/>



Now then the constructive alignment, here we can see this is the learning objectives, teaching learning strategies, feedback and assessment methods, and the context process content. So here constructive alignment is an approach to course design which begins with end in mind, i.e., what the student know and what be able to demonstrate at the end of the course. So what is the skill set that is very important.

It assumes that when the learning objectives, assessment methods, and teaching and learning activities here just, learning objectives, the assessment method, and teaching objectives they are intentionally, if they are aligned, then only the outcomes of the learning will improve substantially. This is according to Bloomberg in the year of 2009. So that is important that there should be there is alignment and intended learning outcome is the major part. Thank you.

Course on Outcome based Pedagogic Principles for Effective Teaching
Professor Shyamal Kumar Das Mandal
Centre for Educational Technology
Indian Institute of Technology Kharagpur
Module 2
Lecture No 11
Taxonomy


Good evening, today I will teach you the taxonomies and instructional objectives. Now what we will cover, I will cover mainly the taxonomies of learning and the Bloom taxonomy. Now before that what I want to tell that what is taxonomy? Taxonomy is nothing but the classification that is known as the taxonomy. Now, the taxonomy is a logical classification where every term is defined precisely and consistently; that is taxonomy, so it is based on the psychological principles. And it is the classification of goals for our education system that can provide constructive help in developing curriculum and testing. For developing the curriculum and for the developing for the evaluation of the curriculum, the taxonomy is very important. So it helps in specifying learning objectives so that learning experience can be built appropriately.

In that case, it means that how to write the learning objectives. In that case, taxonomy has a very important role here; we will explain the Bloom taxonomy. And it allows, you know, the clear communication amongst the educators regarding learning goals and the experiences. So that is the taxonomies of learning. Just see here, this is a...In this picture, umm this here is Benjamin Bloom.

(Refer Slide Time: 2:11)

Historical Background

A group of college and university professors led by Benjamin Bloom published a handbook in 1956 -
"Taxonomy of Educational Objectives –
The classification of Educational Goals"

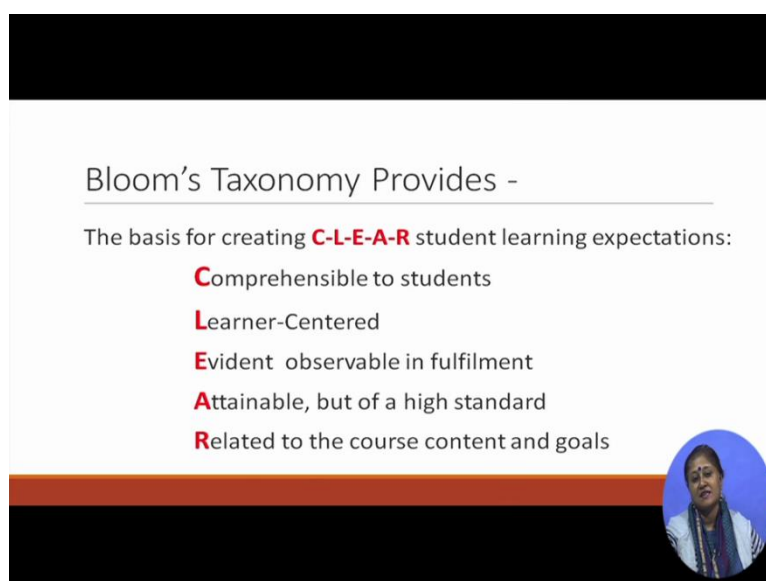


You know, his book is, he published in the year of 1956, Taxonomy of Educational Objectives – The Classification of Educational Goals okay. Here, the Benjamin Bloom's taxonomy is used extensively for planning in a teaching and learning activities, so he is the father, so why we need Bloom taxonomy? Why? The first thing it consider it is a classy and the thing is that it is a solid theoretical base for systematic planning, for the planning of the education or the curriculum, the systematic planning this Bloom taxonomy is very important for teaching and for evaluation okay both of the bases, at the macro level and the micro level, so in that case so Bloom taxonomy is very important.

Now, why we use the Bloom taxonomy? Okay. The first, if I write the curriculum of any course, you know, in terms of observable student performance, we call it specific instructional objectives. We will teach you that how to write the specific instructional objectives, so for that the Bloom taxonomy is very important. If the objectives, then it is easy to plan the teaching and learning strategy. If objective is clear, teaching and learning strategy, it is clear. So it helps, the Bloom taxonomy it helps in the teaching and learning strategy in keeping with our instructional objectives. If in the instructional objectives, we give importance in our course to the analysis level, so in the teaching and learning strategy also we will think that okay, we will give more focus in that phase.

So and if you know the teaching and learning strategy, so Bloom taxonomy, it help you to plan the assessment and the evaluation strategies to match the instructional objectives. So Bloom's taxonomy provides the, you know, the basis for creating clear, C L E A R student learning expectations. So what is CLEAR? In the C, it is comprehensible to students. C for comprehensible to students, okay?

(Refer Slide Time: 5:05)



Bloom's Taxonomy Provides -

The basis for creating **C-L-E-A-R** student learning expectations:

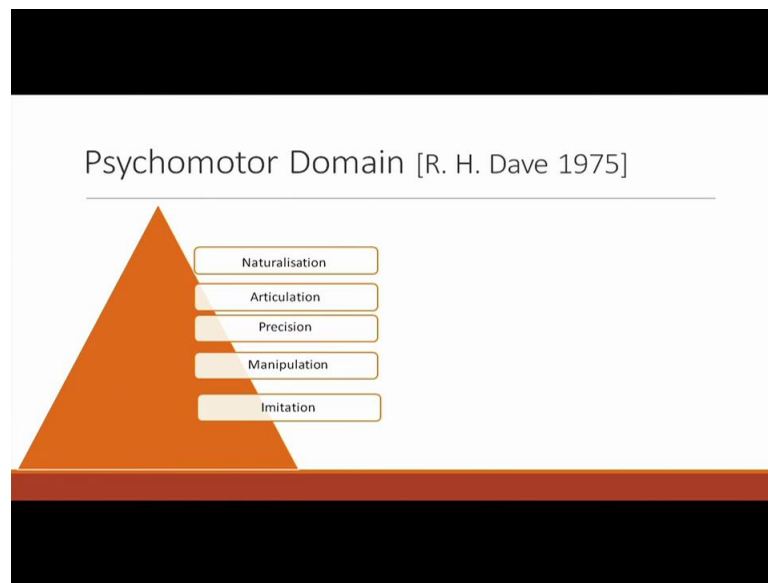
- C**omprehensible to students
- L**earner-Centered
- E**vident observable in fulfilment
- A**ttainable, but of a high standard
- R**elated to the course content and goals

L, it is learner-centred, we have not considered the teacher-centred, and the approach should be the learner-centred approach, so L for the learner-centred. E evident observable in fulfilment, so that is for E. A, it is attainable, right? So but the attainable but it is of a high standard, the attainable up to a high standard. And R is related to the course content and the goal. So that the Bloom taxonomy, it is clearly the CLEAR student learning expectations, right?

So the domains of learning Benjamin Bloom assorted that all learning activity can broadly be classified into 3 domains. One is the cognitive domain, one is the psychomotor domain and the other is the effective domain. So what is cognitive domain? It is a knowledge based domain cognitive, right. It is knowledge based domain and it involves intellectual and the thinking skills, what we will think these things, these are only in the cognitive domain umm. The second one is the psychomotor domain; psychomotor domain is mainly skill based domain. It is mainly the skill based domain and it involves the physical skills of performance or action, so this is the psychomotor domain. And affective domain, it is what your feeling is, is encompassing you the attitudes, the values all this is in the affective domain.

So we will explain one by one, let us come to the psychomotor domain. The psychomotor domain Simpson in the 1972 includes physical movement, coordination, and the use of the motor-skill areas. So what is that? The development of in these skills require practice; in the psychomotor, you need practice as it is measured in terms of speed, precision, the distance, procedures, or techniques in execution, so if you practice and you have to execute it, right? So this is in the psychomotor domain.

(Refer Slide Time: 8:46)



The psychomotor domain that skills if suppose you are digging a ditch or washing a car, from there the more complex task you can do. What is that? Suppose operating a complex piece of machinery, so from digging a ditch or washing a car to the complex piece of the operating a machinery, so this is the change in the psychomotor domain. In the psychomotor domain, there are 6 stages. The first one is imitation, umm the second one is manipulation, third one is precision, fourth articulation and then naturalization. So there are five stages in the psychomotor domain. It is not 6 it is 5 stages, so it is imitation, manipulation, precision, articulation and naturalization, right?

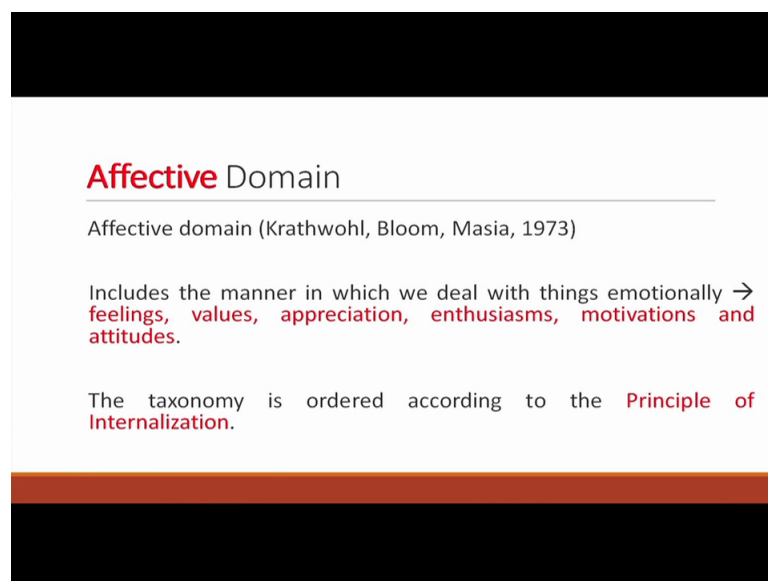
Now what is precision? Precision is nothing but if you observing and patterning behaviour after someone else right for example, trying to operate equipment by observing someone else. Suppose I do not know how to use umm how to use umm a fax machine or how to use photocopy machine, so in that case I am observing it. They are doing this, so I am doing in that way, so observing it and doing it so that is the imitation. The children, the small kids, they you know, they learn from their imitation. What the another kid is doing they are doing in that way, so it includes you know, the trial and error and until an appropriate response is achieved, so this is the first part; that is the lower level, imitation.

After that we call the manipulation, Manipulation is higher level than imitation, so being able to perform certain actions by following instructions and practicing, that is called as the manipulation until you know, it becomes habitual right? So learner still is not sure that whether himself or herself right, but they are trying to do it. For example, trying to operate an equipment on one's own after taking lesson or reading about it. Suppose I do not know how

to use Microsoft Excel, I am reading a book or anything that help, and I am learning it, I am doing it, so this is the manipulation. The third level is being known as the precision. I will give first example; working and reworking something, so it will be just right so it is it is nothing but refining become more exact, so few errors sieves apparent but this is third level that is the precision level.

Then the articulation level, what is that? Using one machine or equipment skillfully that is the articulation level. So coordinating series of actions, achieving harmony and internal consistency, so it is the skills are so well developed that the individual can modify movement patterns to fix special requirements or to meet the problem situation. So that is the articulation, it is nothing but the coordinating of the series of action and achieving the harmony and internal consistency, so this is articulation. And the top level, it is nothing but the naturalization. The example is that suppose I can use the equipment without thinking even in novel way. Suppose, that is means you know, automatically you can do that, you do not have to think automatically we are doing this, so having high speed performance.

(Refer Slide Time: 12:56)



Affective Domain

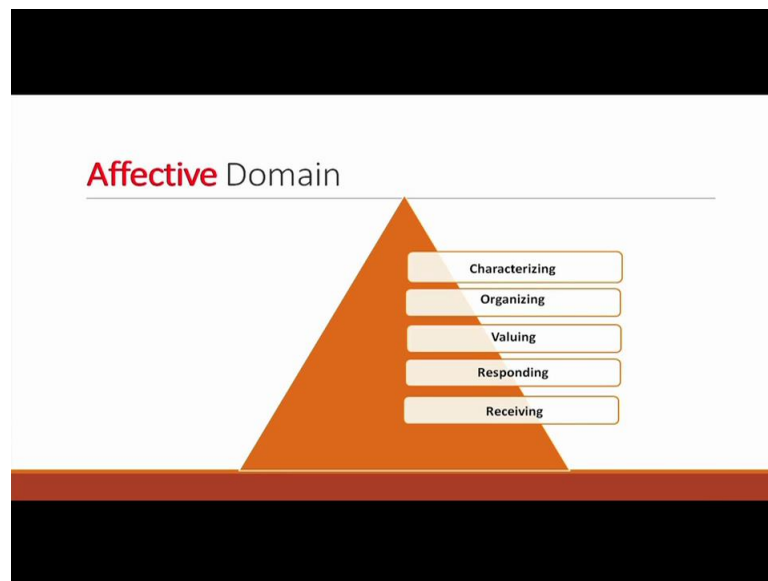
Affective domain (Krathwohl, Bloom, Masia, 1973)

Includes the manner in which we deal with things emotionally → feelings, values, appreciation, enthusiasms, motivations and attitudes.

The taxonomy is ordered according to the Principle of Internalization.

So in that, naturalization becomes natural and without needing to think much about it, so we just response it automatically, so this is the top level. So in the psychomotor level, imitation, manipulation, precision, articulation and naturalization, okay? So now we will come to the affective domain. Affective domain, it is by Krathwohl, Bloom in the year of 1973 but what it includes, the manner in which we deal with a range of things which is emotionally, the emotional thing, what was that? Was the feelings, the values, you know, the appreciation, enthusiasm, motivations and all these attitudes that is in the affective domain.

(Refer Slide Time: 14:03)



So the taxonomy is ordered according to the principles of internalizations, internal thing right, so that is the affective domain. So in this affective domain there are also five levels just like psychomotor domain, what are those? One is receiving, responding, valuing, operating and the organizing and characterizing. Now first I will call what is the receiving thing, right? Receiving in the class sometimes you listen to others with respect receiving it, so listen for and remember the name of the newly introduced people. Some newly introduced people, you listen their name so that is receiving things or listen to others with respect hello like that, so this is the receiving thing. So it is the awareness, the main keyword is awareness or willingness to hear so or the selected attention, so that is the receiving part.

The next part, above the receiving, that is called the responding. if you are responding in the class right, Participations in the class discussion umm or gives a presentation. You are responding, that is why you are giving a presentation. Or you are questioning some new you know, that ideas, concepts, these you are questioning in order to fully understood that, so in that case this is the second part, you are responding it with active participation right, In the part of the learners attend and react to a particular phenomenon, so that is the responding part. The third is the valuing thing, Valuing is, suppose example I will better to give, propose a plan to social improvement and follow through with commitment, so that is the valuing things, or inform management, you are informing management on matters that one feels strongly about, so that is the valuing.

So the work or value or person attaches to a particular object valuing. Phenomenon or behaviour, so this ranges from the simple acceptance to the more complex state of

commitment, right so that is the valuing thing. The fourth part is the organizing, Organizing is means suppose organizes values right, into priorities by contrasting different values, resolving conflicts between them and creating an unique value system.

So what suppose the example, what is that, recognizes the need a balance between what is the freedom and the responsible behaviour, so that is the organization so that is the fourth level. So you have to you can recognize freedom thing and the responsible behaviour, right? The top level is the characterization it is just it shows self reliance when working independently, what is that? Uses an objective approach in problem solving or values people for what they are, not from their how they looks like that, it is not that. You can just value them from their they are, from that okay? So has a value system that controls their behaviour, so the behaviour is consistent, predictable, you can predict and most important characteristics of the learner, so these five things; receiving, responding, valuing, organizing and characterizing.

Now but here the one thing, the difficulty in this domain is that it is the internal or the covert thing. Feelings and emotions are the, are as important as overt behavioural manifestation, so but here we mainly focus to the cognitive domain. The cognitive domain involves knowledge and the development of intellectual skills right, so it includes, the cognitive domain, it includes the recall or the recognition of the specific facts, procedural patterns and concepts that serve in the development of intellectual abilities and skills.

So if starting from the simple thing that is the knowledge recall knowledge recall the lowest level and from the top evaluation, creation or the highest level, right? Suppose, first the knowledge and the comprehension, then the application, analysis, synthesis and evaluation. So each category must be mastered before proceeding to the next okay. You can go to the comprehension level if you know the knowledge. If you are in the comprehension level means you know the knowledge level.

The application level means the knowledge and comprehension you have. That is why you can apply. And in the analysis also you can, after application also only you can analyze, so it is like that, right? So first we will come one by one, the knowledge level: Knowledge is the recall of data, remembering previously learned material, knowledge of dates, events, essays, knowledge of major ideas, some keywords is that define, list, name, outline, points, state, identify, all these things.

So what do I know and do at this level? In the knowledge level, what do I know and do at this level? I can recall information about the subject, topic, I can recall it. I read material, listen to the lectures, what are the lectures I am listening it or watch videos or take notes, so all these things in the knowledge level. I learn the vocabulary or terminology as well as the conventions of rules associated with a subject, so this the knowledge level, where the testing in the knowledge level, how can I test?

What are the typical ways I can understand or I can demonstrate my knowledge? What is the typical? Answer true-false, yes-no, fill in the blanks, multiple choices questions correctly. Define all the technical terms associated with the subject by their attitudes, properties and the relations, so suppose the example. The student will define the 6 levels of Bloom's taxonomy of the cognitive domain. So this is a knowledge level question, so these 6 levels: knowledge, comprehension, an application, analysis, synthesis and evaluation.

Types of knowledge: First is the knowledge of terminology, umm define technical terms, range of meaning of the words as in the dictionary, terms and concepts in the science, so this is the knowledge of terminology. Knowledge of specific facts that is also knowledge about the culture, major natural resources, properties of elements, compounds, data, so all the specific facts, the knowledge of that. Knowledge of conventions: Conventions symbols of the domain area, rules of social behaviour, forms of scientific papers, protocols standards, all these things in the knowledge of conventions. Knowledge of trends and sequences: so in that case, trends in data compression, sequence of a given process or operation, knowledge of classification or the categories, type that can be.

Knowledge of methodology: Different methodology, methods of enquiry, technique, procedures. Knowledge of principles and generalization: Recall of principles in learning, in biology you know, different principles, and knowledge of theories and structures: In that case, it is recalling major theories, suppose civilization and science, different theories, so all these in the knowledge level. So after the knowledge level, we will come to the comprehension level. So the comprehension level, in that case the ability to grasp the meaning of the previously whatever you learned, the material. The ability to grasp the meaning, this may be demonstrated by translating material from one form to another, you are translating this or interpreting material or explaining this, explaining or summarizing this or by predicting consequences or effect, so that is the comprehension level.

Example, suppose the student will explain the purpose of Bloom's taxonomy of the cognitive domain, so here the keywords explain, summarize, describe, illustrate types of comprehension. Suppose translation into other language, so the first one is the translation, translation into other language, into other forms of communication suppose that data to graph or state in own words or explain so that is the translation. The second one is the summarization or the generalization, the third is the extrapolation, so that means making the predictions, right? So based on understanding or trends, consequence or actions described in a case of the communication, so what is the extrapolation, so this is the second part, second level.

The third level is the application level, Application it refers to the ability to use, learn material in new or concrete situation. Whatever you are learned, so you are applying this, only in the 21st century, engineering education mainly we are focusing that they can apply, not the knowledge of comprehension, if they know it okay where they can apply that is very important right, where they can they analyze that is important.

So in that case, this may include the application; all the rules, method, concepts, principles, laws, what they learned, they are applying it right, or the learning outcomes in the area require a higher level of understanding than those under the comprehension level, so it is the higher level, so it solves problems using required skills or knowledge. Application; apply concepts and principles to new situation, apply laws and theories to practical situation, solve mathematical problems, construct graphs and chart, different these type of application they have to apply it, right?

So in the testing application solve problems independently in new situation and without prompting by the teacher, so that is the application level. So suppose, one example, the student will write an instructional objective for each level of the Bloom's taxonomy, so that is the application. The keywords are apply, demonstrate, calculate, illustrate, examine, these all the application level action verbs.

Analysis the fourth level, analysis refers to the analysis is a synthesis, just the opposite. Analysis means ability to break down material into component parts. Synthesis means of the parts you are joining, but let us come to the analysis, means you just break down the material into small parts, analyze it so that the organizational structure may be understood. So this may include the identification of the parts, analysis of the relationship between parts, and recognition of the organizational principles involved.

So learning outcome here present a higher intellectual level than comprehension and application because they require an understanding of both the content and the structural form of the material. So some example, in the analysis level, the student will compare and contrast the cognitive and affective domain. What is the cognitive domain and affective domain if they can compare, so that is the analysis.

So the action verb is compare, analyze, contrast, separate, these, so types of analysis. Suppose analysis of elements, recognizing hypothesis, conclusions from the statements or analysis of relationship, distinguish the cause-effect relationship or check the consistency of the hypothesis with given information, so that is the analysis of relationship. An analysis of organizational principles, arrangements, structure, forms, pattern or the ability to infer what is the author's point of view; these are the analysis of organizational principles.

The fifth level is the synthesis level where the students originates, integrates and combines. They are combining it, ideas into a product or plan or a proposal, which is new to him or her. So synthesis, it refers to the ability to put parts together, parts together to form a new whole, so this may involve the production of a unique communication, right? Theme, a plan of operation, suppose research proposal or a set of abstract relations that is the scheme of classifying information.

Learning outcome in this area stress creative behaviours okay, with major emphasis on the formulation of new patterns and structures. Example, the student will design a classification scheme for writing educational objectives that combine the cognitive, affective and the psychomotor domain. So here combine, integrate, modify, rearrange, plan, design, invent, all these are the action verbs.

The top level is evaluation level; Evaluation means the ability to judge or the value of the material. Suppose, a statement, a poem or you have to you can judge it, right? Or any research report when you are judging it for a given purpose, so that is called the evaluation. Compare it and discriminate between ideas, assess the values of theories or the presentations, make choices based on you know argument, verify the value of evidence, all these things you know these are the evaluation level. So in that case, suppose an example, the student will judge the effectiveness of writing objectives using Bloom taxonomy. So what if they can judge it, so in that case it is the evaluation level Judge, critique, justify, all these things are the action verbs.

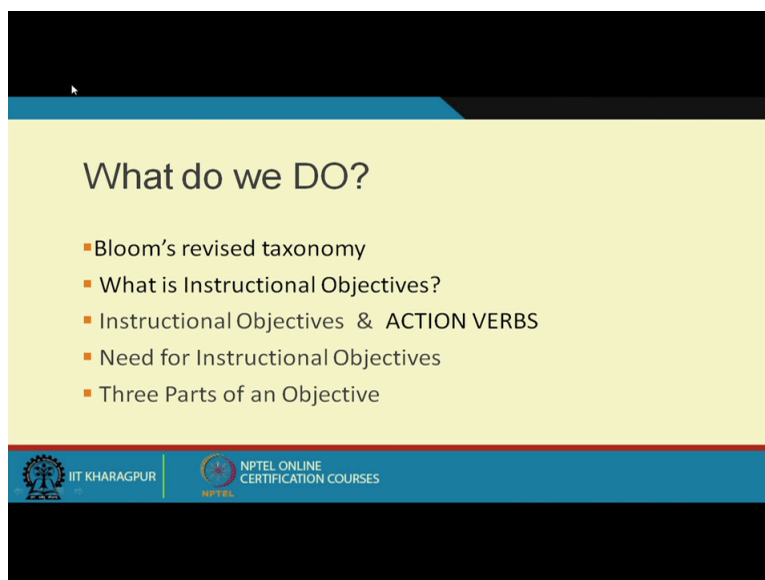
(Refer Slide Time: 32:15)

Bloom's Ranking of Thinking Skills					
Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
arrange define describe duplicate identify label list match memorize name order outline Recognize	explain summarize paraphrase describe illustrate classify convert defend describe discuss distinguish estimate explain	use compute solve demonstrate apply construct apply change choose compute demonstrate discover dramatize	analyze categorize compare contrast separate apply change discover choose compute demonstrate dramatize employ	create design hypothesize invent develop arrange assemble categorize collect combine comply compose construct	Judge Recommend Critique Justify Appraise Argue Assess Attach Choose Compare Conclude Contrast Defend

Here, here the Bloom's ranking of thinking skills in the knowledge level: all, arrange, define, describe, duplicate, label, list, these are the action verbs. Comprehension: Explain, summarize, describe, illustrate, these. Application: Use, compute, solve, demonstrate, apply, change, choose, compute. Analysis level: Analyze, categorize, compare, contrast, apply, change, discover. In the synthesis level: create, design, you know, develop, arrange, assemble and in the evaluation level: judge, recommend, critique, justify, appraise, these are conclude, contrast, these are the action verbs. So this is for today. In the next class, we will explain the revised Bloom's taxonomy and how to write the instructional objectives. Thank you.

Course on Outcome based Pedagogic Principles for Effective Teaching
Professor Shyamal Kumar Das Mandal
Centre for Educational Technology
Indian Institute of Technology Kharagpur
Module 3
Lecture No 12
Taxonomy (Contd)

(Refer Slide Time: 0:32)



Good afternoon, today I will tell you the domains of learning and instructional objectives, How to write instructional objective? We mainly focus on the Blooms revised taxonomy, what is the instructional objectives and the action verbs, need for instructional objectives and the three parts of the objective. Now, what is the blooms revised taxonomy? In the last lecture I explained what the bloom taxonomy is but during the 1990's, a former student of bloom, Lorin Anderson, led a new assembly which met for the purpose of updating the taxonomy, hoping to add relevance for 21st century student and teachers. We are focusing to the 21st century student and teachers and for that we will use the revised blooms taxonomy.

(Refer Slide Time: 1:23)

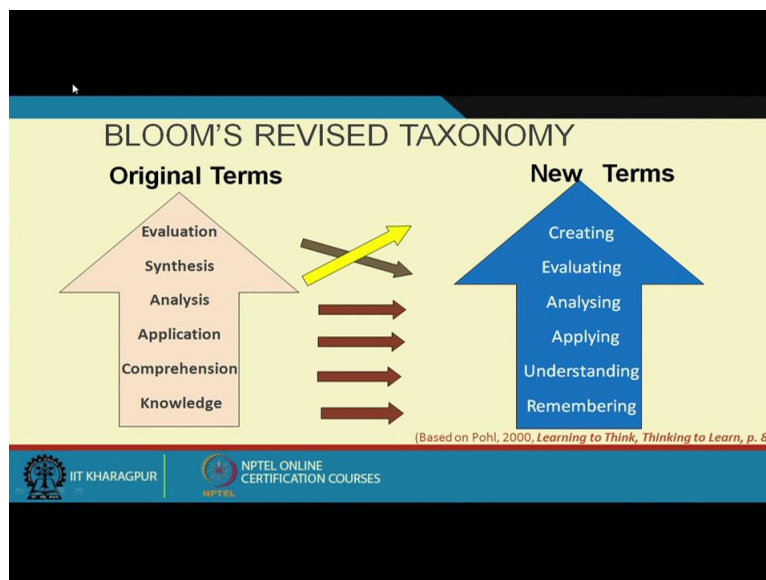
BLOOM'S REVISED TAXONOMY

- During the 1990's, a former student of Bloom's, **Lorin Anderson**, led a new assembly which met for the purpose of updating the taxonomy, hoping to add relevance for 21st century students and teachers.
- The changes occur in three broad categories: terminology, structure, and emphasis.

http://projects.coe.uga.edu/epltt/index.php?title=Bloom's_Taxonomy

IIT KHARAGPUR NPTEL ONLINE CERTIFICATION COURSES

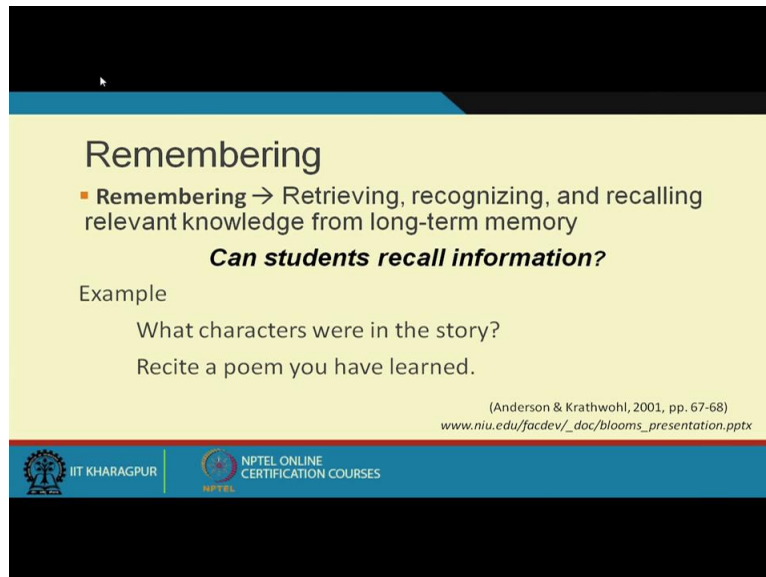
(Refer Slide Time: 1:34)



The changes occur into three broad categories, the terminology, structure and emphasis, first I will explain was that? In the bloom taxonomy knowledge, comprehension, application, analysis, synthesis and evaluation, but in the revised bloom taxonomy just see that knowledge is new name, it is remembering, Comprehension, understanding, Application, applying, analysis analyzing, but what the evaluation level, it comes in the new term it is evaluating. And the synthesis, it goes stop that is the creating level, the new term. So the new is remembering, understanding, applying, analyzing, evaluating and creating, so, what we notice? The term change right, because knowledge became remembering like that and

another thing that knowledge, comprehension, these are the noun form right, but here remembering, understand these are verb form.

(Refer Slide Time: 2:48)



Remembering



- **Remembering** → Retrieving, recognizing, and recalling relevant knowledge from long-term memory

Can students recall information?

Example

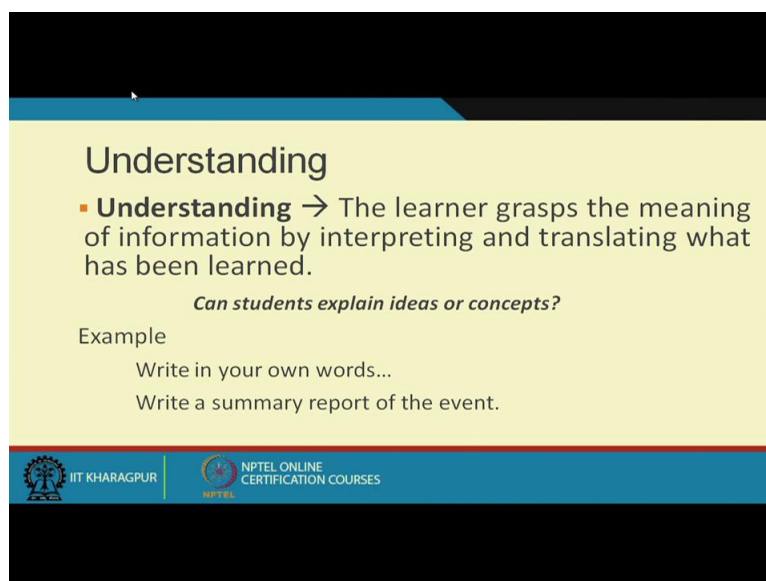
- What characters were in the story?
- Recite a poem you have learned.

(Anderson & Krathwohl, 2001, pp. 67-68)
www.niu.edu/facdev/_doc/blooms_presentation.pptx

 IIT KHARAGPUR  NPTEL ONLINE CERTIFICATION COURSES

You know understand is a verb thing applying it, creating it, so there is a change from the noun form to the verb form. So, remembering, retrieving, recognizing and recalling relevant knowledge from long term memory say, can students recall information? Some example, what characters were in the story? So, it is you have to remembering you are telling that what characters the name of the character. Recite a poem, not explain a poem, and just recite a poem.

(Refer Slide Time: 3:18)





Understanding

- **Understanding** → The learner grasps the meaning of information by interpreting and translating what has been learned.

Can students explain ideas or concepts?

Example

- Write in your own words...
- Write a summary report of the event.

 IIT KHARAGPUR  NPTEL ONLINE CERTIFICATION COURSES

Understanding, the learner grasps the meaning of information by interpreting and translating what has been learned, can students explain ideas or concept? We will keep as a teacher to keep is in the mind, can they understand it? So, write in your own words, so write the action verb, in your own words you have to explain, write a summary report of the event, so these are the understanding level, not the remembering above that.

(Refer Slide Time: 4:01)

Applying

Applying → The learner makes use of information in a context different from the one in which it was learned

Can students use the information in another familiar situation?

Example

- Make a scrapbook about the area of study.
- Make a clay model...

IIT KHARAGPUR | NPTEL ONLINE CERTIFICATION COURSES

Applying means this is the same, just like the old bloom taxonomy. Can students use information in another familiar situation? So, make a scrapbook about the area of the study or make a clay model, is clay model, in that case is a applying it, right.

(Refer Slide Time: 4:21)

Analysing

Analysing → The learner breaks learned information into its parts to best understand that information

Can students break information into parts to explore understandings and relationships?

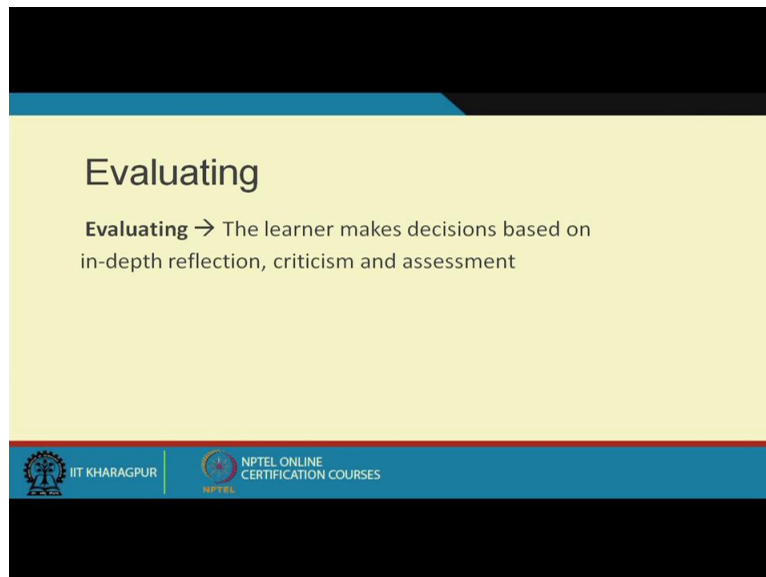
Example

- Design a questionnaire to gather information.
- Make a flow chart to show the critical stages.

IIT KHARAGPUR | NPTEL ONLINE CERTIFICATION COURSES

Analyzing: can student break information into parts to explore understandings and relationships? For example, design a questionnaire to gather information. So this is the, they are analyzing it or you have to make a in your research thing make a flowchart to show the critical stages that is the analyzing level.

(Refer Slide Time: 4:49)



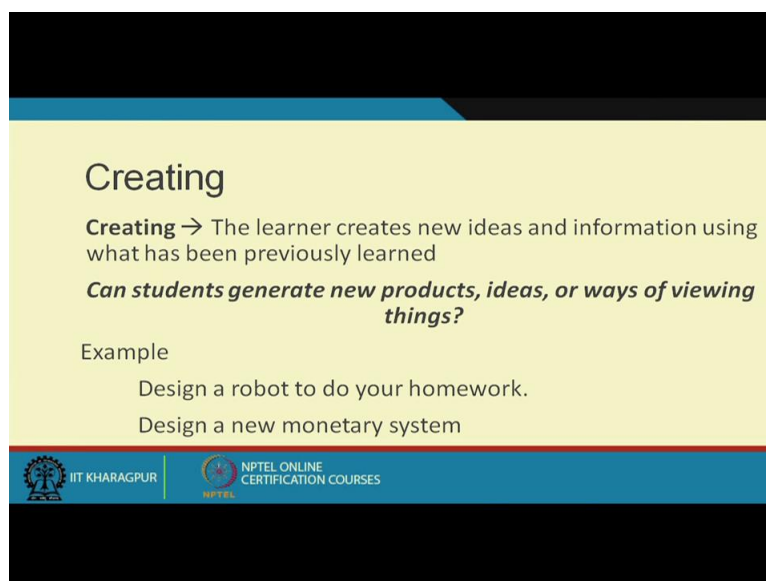
Evaluating

Evaluating → The learner makes decisions based on in-depth reflection, criticism and assessment

IIT KHARAGPUR | NPTEL ONLINE CERTIFICATION COURSES

But here, instead of synthesizing, this is evaluating means the learner makes decision based on in-depth reflection, criticism and assessment. Write a half-yearly report, prepare a case study thing so that is in the evaluation level and the we call that is that and that top is the creating.

(Refer Slide Time: 5:15)



Creating

Creating → The learner creates new ideas and information using what has been previously learned

Can students generate new products, ideas, or ways of viewing things?

Example

- Design a robot to do your homework.
- Design a new monetary system

IIT KHARAGPUR | NPTEL ONLINE CERTIFICATION COURSES

Creating means the learner creates new ideas and information using what has been previously learned. So, can students generate new products, ideas or ways of viewing things? So, there design a robot to do your homework or design a new monetary system, so this is not the only evaluating, they are not only judge, they are designing it.

(Refer Slide Time: 5:49)

Revised Bloom's Taxonomy of the Cognitive Domain					
Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Articulate Define Duplicate Identify List Name Recall Recognize Reproduce Tell	Calculate Categorize Clarify Classify Compare Contrast Describe Discuss Distinguish Exemplify Expand Explain Illustrate Infer Locate Match Outline Summarize	Carry out Classify Demonstrate Execute Illustrate Implement Practice Solve Use Utilize	Appraise Attribute Compare Contrast Deconstruct Detect Differentiate Discriminate Distinguish Examine Formulate Infer Integrate Organize Parse Relate Select Sequence Structure Test	Appraise Check Coordinate Critique Defend Detect Dispute Judge Monitor Prioritize Rate Reconstruct Select Support Verify	Change Combine Compile Compose Construct Create Design Formulate Generate Hypothesize Improve Invent Plan Predict Produce

So this is the creation component is there, so this is that here all the action verbs in the revised bloom taxonomy of the cognitive level.

(Refer Slide Time: 6:00)

Summary - Bloom's revised taxonomy

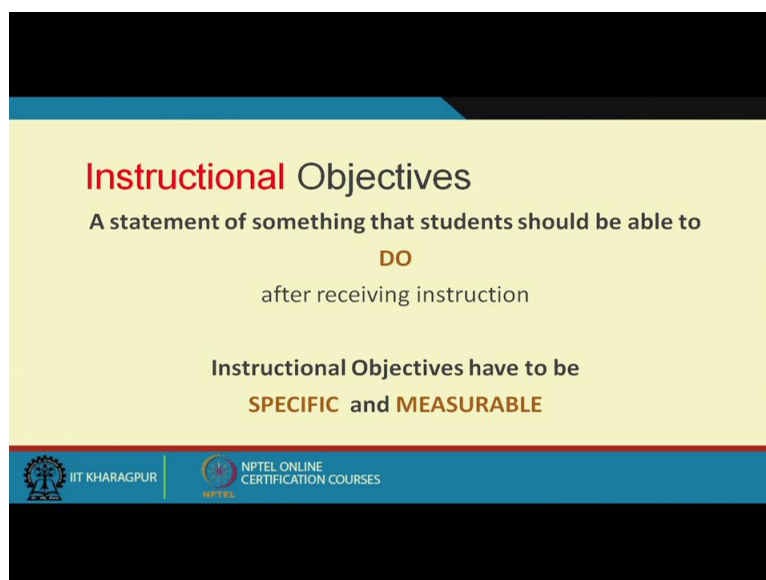
- Systematic process of thinking & learning
- Assists assessment efforts with easy-to-use format
- Visual representation of alignment between goals & objectives with standards, activities, & outcomes
- Helps form challenging questions to help students gain knowledge & critical thinking skills

Only so the summary of the revised blooms taxonomy is that it is a systematic process of thinking and learning, what you are thinking and what you are learning, the revise blooms is

the systematic process. So, it assists if you know the process then assist, it is help you for the assessment efforts to easy-to-use format.

Visual representation of alignments between goals and objectives with standards, activities and outcomes, was the objective clear then outcome also clear. Helps from challenging questions to help students gain knowledge and critical thinking skill and it assists in development of goals, objectives and lesson plan. Lesson plan what to go to before to teaching the class, the lesson plan, these objective and this using the bloom taxonomy or blooms revised taxonomy what I want from the learner if I explain it then it is easy for me to use the lesson plan right.

(Refer Slide Time: 7:07)



So, instructional objective is that how using the taxonomy we are writing the instructional objectives. There this is the main thing here; a statement of something that student should be able to do after receiving instruction so, the do component is very important what they know is not what they can do it, right, so instructional objective, it is very specific and measurable.

(Refer Slide Time: 7:45)

Instructional Objectives

- Objectives are specific, outcome based, measurable, and describe the learner's behaviour after instruction.

Specific- Objectives are **very specific**. This means that they should describe precisely what the learner is expected to do

Outcome based- This means that the objective is going to state what the learner should be able to do *after* the instruction is complete. The process of how the instruction happens is not considered in an objective.

<http://edtech2.tennessee.edu/projects/bobannon/objectives.html>

IIT KHARAGPUR | NPTEL ONLINE CERTIFICATION COURSES

Objectives are specific, outcome based, measurable and describes the learner's behaviour after instruction. After instruction was that is the objective you have write very specific objective so that learner can clearly understand that my teacher, he wants this. Specific means objectives; this means that they should describe precisely what the learner is expected to do. When as a teacher when you will write the objective in that case it should be very specific that learner will do this. Outcome based, already I explained outcome based, so this means that objective is going to state what the learner should able to do after instruction is complete. So the process of how the instruction happens is not considered is under objective, so that means what the outcome, it should specify it in the instructional objective.

(Refer Slide Time: 8:59)

Instructional Objectives

Measureable - This means that objectives should describe learning outcomes that can be measured; objectives should be seen or heard.

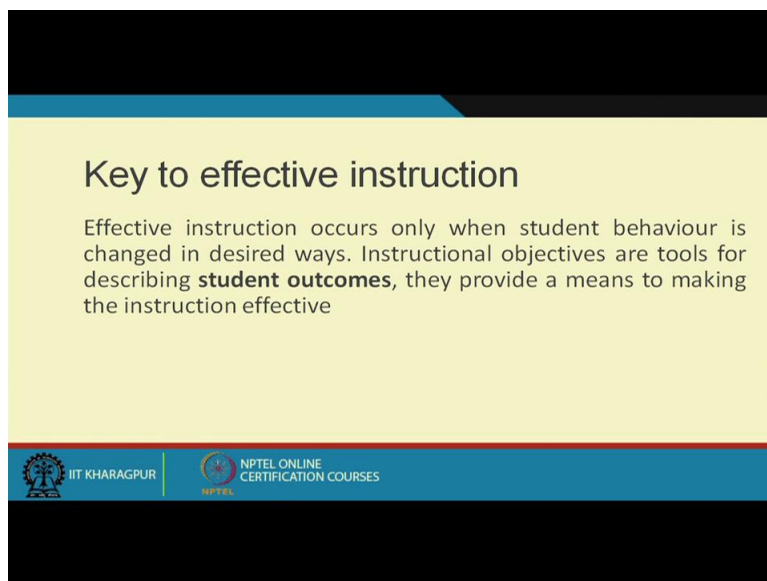
Describe student behaviour- Objectives **describe student behaviours**. This means that objectives should relate what the student should be able to do after the instruction

<http://edtech2.tennessee.edu/projects/bobannon/objectives.html>

IIT KHARAGPUR | NPTEL ONLINE CERTIFICATION COURSES

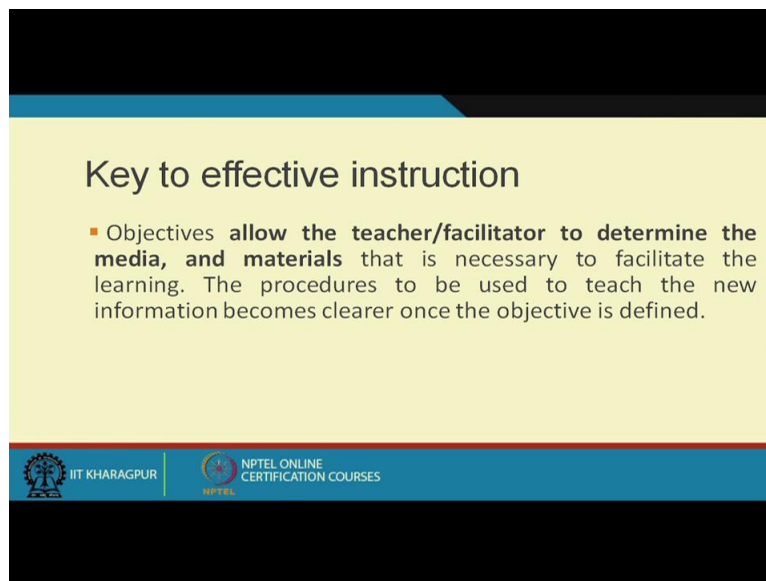
The third component is measurable that this means that objective should describe learning outcome that can be measured “feel” verb or “appreciate” verb is weak thing, “feel, understand” it is also weak concept why? You may understand I may not. Feel, you may feel I may not, right. So, not measurable means it should be measurable feeling is not the measurable things, right. So, the describe students behaviour, the objectives that describes students behaviour, this means that the objective should relate what the learner should be able to do after the instruction, right, so that students behaviour we focusing the learner.

(Refer Slide Time: 9:53)



Key to effective instruction, effective instructions occurs only when student behaviour is changed in desired way. Instructional objectives are nothing but the tools for describing the student outcomes; they provide a means of making the instruction effective. So, objectives tell students to what is expected of them, what you expect so that you what you want from the you suppose, you expect that your student can analyze something right, but you in the question paper you are, in the evaluation page judge this and this type of this not possible, they can only analyze right. So, if it is the objective level it should be clear what you want I want my learner up to the analyzing level, but not in the synthesis or in that creation in that levels. So, they eliminate the guess work because the expectations are clearly defined, right.

(Refer Slide Time: 11:12)



The slide has a black header and footer. The main content area has a light yellow background. The title 'Key to effective instruction' is in black. A bullet point in red states: 'Objectives allow the teacher/facilitator to determine the media, and materials that is necessary to facilitate the learning. The procedures to be used to teach the new information becomes clearer once the objective is defined.' The footer contains the IIT Kharagpur logo and NPTEL Online Certification Courses text.

Key to effective instruction

- Objectives **allow the teacher/facilitator to determine the media, and materials** that is necessary to facilitate the learning. The procedures to be used to teach the new information becomes clearer once the objective is defined.

IIT KHARAGPUR NPTEL ONLINE CERTIFICATION COURSES

Objectives allow the teacher to facilitator to determine the media and materials that is necessary to facilitate the learning. The procedures to be used to teach the new information become clearer once the objective is clear yes, when the objective is clear then you know what will be the outcome. Evaluation and if the objective is clear if you then it is easy for us to create your evaluation paper your question paper, so evaluation is always based on the instructional objectives. We are actually promoting self-learning, the students they from the media, from different they know they can read on their own, but what they have to achieve if the objective is clear, okay they will learn on their own and they can understand but the teacher want this type of questions or that the evaluation everything is very easy. So, (deter) the evaluation determining the objective classification will assist you in determining the appropriate method of evaluation.


(Refer Slide Time: 12:33)


Basic Characteristics of Instructional Objectives

Action Oriented Statements – describing what is to be achieved by the learner.

Related to **intended Learning Outcomes** - NOT - the process for achieving those outcomes.

Intended Learning Outcomes (ILOs) are student centered and describe the intentions for your students' learning; they specify what students should know and be able to do by the end of the program.

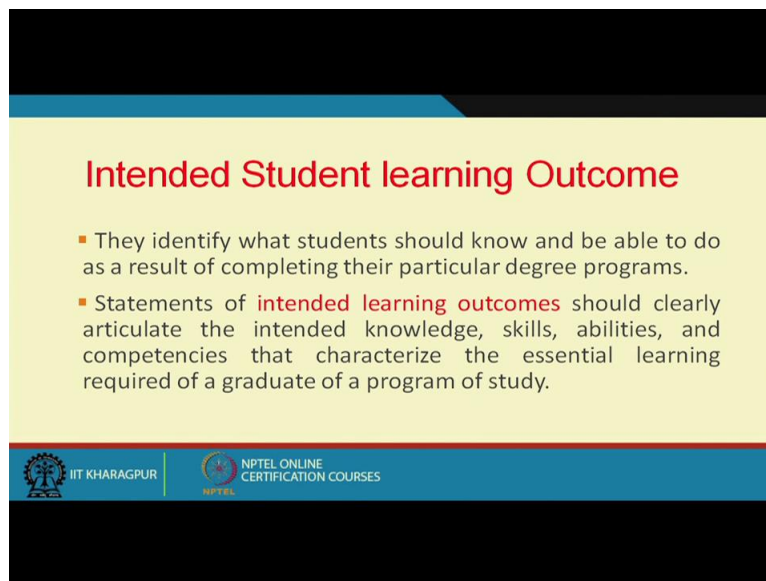
 IIT KHARAGPUR

 NPTEL ONLINE CERTIFICATION COURSES

Basic characteristics of the instructional objective is a action oriented statement. Describing what is to be achieved by the learners. So, it is related to the intended learning outcome not the process for achieving the outcome, so here this a new term that is the intended learning outcome. These are the students centered and describe the intentions for your students learning, they specify what students should know and what I mention be able to do, right by the end of the program.

So, after end of the program they after 40 hours of lecture after end of the program, they will do this, so that in the course suppose in the course, there are some modules another modules will the sub units, actually in the software framework I will explain that, in the course what the objective of the course if you write it specifically then, it is easy for the learner okay in this course the objective is this I have to achieve it. In each module or each unit we should specify unit means one hour lecture, some objective if I clear so after one hour class okay, the objective is this, I have to achieve those objectives, as a learner I will think accordingly, but as a teacher the objective we should precisely we should write it very clearly, right.

(Refer Slide Time: 14:10)



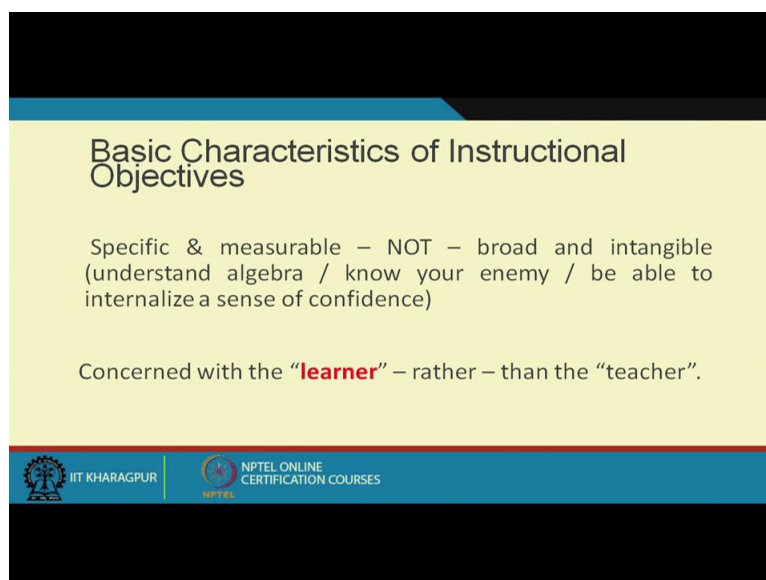
Intended Student learning Outcome

- They identify what students should know and be able to do as a result of completing their particular degree programs.
- Statements of **intended learning outcomes** should clearly articulate the intended knowledge, skills, abilities, and competencies that characterize the essential learning required of a graduate of a program of study.

IIT KHARAGPUR | NPTEL ONLINE CERTIFICATION COURSES

Intended student learning outcome, they identify what students should know and be able to do as a result of completing their particular degree programs. So, statements of intended learning outcome should clearly articulate the intended knowledge, skills, abilities and competencies that characterize the essential learning required of a graduate of a program of study, right.

(Refer Slide Time: 14:47)



Basic Characteristics of Instructional Objectives

Specific & measurable – NOT – broad and intangible
(understand algebra / know your enemy / be able to internalize a sense of confidence)

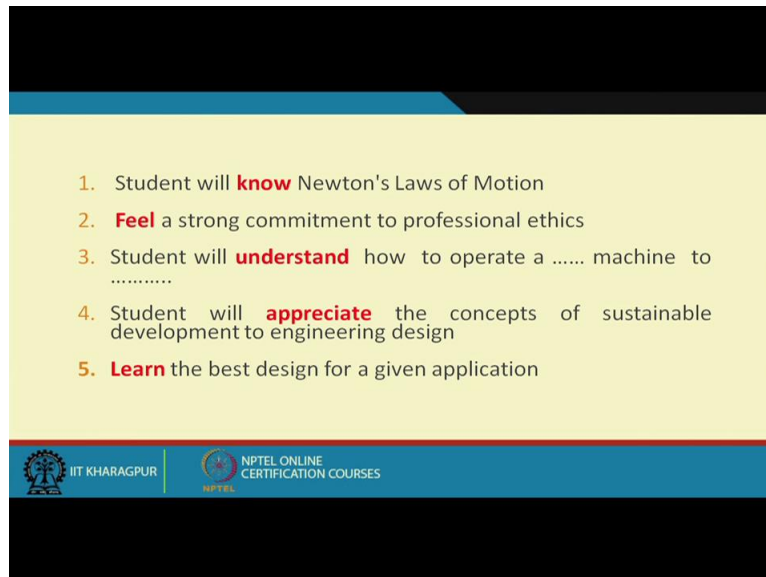
Concerned with the “**learner**” – rather – than the “teacher”.

IIT KHARAGPUR | NPTEL ONLINE CERTIFICATION COURSES

Now, the basic characteristics of instructional objectives I already mentioned, it is specific and measurable, not broad and intangible, understand algebra, know your enemy you may not you may, be able to internalize a series of confidence, so it is concentrate to the learner rather

than the teacher, right because feels students enough so, we are totally learner centric. The total outcome base learning is the learner centric approach.

(Refer Slide Time: 15:15)



1. Student will **know** Newton's Laws of Motion

2. **Feel** a strong commitment to professional ethics

3. Student will **understand** how to operate a machine to

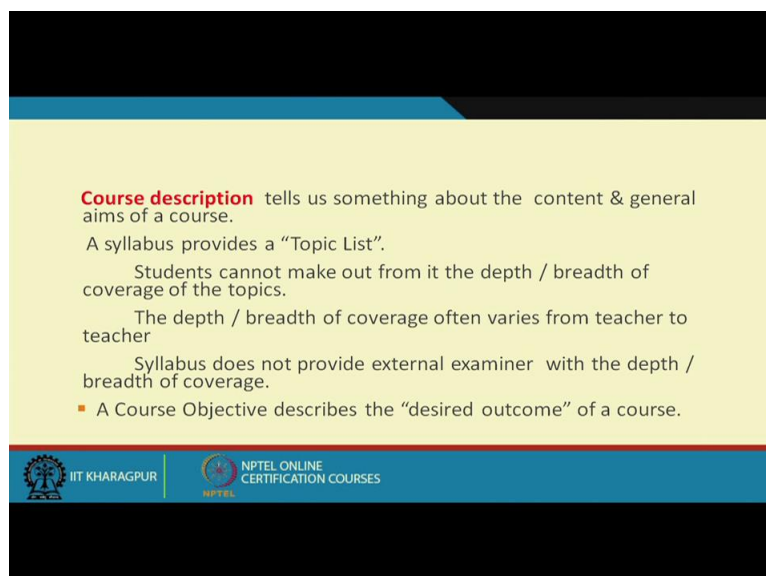
4. Student will **appreciate** the concepts of sustainable development to engineering design

5. **Learn** the best design for a given application

IIT KHARAGPUR | NPTEL ONLINE CERTIFICATION COURSES

Student will know Newton's law of motion, know is a wrong term you may I may not. Feel understand, appreciate, learn is better avoid this words these are not the exact action verbs. So, now was that action verb now we have to know what the action verb. Instructional objective should not be formulated with vague statement. The student understand/ appreciate I mentioned that, so instructional objectives are to be formulated with the help of the action verbs. So what identify assess, list, analyze, design, compare very specific and it is measurable.

(Refer Slide Time: 16:15)



Course description tells us something about the content & general aims of a course.

A syllabus provides a "Topic List".

Students cannot make out from it the depth / breadth of coverage of the topics.

The depth / breadth of coverage often varies from teacher to teacher

Syllabus does not provide external examiner with the depth / breadth of coverage.

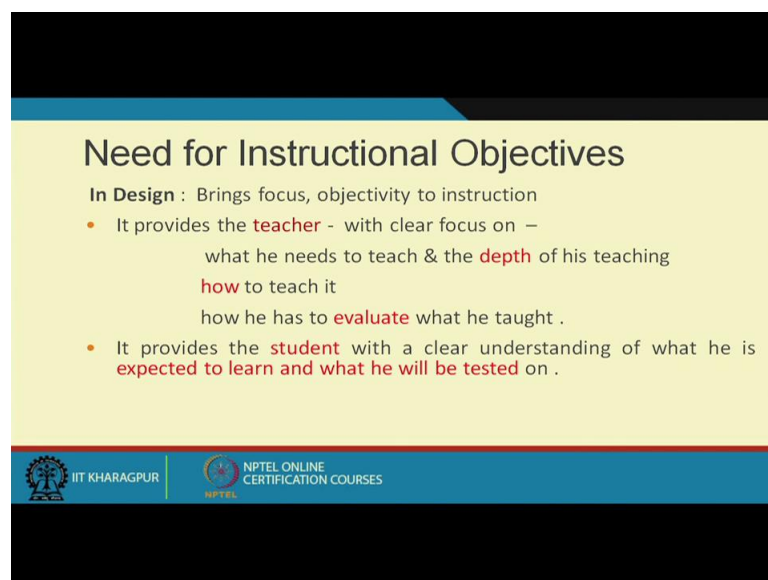
■ A Course Objective describes the "desired outcome" of a course.

IIT KHARAGPUR | NPTEL ONLINE CERTIFICATION COURSES

Course description tells us something about the content, any course description and general aims of the course, but you know our syllabus provides a Topic list, students cannot make out its depth in the in any course how much that how the depth and breadth, the depth and breadth coverage, varies from teacher to teacher suppose A teacher is teaching one course and B teacher is teaching the same course. One teacher in some topics it goes not in the breadth but it goes he goes to the depth right, another we know breadth but not in the depth. So, this in the if you write the instructional objectives so course description, it is not clear but when you write the instructional objectives, in that case how much you should specify that, then it is easy for the learner to know that okay. In this topic it will go the depth part is very important right.

So, syllabus does not provide that so provide external examiner with the depth and breadth and in that case if the instructional objective is clear, in that case the industry people also can know that the okay, this student he knows up to this level because the objective written by the teacher not the syllabus things. So, that is why this instructional objective is very-very important, our course objective describes the desired outcome of the course.


(Refer Slide Time: 18:08)




Need for Instructional Objectives

In Design : Brings focus, objectivity to instruction

- It provides the **teacher** - with clear focus on –
what he needs to teach & the **depth** of his teaching
how to teach it
how he has to **evaluate** what he taught .
- It provides the **student** with a clear understanding of what he is
expected to learn and what he will be tested on .

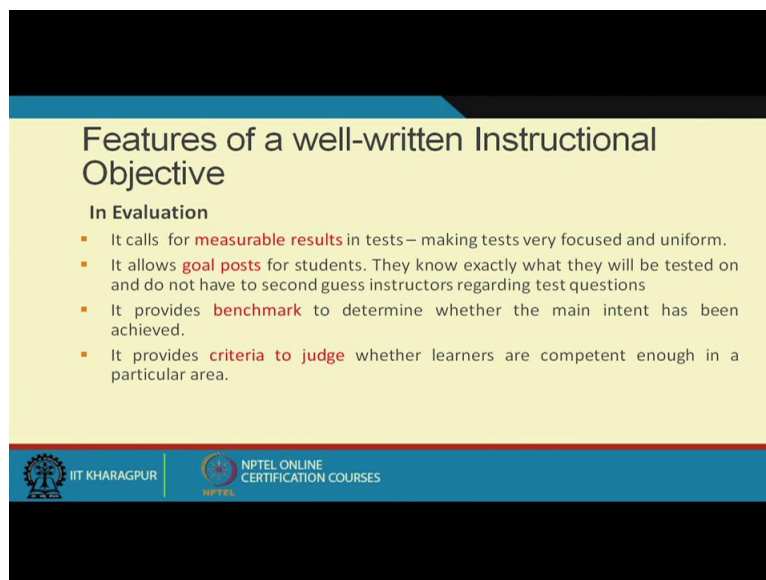
 IIT KHARAGPUR

 NPTEL ONLINE
CERTIFICATION COURSES

So, in planning so need for instructional objectives in planning, it guides selection of the proper tools for the instruction, Mode of teaching, lecture, demonstration, hands-on what the learner needs to achieve after the instruction. Once objective are fixed, instructor is free to attain the goal in his own way the learner can, it allows a consistent results from learners across instruction across years.

So, in the planning, to planning the instructional objective is very important. Now, to design it first in the planning component instructional objective before that teaching you have to plan. The second is to design thing, in design, it focus objectivity to instruction. It provides the teacher with clear focus on what he needs to teach and the depth of his teaching, right. In the design how to teach it, how he has to evaluate, it provides the students with a clear understanding of what he is expected to learn and what he will be tested on clear. I mention the future employer of such students with clear idea of exactly what the students has learned from the course. So, you can understand right, the design that is why from the design point of you there is a great need of the instructional objectives and the last point you say the evaluation.

(Refer Slide Time: 19:44)





The slide is titled "Features of a well-written Instructional Objective" and is divided into a yellow content area and a blue footer area. The title is in bold black text. Below the title, the section "In Evaluation" is highlighted in bold. A bulleted list follows, with key terms in red. The footer contains the logos of IIT Kharagpur and NPTEL, along with the text "NPTEL ONLINE CERTIFICATION COURSES".

Features of a well-written Instructional Objective

In Evaluation

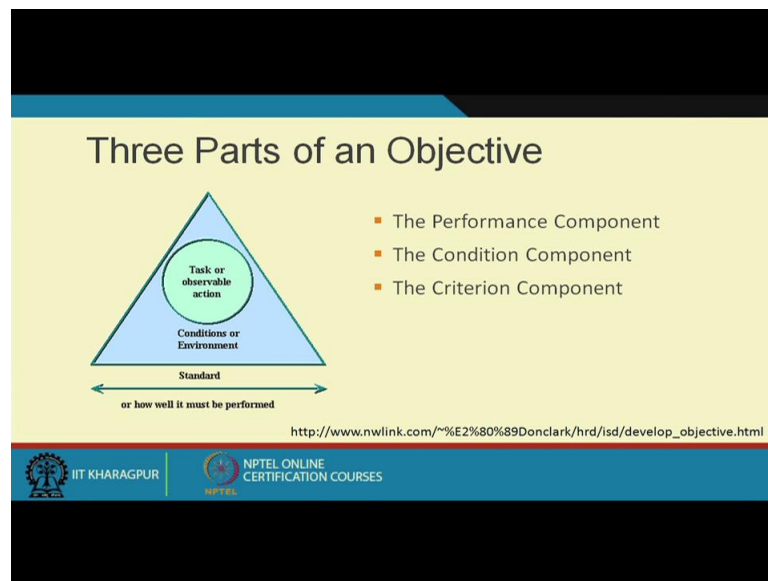
- It calls for **measurable results** in tests – making tests very focused and uniform.
- It allows **goal posts** for students. They know exactly what they will be tested on and do not have to second guess instructors regarding test questions
- It provides **benchmark** to determine whether the main intent has been achieved.
- It provides **criteria to judge** whether learners are competent enough in a particular area.

 IIT KHARAGPUR

 NPTEL ONLINE CERTIFICATION COURSES

It calls the measurable results in tests making tests very focused and uniform. It allows goal posts for students, right. They know exactly what they will be tested goal post all and do not have the second guess instructors regarding the test questions. It provides a benchmark to determine whether the main intent has been achieved or not. It provides the criteria to judge whether learners are competent enough in a particular area, media. So in the evaluation if the learner is competent it is easy for us. So, the thing is that you write the instructional objective is very important.

(Refer Slide Time: 20:41)



Now, to write the instructional objective, there are three components, one is the performance component, one is the condition component and in the criterion component. First was that, performance component is that what the learner have to perform, what the learner have to do that is the performance component.

Condition means under what condition they have to perform, so that is the condition component. Criterion component is up to what level that is the criterion component. So, when you will write the instructional objective we should first the performance component that is very important what the learner have to perform, not the feel and this things understand only describe some that is the only apply do this things so, that is the performance. Under what condition, condition is component and up to what level you have to specify that because in the criterion you are specifying up to this level but in the evaluation properties you are thinking that they will do that level that is not fare, okay.

(Refer Slide Time: 21:54)

The Performance Component

- Performance describes what the learner will be doing when demonstrating that he/she has reached the objective
- What should the learner be able to do?

Performance may be “overt” – where it can be readily seen / heard (dance / draft a report).

Performance may be “covert”, i.e., is not a visible performance.

Such performances often describe something a learner can “BE” instead of something a learner can “DO”.

IIT KHARAGPUR | NPTEL ONLINE CERTIFICATION COURSES

So, performance component describe the learner will be doing when demonstrating he or she has reached the objective what should the learner be able to do. Performance may be overt where it can be readily seen or heard suppose dance thing or drafter report, right. So, it is a overt but it can be overt which is not visible performance, right. So, such performance often describes something a learner can “BE” instead of something a learner can “DO”, right, so this is the performance part.

(Refer Slide Time: 22:46)

The Condition Component

- The Conditions component of an objective is a description of the circumstances under which the performance will be carried out.
- It also includes a description of what will be available to learners when they perform the desired behaviour.

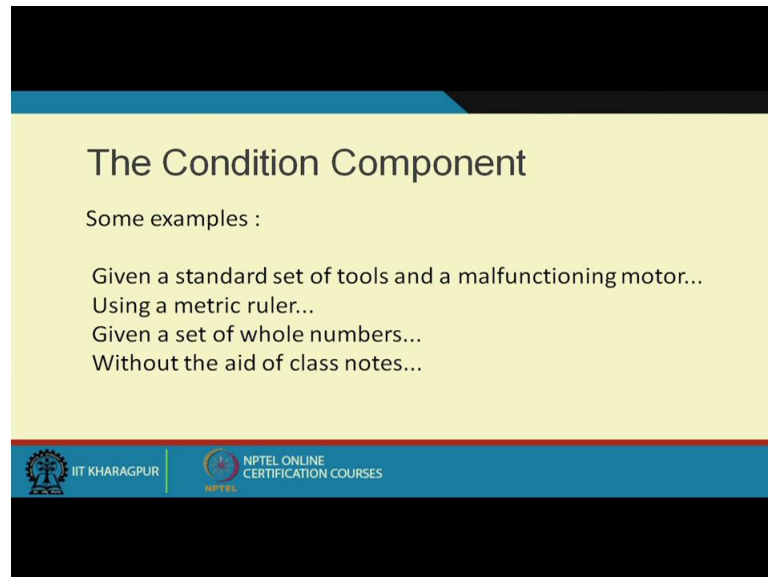
For example: Travel from Kolkata to Delhi in 2 h
In an aircraft, travel from Kolkata to Delhi in 2 h

IIT KHARAGPUR | NPTEL ONLINE CERTIFICATION COURSES

Condition I mention was the condition; the condition component of an objective is the description of the circumstances under which the performance will be carried out. Suppose, it also includes, a description of what will be available to the learner when they perform the

desired behaviour, suppose example, travel from Kolkata to Delhi in two hours. In an aircraft if I mention so that is the component right, in an aircraft travel from Kolkata to Delhi in two hours, so that thing you should specifying what condition, right.

(Refer Slide Time: 23:25)



The slide has a yellow background with a black header and footer. The title 'The Condition Component' is in black text. Below it, 'Some examples :' is followed by four indented lines of text. The footer contains the IIT Kharagpur logo and the NPTEL Online Certification Courses logo.

The Condition Component

Some examples :

- Given a standard set of tools and a malfunctioning motor...
- Using a metric ruler...
- Given a set of whole numbers...
- Without the aid of class notes...

IIT KHARAGPUR NPTEL ONLINE CERTIFICATION COURSES

And the last suppose give some examples, given standard set of tools and a manufacturing motor to that. Using a metric ruler, given a source set of whole numbers like that we should specify it. The criterion component I mention up to what level, the final component of an effective objective is the criterion. So, the criterion is the description or the criteria for acceptance of a performance as sufficient that is help to gauge the quality of performance. This component tells the learner I mention how often, how well, how much, how will, you know, so his performance this is the criterion component.

(Refer Slide Time: 24:18)

The Criterion Component

Some common criteria :

- Speed / time limit on the performance
- Minimum marks for passing / grades
- Level of accuracy (within 0.5% accuracy)
- Quality of the performance (information is factual / pertinent / treatment is courteous)

IIT KHARAGPUR | NPTEL ONLINE CERTIFICATION COURSES

Speed or the time limit of the performance, minimum marks for passing this is the you know, these are the level of accuracy with a 0.5% in accuracy so that is the criterion component.

(Refer Slide Time: 24:33)

Examples of Instructional Objectives

- Write a customer reply letter with no spelling mistakes by using a word processor.

Performance Criteria : Write a customer reply letter
Criterion Criteria: with no spelling mistakes
Condition Criteria : using a word processor

http://www.nwlink.com/~%E2%80%89Donclark/hrd/isd/develop_objective.html

IIT KHARAGPUR | NPTEL ONLINE CERTIFICATION COURSES

Example, write a customer reply letter with no spelling mistakes by using a word processor. So, what you have to perform? Write a customer reply letter right. Now what is the criteria; with no spelling mistakes and condition using a word processor.

(Refer Slide Time: 24:58)

Examples of Performance Objectives

- Copy a table from a spreadsheet into a word processor document within 3 minutes and without reference to the manual.

Observable Action: Copy a table from a spreadsheet into a word processor document

Measurable Criteria: within 3 minutes

Conditions of Performance: without referencing the manual

http://www.nwlink.com/~%E2%80%89Donclark/hrd/isd/develop_objective.html

IIT KHARAGPUR NPTEL ONLINE CERTIFICATION COURSES

Suppose here copy a table from a spreadsheet into a word processor document within 3 minutes and without reference to the manual. What is the objectible action; copy a table from a spreadsheet into a word processor document? Now, what is measurable criterion; within 3 minutes. What is the condition of the performance; without referencing the manual?

(Refer Slide Time: 25:34)

Examples of Performance Objectives

- Smile at all customers, even when exhausted, unless the customer is irate.

Observable action: Smile

http://www.nwlink.com/~%E2%80%89Donclark/hrd/isd/develop_objective.html

IIT KHARAGPUR NPTEL ONLINE CERTIFICATION COURSES

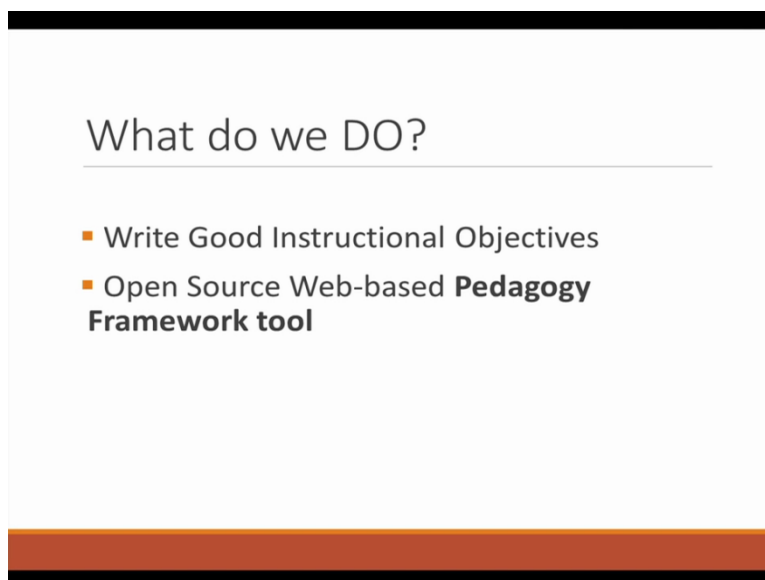
Smile at all customers even when exhausted unless the customer is irate, okay. So, the observable action you have to smile. Measurable criteria at all customers, condition, even when exhausted and variables unless the customer is irate. So, this is (I) now in each subject suppose the thermodynamics in each subjects, the teachers have to write the instructional the teachers instructional objectives using these condition, criterion and performance component

and when you use the performance component that time you have to keep in mind the bloom taxonomy and the action verbs, whether it is in the knowledge level, comprehension level, application level, analysis, synthesis or evaluation in which level that in the performance part these bloom taxonomy and action verbs is very important, okay.

So, in the next lecture I will explain you, how to write the instructional objective is clear. Now using the software framework how we can write the instructional objectives I will show the software framework developed by IIT Kharagpur, Thank you.

Course on Outcome based Pedagogic Principles for Effective Teaching
Professor Shyamal Kumar Das Mandal
Centre for Educational Technology
Indian Institute of Technology Kharagpur
Module 03
Lecture No 13
Taxonomy (Contd)

(Refer Slide Time: 0:29)



Good afternoon, taxonomies and instructional objectives. Here, mainly I cover the how to write the good instructional objectives and the open source web-based pedagogy framework tool, professor Dasmandal will explain how to use the pedagogic tool but before that some example I want to give for instructional objectives. The student will demonstrate metric measurement of length is better if you write in such a way that given a metric ruler the students will measure the length of common linear objects to the nearest millimeter, so, given the metric rule, so it will be very clear right.

So, the students will learn suppose about objectives if you if the instructional objectives if we write it, the students will construct well-defined instructional objectives. If you write in that way this is really proper anybody can understand it, right. So, there is some example of performance outcome and the instructional objectives, suppose performance outcome, the students will add double digit numbers, okay but when the instructional objectives I will write if we write in that way that given two double digit numbers written in an equation form the students will add them together, if you write it the instructional objectives given this things the condition component and what you have to the you have to add the number, so that is the performance component, okay.

(Refer Slide Time: 2:16)



So, in that just see here, initiate in that if you just go to the www.ide.iitkgp.ernet.in, it is an open sourced a web-based pedagogy framework tool where you can develop your own course for the designing reviewing, monitoring the outcome based curriculum you can develop your own course in your own subject. So, what is the vision of this framework? Why we develop this framework because we want that the make engineering education system more learner centric.

So, in the framework only if you mention what is the objectives, the students the learner can know okay, this is the objective, so we will we will learn in my own way in such a way so that we can get that objectives. So, it is the open source so the learner can see the tool and the thing is that take care of individual differences amongst learners in their own time, they as the learning styles, learning approaches are different. So, the learner if know the objective so in their own style they can learn on their own and it ensure the mastery over not only the domain knowledge, but also over knowledge, skills and attitude that needed to the 21st century we are focusing there.

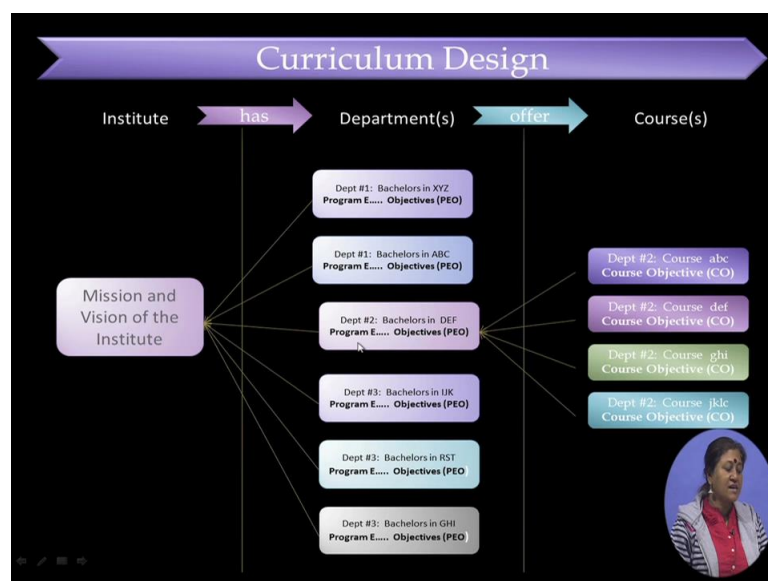
So, and we introduce the outcome based learning right. So keeping these things we developed our software and what are the features of these web-based tool. Here, any institute can develop their own course, any individual can develop their own course because the outcome based framework is there and industry experts in that when the developing the course, the industry experts also can see the course and they can provide the framework you know, for any course any they can give their comments and according the learner can also know and the course developer also can change that okay, this industry people they want this. So, according

to that we can change our objective with the, we can give more learning materials we can everything is there.

So, features industry experts can add individual learning resources, their case studies, unsolved problems for any course outcome and any student and learner, a can view the above courses for develop the intended skills. So, this is really a very modern approach for the curriculum design. So, the select the course objectives which promote higher order of thinking skill that is analysis, synthesis and evaluation level and it express the objectives of knowledge, skills and attitudes which the students should be able to do, demonstrate and on successful completion of the course using measurable action verbs.

Here, the action verbs the course developers; they do not have to remember everything in the framework, so if they can you know in the if they click in that action verbs in the knowledge level, all the action verbs is given, the course developer can choose the action verbs and they can write their own instructional objectives and it takes so the advantages of the ICT tools to make these available to everyone concern well in advance.

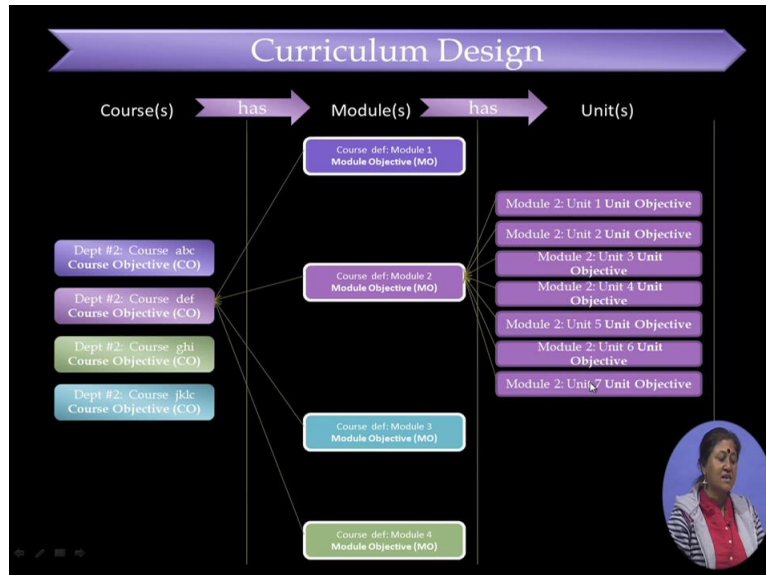
(Refer Slide Time: 6:21)



So, just see here, here in that suppose we are we are developing a course here, in the institute, mission and the vision of the institute. Any institute if you register you can write your own mission because institute A mission and vision is different from the institute B mission and visions. So, there you can write the institute, mission and vision under the mission under the institute different departments are there, department A, B, C and different programs are there. So, under the department some courses are there, suppose here that the program if objective

program educational objectives in that institute the subject experts will write under the program educational under the department few courses suppose, this is the mechanical department and in this mechanical department, thermodynamics, fluid mechanics different courses are there.

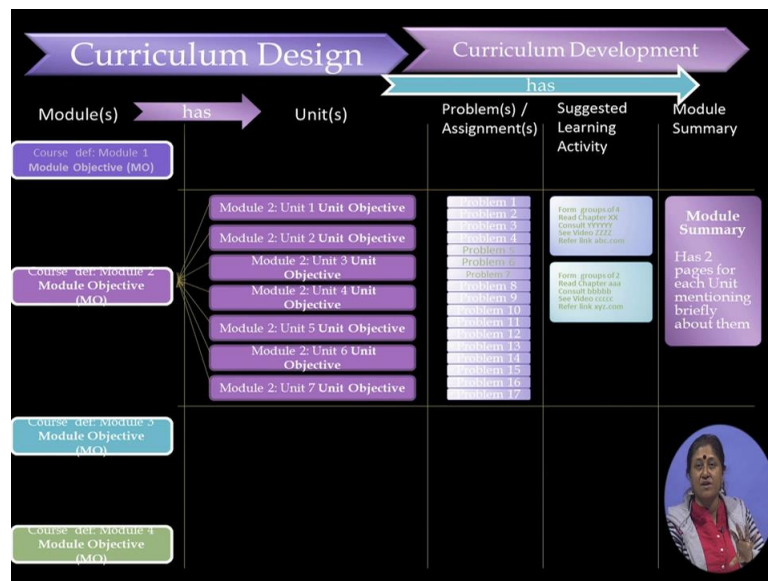
(Refer Slide Time: 7:34)



So, under the course view under the course we just what we did under the some course, we just distribute it them into some modules and the modules some units. So, the faculty developers have to write course objective 5 to 6 course objectives, suppose it is a 40 hours of lecture, in that case one in that course suppose there are 8 modules and each modules have five units. So, in that case 8 into 5, 40 hours of course. So, 5 units' means one unit is nothing but one hours lecture. In that one hour lecture the course developer have to write 2 or 3, 2 to 3 unit objectives and in the module suppose 1 module, it caters 5 objectives.

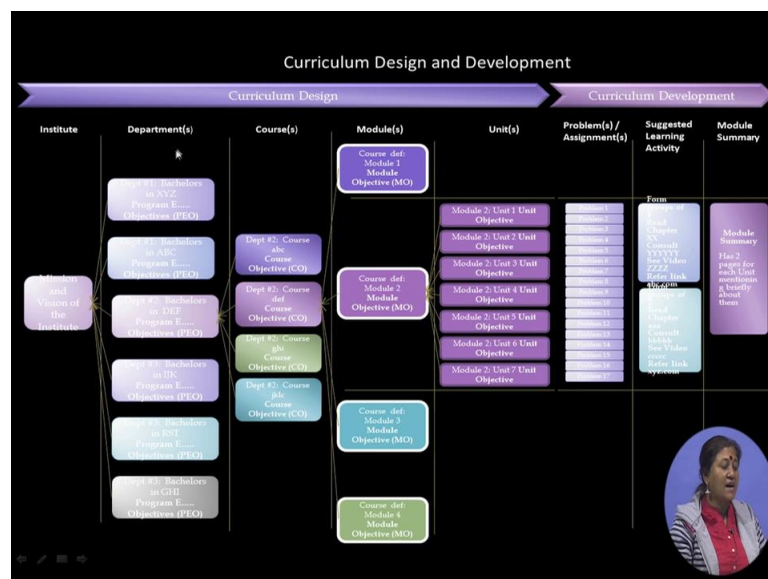
So, module objectives are little bit broader and the course objective is on the top. So, first the course, course under that module and under that module some units are there. So, here also we can see that the in the in the course few modules are there and in that module, all the units are there, suppose two unit one, unit objective, module 2 unit 1 unit objective, the course developer have to write.

(Refer Slide Time: 9:41)



So, here under the unit some problems which each unit we have write a problem, okay. The course and if the problem should link to that objective, so it works suppose we here 2 or 5 or 6 different units are there, if the learner and the problem one is correlated with objective four. So, if the learner can do unit level problem unit level it means that they understand the unit objective, so with each objective, there you have to link some unit level problems. So, in the assignment if you do that you can understand it, you can use it there and the suggested learning strategy what books here, in this framework, it is not the content development. Here, what books the learner can follow? What lectures they can see in the web? All the links you have to give and the module summary the total summary of the module.

(Refer Slide Time: 10:08)



So, this is the total curriculum design and development institutes under the departments, under the department course, in the course the course objectives, under the course few modules are there, under the modules units are there and each unit or each module or each course, their problems you have to give and the learning activity in the suggested learning activity what books what learning material they can use that only you have to mention those things under module summary.

So, the course level learning objectives, it is written mostly the broad general objectives unless in specific instructional objectives, but in the under the course the module is there and the module level, it is more specific and often should contain more action verbs to define the learning objectives and the under the module, there will be some units which is a very specific because one hour in one hour lecture what you want your learner, write it very specifically. So, this is the things are just give one example what course outcomes objective, just see a introduction to algorithm design by professor P. P. Chakraborty.

(Refer Slide Time: 11:29)

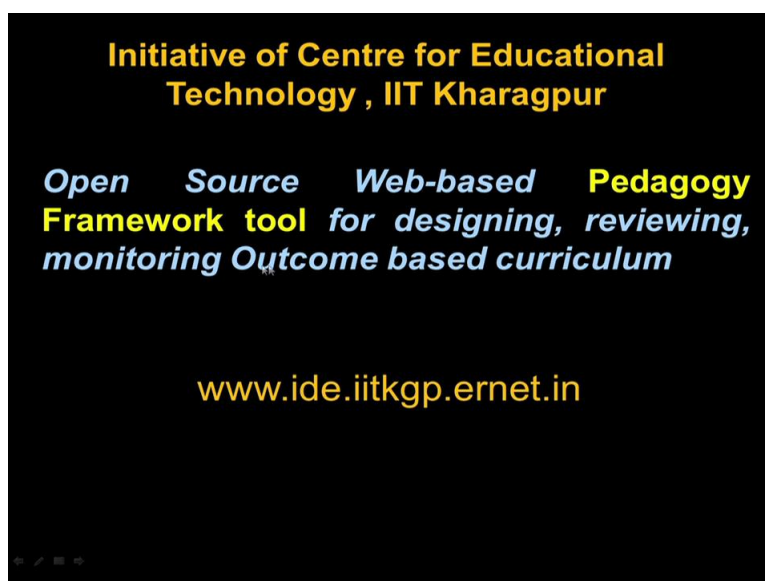
Course Outcomes / Objectives-
Introduction to Algorithm Design
Prof P. P. Chakraborty, IIT Kharagpur

Given an English language problem description, **define** (K) the problem precisely with input/output requirements, **examine** (An) its inherent complexity and **develop**(App) a generic or set of initial solutions (which can be explored for various design options) and **justify** (Eva) their correctness

Given an English language problem description, define the problem precisely with input/output requirements, examine its inherent complexity and develop a generic or set of initial solutions and justify their correctness. Here, define is an action verb, examine is an action verb, develop is an action verb, justify is an action verb, define it is an knowledge level action verb, examine; it is an analyses level action verb, Develop, it is an application level action verb and justify is an evaluation level action verb. So, in it is a very good instructional objectives and here, all the different action verbs are there.

So, it is not that in each objective only one action verbs is there, there can be 2 or 3 action verbs so, when you will write the performance component, the action verb and the proper what you want your learner very specifically you write. So, this is I am just giving the some example. Now, professor Dasmandal will explain you how to use the software framework? Where you have to do so that you can develop your own course? Thank you.

(Refer Slide Time: 13:20)



So, let us discuss about that the tools that outcome based curriculum development tools which have been IIT Kharagpur, under MHRD project that is called open source web-based pedagogy framework tools for designing, reviewing, monitoring outcome based curriculum. So, what is meaning is that if you want to develop that outcome based curriculum whatever the theory we have discussed, whatever been the first 5 lectures we have discussed that what is problem in education present education systems and how to improve the student engagements. If you develop your whole course using this framework tools and if it give it to the students before they come to the class then what happen, we belief that it will increase the student engagement and also, it will increase the students self-learning ability how we will discuss, okay.

(Refer Slide Time: 14:06)

Features of the Open Source Web-based Tools

- **Any institute** can developed the outcome based frame work for any program
- **A individual teacher** can developed his/her course in Outcome based frame work
- **Industry experts** can provide feedback for any course/ program outcome
- **Industry experts** can add additional learning resources, case studies, unsolved problem for any course outcome
- **Any student/learner** can view the above courses for developed the intended skill

So, what are the features of the tools? Any institute can develop their outcome based framework for any program. The tools provide a facility to develop the outcome based curriculum for a whole program and all program of the institute are demonstrated in the tool. Required you can register as an institute and you can add your institute mission and vision, then you can add one program, then you can write program educational objective then you can add the courses which is required to taught for fulfill that program educational objective and you can develop each and every courses based on this outcome based curriculum framework, so that facility is there that is called institute registration facility is there.

Any individual teacher suppose your institute does not interested about to develop that open source curriculum kind of things, as a teacher you can login and develop your curriculum using this framework and give it to the students before you come to the class before you teaching it and that increase the student engagement because in the curriculum design principle such that it will provide all the information about the course to the students and student will try their in their home and come to the class with prepared, so I will describe that thing.

(Refer Slide Time: 15:41)

Features of the Open Source Web-based Tools

- **Any institute** can developed the outcome based frame work for any program
- **A individual teacher** can developed his/her course in Outcome based frame work
- **Industry experts** can provide feedback for any course/ program outcome
- **Industry experts** can add additional learning resources, case studies, unsolved problem for any course outcome
- **Any student/learner** can view the above courses for developed the intended skill

The tools also provide, industry an expert can provide feedback or any course program outcome. An industry person said that okay, suppose I am developing a course on, let us the data structure and algorithm and I develop the whole course and it is available in my this portal. An industry experts seating on his own desk or seating in his home can see the whole course and can comment particularly that okay, these course objective or course outcome is not appropriate, it may be like this, so that comment then and there we will come to the teacher's side and teacher can see that comment and he can modify that things, okay.

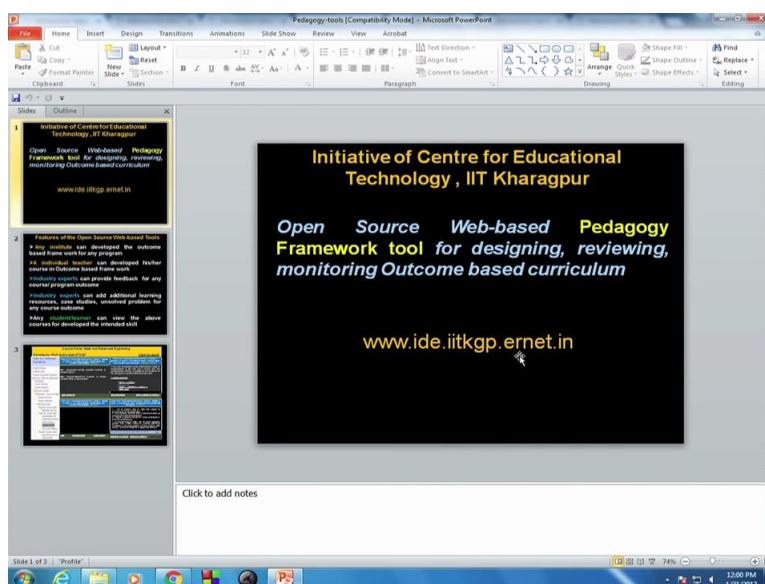
So, if that the industry can give an active feedback directly to the teachers regarding the outcome, regarding the teaching methodology of the course, regarding that industry expert can add additional learning resources, so somebody who want suppose you are teaching a subject, somebody can say this is the very good learning resources I found, so you can add it then case study, suppose I am teaching a course I require a lot of case study and I one of the case study taught in the class and industry expert when visualizing this course and he say that there is a there is a problem I have that can be discussed in the class also, you can then and there add that case study and it will be come to the teachers.

So, industry and academia active collaboration is possible throughout these tools. Next is any student and learner can view their goal, their pathway, their test item whether they reach the goal or not that create the self-learning ability at any point of time. More ever, it is also provide a teacher training, suppose there is a course on Digital signal processing and this semester you assign a teacher whose may be the new comer who may be the not taught course earlier.

Now, let us the whole framework is available for that course for that college for that program and this is given to the new teachers, what he know, he know what are the course outcome, each and individual lecture outcome, so why he will go to the class he know what has to be supposed to be taught or supposed to be test from the students whether they receive that goal or not. What kinds of problem are standard to teach this course? What kinds of industry feedback is available regarding this course?

So, all the information is available to the teachers. So, he can prepared his teaching learning process as per his own individualism and he can interact with the students with that whereas, it is not the matter that whether the teacher is a new comer or he is a first time teaching the course, the quality will be same because the course structures is given to the students, students has to acquire those skill. Even if the new comer teachers miss some point, students can say, sir we have not the received this goal because we have a confusion in this regards, then teacher can then and there he clarify the confusion or the teacher can take advice from his senior teacher, sir, the students are asking about this kind of this misconception I do not know not the correct answer can you suggest. So, whole teaching community will be benefited if that kind of curriculum development is already available, okay.

(Refer Slide Time: 20:02)



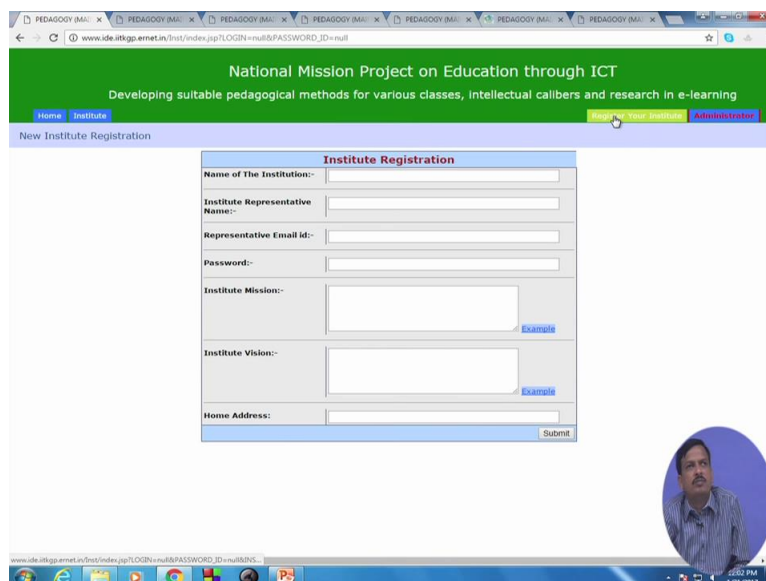
Now, I will show you in the software itself how you develop your own course? How institute can registers? How industry can give feedback!? How you see the feedback? All kinds of features and facility I will show you, okay. Let us go to the website, if you see, in my first slide I say that address is www.ide.iitkgp.ernet.in this is the website address please note it down www.ide.iitkgp.ernet.in, if you type this in your browser, it will open this page.

(Refer Slide Time: 20:25)



As I said that this is a project given by the Ministry of human resource development and under this project this framework tool has been developed and there is others also, there is a some course which is already developed by a expert teacher is also available, okay so this is a whole site you can get some documents, developer guide, reviewer guide, outcome based curriculum design, those are project related things but you can go through it you can see that things, but in the tool wise suppose I want to do institute registration then I can go for the institute registration, if I click on institute registration then it will page open up like this.

(Refer Slide Time: 21:16)

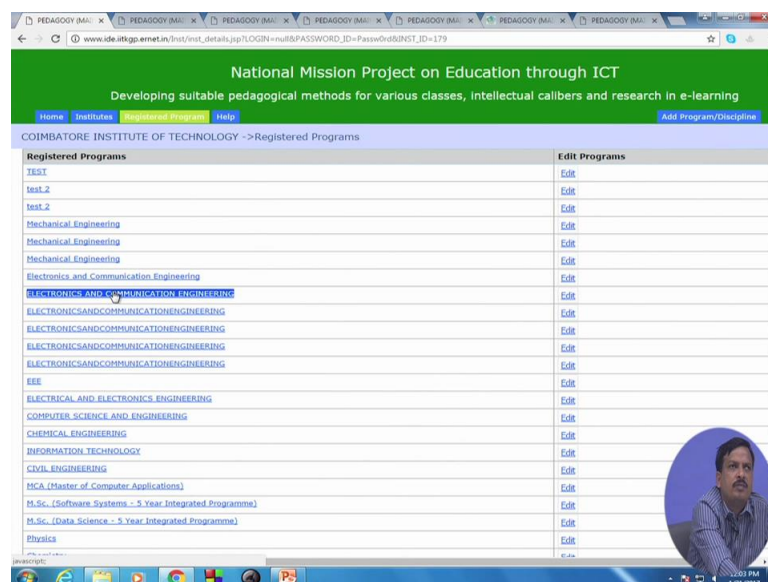


Then as a institute register your institute I can register name of institute representative. So, institute representative is the moderator of development of the course. So, collectively write

down the institute mission and vision, then as a person act as institute moderator, he can submit that mission and vision statement and then submit it. Once you submit it, then institute name will be come in here, okay. Once you click that institute it, there is a lot of people are doing it in a kind of test kind of basis and there may be something somebody doing it very seriously.

So, you can add a program or discipline, suppose my institute has a 5 discipline computer science, 4 year Computer science, 4 year Electronics, 4 year Instrumentation, 4 year Mechanical, so, I can 4 program add 1 by 1 program I can add. So, I can write the program name B. Tech computer science, okay then program educational objective or program educational outcome be PEO, program educational objective. There is example is given, so you can go through this example a write your program educational objective.

(Refer Slide Time: 22:42)



Once you registered then your registered program will come here that is mechanical engineering. Once you click the mechanical engineering now for attainment of the program educational objective, which is derived from program specific outcome, okay program specific outcomes should match the program educational objective and program specific outcome is nothing but NBA or Washington accords attributes 12 attributes, which will be attained by offering different course in last lectures I will talk about this details, okay.

So, let us you identify the course all scientifically you identify the course that okay, B. Tech computer science may be it be mechanical, may be required thermodynamics, machine tools and machining, kinematics of machine all kinds of course are identified. Each and every

course now can be registered by the institute coordinator, he is register the course, create the password and send the password to the teachers. Now, the teachers will login if you see the course under the mechanical all courses will be displayed then he can login on the course and develop his curriculum, okay. The program we are not here included the lab courses curriculum web development, but yes next years 2 to 3 years we will include that lab courses curriculum here and also diagnostic test but formative evaluation also will be included in this software okay.

So, excluding the lab courses all the theoretical courses teachers can develop his curriculum. I will demonstrate how to develop a single course, okay. It is in the same, suppose there institute is not interested to register and do that all kinds of all courses, as a individual I can go through this page web page let us as a individual I want to develop the course, so I go to the home.

(Refer Slide Time: 25:36)

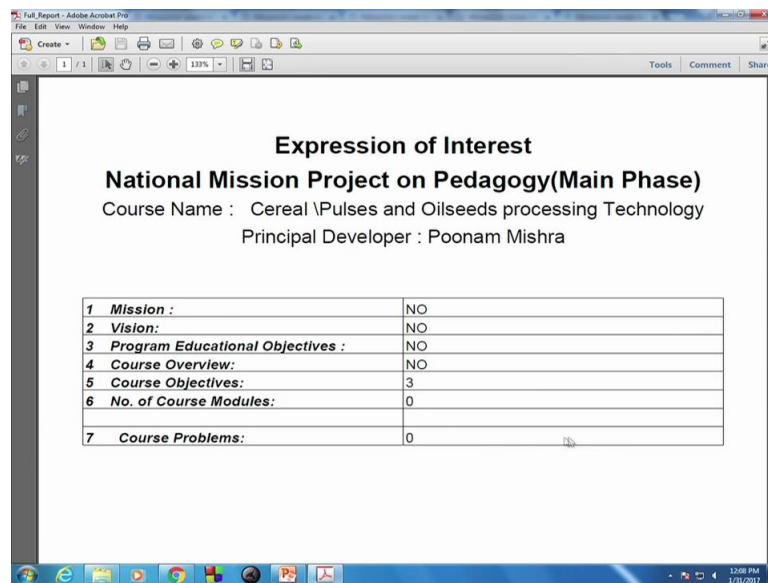
The screenshot shows a web browser window displaying the 'New Course Register' page of the National Mission Project on Education through ICT. The page features a green header with the project name and a navigation bar. A prominent yellow button labeled 'Register Your Course' is located in the top right corner. Below the header, a red banner states 'YOU CAN REGISTER YOUR COURSE HERE:'. The main form, titled 'Register Your Course', includes several input fields: 'Course Name*', 'Institute*', 'Discipline*', 'Principal Developer Name*', 'Email Address:', 'Password:', and 'Contact Number*'. Additionally, there are radio buttons for 'Course Type' (Core and Elective) and 'Course Level' (UG and PG), and a 'Semester*' dropdown menu with options from 1 to 8. A warning message at the top of the form advises users to 'Please avoid Special Character expect Email Id(i.e. &, -, \$, # etc.)'.

Once I go to the home it will go to the home I can develop my own course. Let us forget about the program educational objective, forget about that PEOs, let us I want to fresh develop my I want to teach a course, I am teaching a course I want to develop my own course curriculum own course whole structure based outcome based curriculum for my own course, okay. In that case I go to the training, once we go to the training you get registration page course registration page, I can type my course name, institute and provide a email id and password. This email id is not this password is not password for your email id, you're during the development phase your course is password protected. So, nobody can view your course during the development, after the development once you complete your course, then it will

(Refer Slide Time: 26:15)

So, once your registration is completed then your course will come in here, course name wise it, see the lot of people have already registered somebody is developing their course and kind of things, okay. Now, you can delete once you suppose you register wrongly you can delete your course by providing you see you can only delete or administrator can delete, but I am assuring that you will not delete the course, you can delete your course by providing your used id password during the creation time, okay.

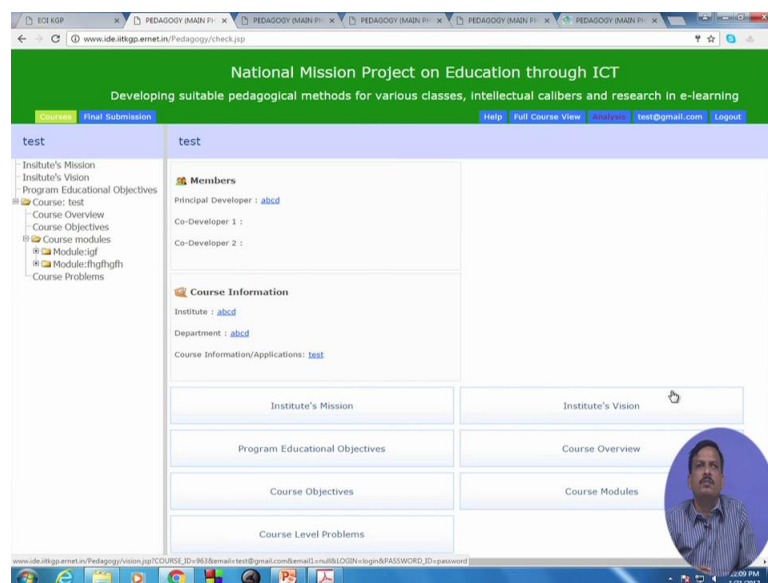
(Refer Slide Time: 27:17)



Expression of Interest	
National Mission Project on Pedagogy(Main Phase)	
Course Name : Cereal \Pulses and Oilseeds processing Technology	
Principal Developer : Poonam Mishra	
1 Mission :	NO
2 Vision:	NO
3 Program Educational Objectives :	NO
4 Course Overview:	NO
5 Course Objectives:	3
6 No. of Course Modules:	0
7 Course Problems:	0

Now, once you click on the course any course if you click or there is another button call report. This report is nothing but a PDF file, which you will indicate how much progress you have done on your course. So, full report will be generated, it is a PDF file and it will show you how much progress you have done, okay. So, it is like whether you have written the so individual course mission, vision is not required, so whether you write the course overview whether if the course objective, number of course module you added course level problem added or details your work will be listed in this report how many things you have done, how many things you have not done it will told instantaneously.

(Refer Slide Time: 28:07)



So, suppose institute moderator can monitor the progress by clicking this thing or as a developer I can monitor my how much amount I work I have done I can monitor these things, okay so this is the report kind of things. Next one, let us I have registered a course and login how you login? Once you create your course name it will come a course development page, once you click the course development page, it will give you registration email id and password. Once you provide the registration email id and password, the course will be look like this, this page will be open. As a single course development I am explaining, so as an institute registration the course login and password created by the institute moderator and sent to you.

Now you login using that your institute under that course and you login up get this structure. As an individual developer, I can register my course under the training once I click on my course I will get this page, okay. Once I get this page what is written institute mission, institute vision program educational objective if I, for the single course development let us, I do not know this thing not required, then course goes start as here. So, I have I have login as a test course name is test, so whatever the course name you provide that will appear in here in the course name. Then there is one work called course overview, I have to write the course overview, what is course overview? For taken any course I want to develop what do you mean by course overview?

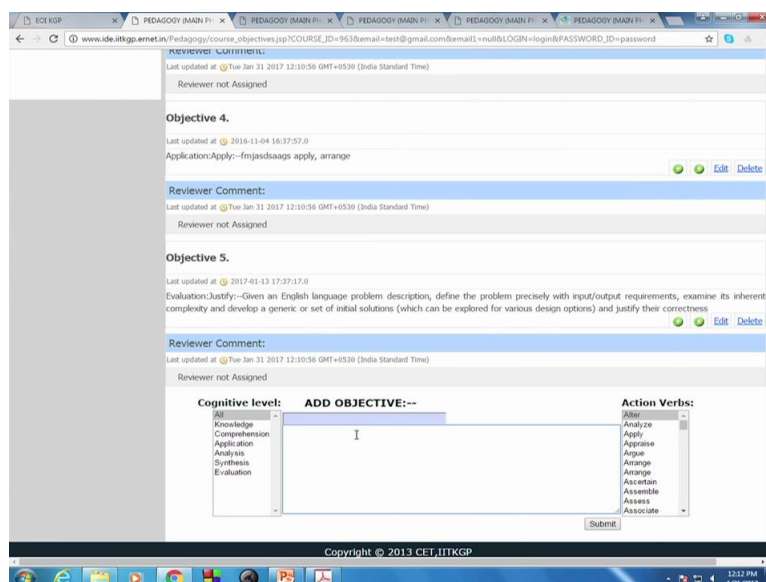
Course overview is nothing but a one page maximum may be half a page write up about the coverage of the course in one part. Another part is that suppose I want to motivate my student to take the course seriously, what I should write that part also. So, one paragraph related to how you motivate the students to take this course and one paragraph the paragraph way the coverage of the more or less coverage of the course, so that is very simple and any teachers can write that things.

Next one is come course objective, course objective means course outcome. Here, we said instructional objective, the instructional objective is the process to write the course outcomes scientifically correct or correctly write the course outcome. So, every outcome you said that correct instructional objective must have a performance component to specify it, it require condition component, to achieve make it achievable it required criterion component.

So, an instructional objective or an outcome should be specific, should be measurable, and should be achievable. So, specific means condition component, performance component means measurable component and criterion component means whether it will be achievable

or not I cannot write a course objective our students will be able to design an aeroplane, any course I cannot thought how to design an aeroplane or that skill cannot be developed within that specific of time. So every objective must be achievable, must be measurable, must be specific, okay, how do you do that?

(Refer Slide Time: 31:32)



So, once you click the course objective you can write a course objective here, in this block. So, what is course objective? Course objective is nothing but a major take way by the students; it should be specific, measurable, and achievable. We said generally, it is 5 to 6 course objective is sufficient for 40 hour course, so if I am teaching 40 hour course, 5 to 6 course objective is sufficient. Main confusion of the teacher is that then the course objective must starting from the knowledge component then comprehensive, but bloom taxonomy you have you have learn it is not true. Course objective as the major final outcome of your course if it is a B. Tech program course if you see that NBA and Washington accords said the students must able to design, synthesize, analyze, conceptualize so all are higher cognitive level.

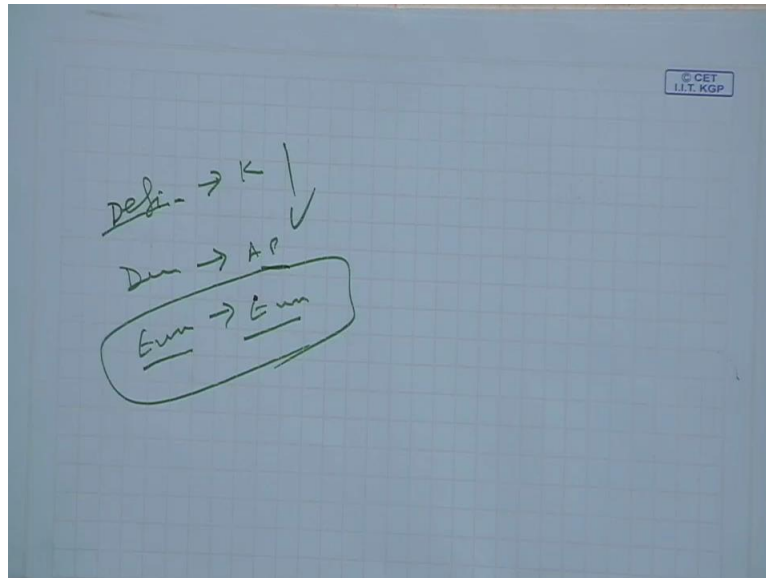
So, any course which is taught for B. Tech cannot be taught as a superficial level, the student only have to describe and define. So, a course objective may be in application, evaluation, synthesis or analysis with that higher cognitive level not the lower cognitive level and if you not write the course objective, which can be achievable by single lecture then that cannot be course objective that may be a lecture objective or unit objective.

So, course objective 5 to 6 course objective that means on an average to achieve one objective I should spend at least 8 lectures, it is for 40 lectures course, 5 objective on an average 8 lectures, so course objective are the major outcome of the course and our confusion is that is the objective in a single liner, no, objective can be a paragraph, but it should be specific, measurable and achievable. An objective must not contain the term like different, certain, basic as example, what you covered we expressively write.

Suppose given example that students were able to solve the differential equation, it is not a course objective. Solve the differential equation is measurable, but it is not specific and may not be it is achievable. So, suppose I am totally teaching engineering mathematics may be I have assigned 15 lectures for differential equation, solution of the differential equation or 10 lectures for solution of the differential equation and I covered up to second order differential equation solution.

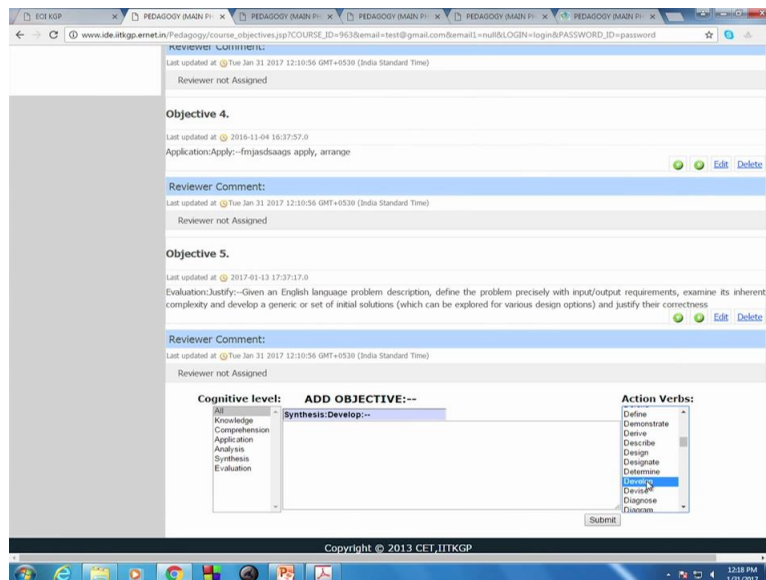
So, suppose I will write the today we will able to solve the differential equation and in examination I give third order, you will not able to solve it. So, what I am say instead of solve differential equation I should write for a given second order up to second order differential equation, student will able to solve that equation using this this this method. Many people a write a today we able to apply Newton's second law of motion as a application level objective, it is not. Applying law it is not application objective, I will determine something based on that law. So law is whether secondary issue first issue is an using this law what I able to do, so that is the objective. Next confusion is that if the objective should got the only single action verb a performance component, no it not necessary, the objective may have 4 to 5 performance component, okay 4 to 5.

(Refer Slide Time: 36:04)



Now, that example that I can show you the example, so a objective content let us three action verb, one is define, second is design, third evaluate, okay. So, define is an knowledge level, derive design may be application level and evaluate may be evaluate is evaluation level. So, as per the bloom taxonomy if higher level, it is assume that the lower level, so if a objective has multiple action verb, okay. Let us see the objective 5; given an English language problem precisely define, first one is define then examine then develop then I have a justify.

(Refer Slide Time: 37:18)



Since justify is the higher level I will take justify and then submit, so one objective at a time and select the action highest level of the action verb in here. So, you may not be not know that bloom taxonomy all action verb, it is not required if you click all then all action verb will be available. So, first I click on define if I click the define if I click the define, it says that it is

knowledge level, then I click the develop this develop, it is said this synthesis level, then I click justify J justify, it is a evaluation level. So, since I know this is the lowest level then highest highest highest highest evaluation is the highest level. So, since it is evaluation level then I label that objective as evaluation level and submit it.

So, one objective at a time you submit, so you write 5 to 6 objective, okay then you add module so what how do you add module, click course module add module click then at write the name in here and add. In software, module name is editable but order is not editable so because about the order name is editable, okay.

Now, I can add the module once you add the module what is what do you mean by module? A course is divided in a several module 40 lecture suppose I taught a course on digital communication, it is a 40 lectures, so let us first module is A to D conversion is one module. so I is the module. So, a module may be more or less 5 to 8 lectures will vary, okay. So, a module has a module overview I can write the module over this module edited like this way, so module overview a page then I have module objective like the course objective I have to write the module objective. So course objective means course outcome which will be which will student will able to develop at the entire course, but the module outcome or module objective are those which will be develop by the student during that module itself, okay, so those of the module objective.

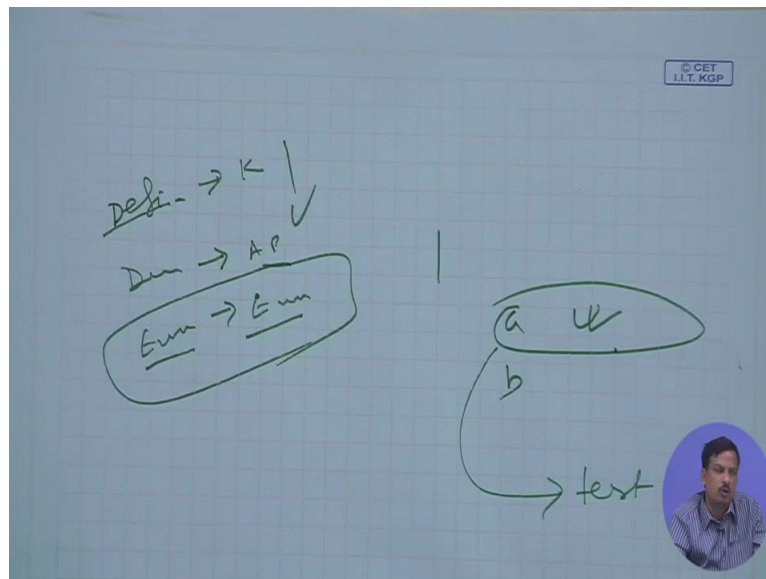
So, why I given the course is different syllabus several module? The scientific aspect is that the course has to be modulized, suppose you are talking Digital communication I am interested only know the A to D conversion, so I can click the arrow just click to the module up to A to D conversion is okay and suppose there is a 6 digital communication courses available in the net, as a learner I want particular module from particular course particular module from another course particular module from another course because the outcome of the course will be depend on my program outcome and my program educational objective, so you cannot say okay this can be developed by an IIT teacher.

So since, the IIT is digital communication course is the best course, so everybody should taught that IIT digital communication course, it is not true because every college every institute his own program and different requirement your program educational objective will be different from IIT, so you cannot copy that whole course of the IIT we have to think, okay my objective educational objective or my vision mission is to supply the manpower to the software industry so what amount of digital communication I should taught my student is be

define by their, IIT objective they produce research student so we taught maximum digital communication, okay so that is the module we have to write module objective, then if you go here then module objective then module unit.

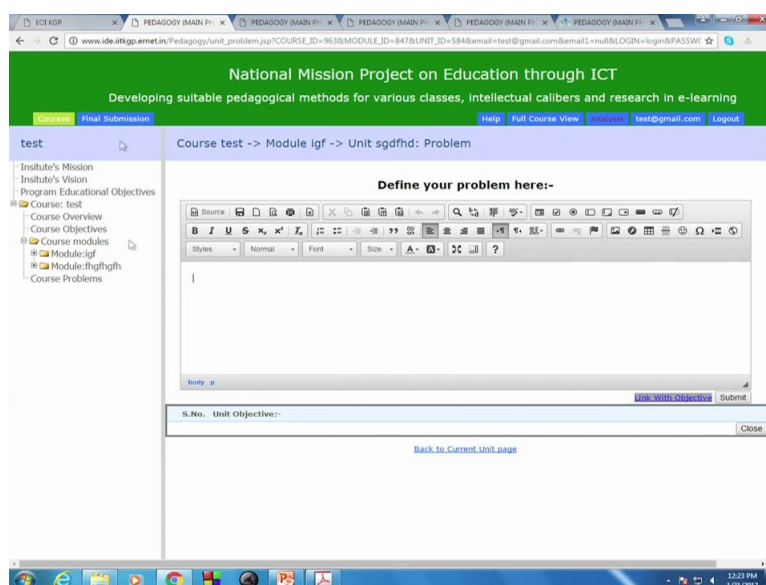
A module consist of several unit means lecture, so let us first module I have an 5 lectures so I can use add 5 unit and each lecture has a lecture summary or unit summary and has an unit summary or lecture summary and has an unit objective means lecture outcome what is outcome of this lectures, okay and then I have lecture level problem, suppose I define a lecture outcome is one, let us I have define the lecture number 1 as a outcome A and B, okay.

(Refer Slide Time: 42:05)



Now, as a student after I reading some material which you provided let us say I am claiming that I have reach the outcome level 1, whether I reach the outcome 1 or A I have to test it. So, I said each outcome or objective must be achievable, measurable and specific, so I want to measure whether I reach that outcome or not how do we measure to provide a test. So, the each objective must be linked with the test item which is call problem unit level problem. So, unit level problem is cater to unit objective if you click link with objective all objective will drop down here, you just provide the problem and assign the objective I will show you in the course level problem.

(Refer Slide Time: 43:02)



So, if this problem is cater to this objective only, so unit level problem unit objective only, module level problem module objective only, okay as a teacher I am developing and if you see there is another in module level so see this is unit level. In module level there is called module level problem, so it is cater to module level objective, then in module level another one is called module learning strategy, what is module learning strategy?

Lecture wise I provide some material in unit summary those are the material has to be read by the students and in module learning strategy I will specify to achieve the module objective and the unit objective which is mentioned in under that module, what are the reference material I have to read? So I can write for unit number one you can read this book chapter number this and edition of this from page number 1 to 5, specific, okay then somebody said to outcome of this can be achieve seeing this simulation link, so you can specify the link, industry said if you want to achieve this objective, go through this material industry will upload that material.

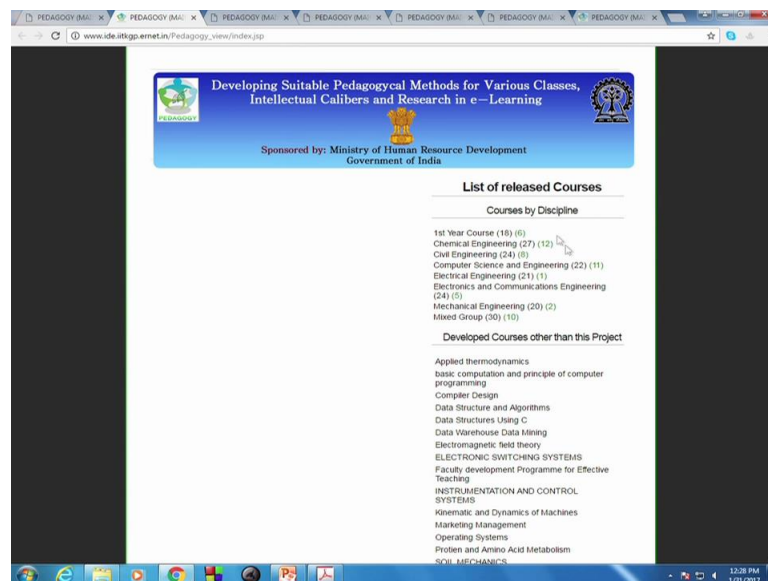
So, module learning strategy will specify different kinds of material which will be used to achieve that module objective, okay. So, that can be added by primarily first will be added by the teachers developer teachers then that can be matured by different participating module like industries, student, expert that can be rule done, okay that is module learning strategy.

Now, I said that every objective must be associated with a problem that is test item. So if I see the course level problem means whether we achieve the course objective or not I can test. So here if I link with objective all the course objective will be listed down here, suppose I give an problem here and which is cater to objective number 5 by link this and submit it then it will write the objective number 5 if you able to if you want to say that I have achieve this objective ok solve the objective number 5. You can add your solution, but the solution will be not visible to the students, if it is request will come then you can explain that solution in the class, okay. This problem you cannot deliver or you cannot solve this is can be solve like this, so this is the main concept which you should know.

So, as I said I have to increase the student engagement, I have to enhance the self-learning ability, I have to enhance the student engagement and their skill set. So skill I have already specified, path I have said I provide them test item by which student can test whether they achieve that or not. Now, I am saying in the class, I said the today I will discuss about the module unit number 5 and this is the unit objective, okay.

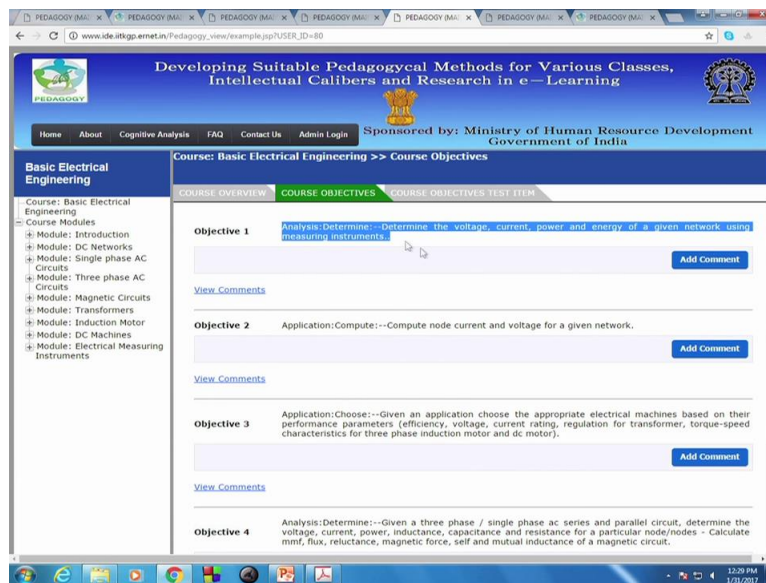
So, once I write that unit objective and corresponding problem, student will prepare then students will come, sir we cannot solve this problem because then we can discuss what the misconception is there in the problem in the class which will raise the student engagement, which is raise the student self-learning ability and this whole course will be available to the students before they come to the class, whole course is available to the industry to give their valuable comment to add some case study, to add some resources, to add some pictures all are available, okay so this is a course development I have said.

(Refer Slide Time: 47:06)



Now, if you want to see the develop already developed courses if you see there will be if you click the home, there is a course view if you click there this page will come, so those are the course which is already developed, okay. Once you see that course, the course will be open like this way, anybody can see the develop courses, it will open course overview, course objective, course test item, okay. So, student first see the course overview then he see the course objective, okay I have to achieve this after completing the whole course and I have to solve this kind of problem this kinds of problem, okay.

(Refer Slide Time: 48:13)

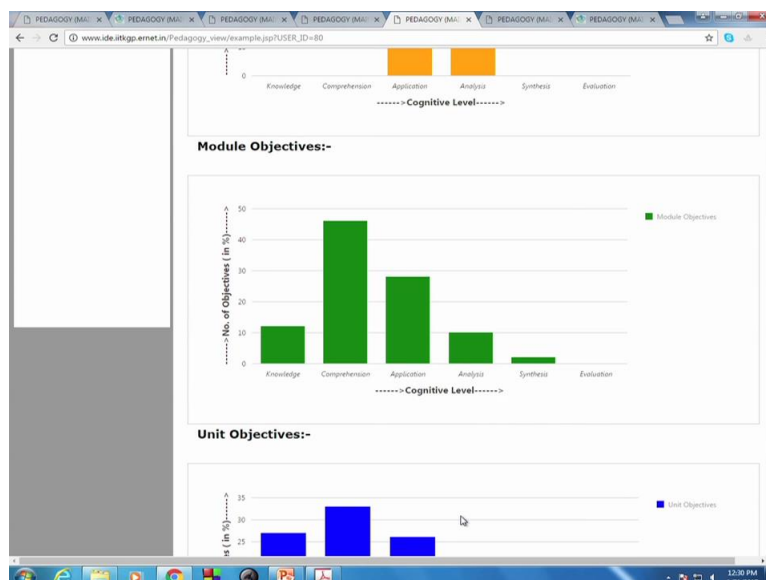


Now, suppose industry said okay objective, this objective can be achieved by this kind of problem, so if they can add a problem so he can write his name, his email id, type the problem and then he said link with that the for this objective scatter to this problem, then submit that will come to you that this problem is added for this kind of objective test link, so it is continuously evolving your curriculum, okay. Anybody can give a comment, suppose in course objective anybody can say that this objective I think is not correct because this kind of skill does not require by the industry, so I can as a Industry person I can add my comment, okay this may be modify to this kind of skill set, so I cannot say that then the industry cannot complain, your students is not employable because they have give the feedback that yes this kind of skill set we required, okay.

So, if the anybody can give the feedback, okay then if you see the module level, all the module will be visible so DC Network, click the module then module overview, module objective, module objective test item and module learning strategy you do not cross the whatever they develop material is available because they are not 100% correct with this is evolving in phase. So, you can develop a better course then the available course also, okay I can go to the course objective. And anywhere industry can give a feedback, module level objective we can module level problem can add, we can module objective we can modify, we can say a suggest some module levels add simulation, some extra kind of simulation, add learning resources you can give add another type of resources, so which will be available as a teachers and you can distribute to the students, okay. Similarly, there is a another module call

cognitive analysis, see once you complete your course, it is available to portion, it is in delivery side also it is in development side also.

(Refer Slide Time: 49:55)

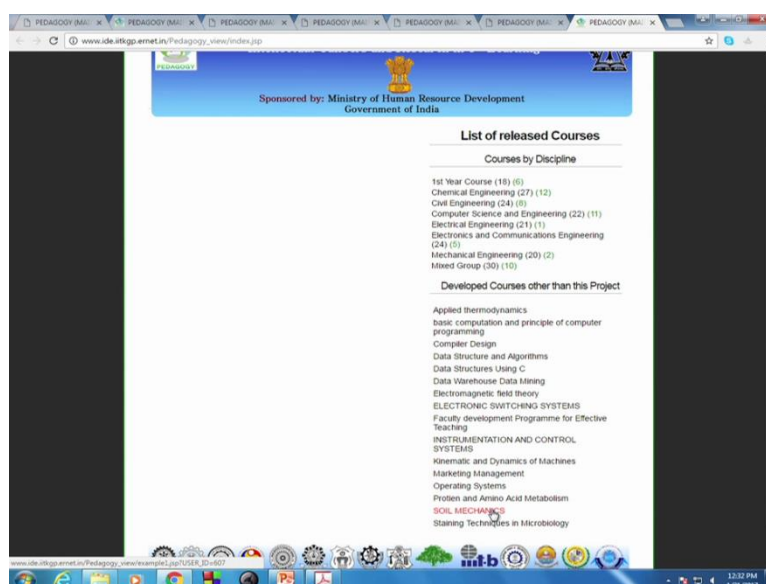


See there is an graph will come up that means let suppose your course objective more or less are knowledge and comprehensive side, then we say this course is not suitable for B. Tech course, this may be ITI course. For B. Tech as per the NBA as per the Washington records, it should be an application, analysis, synthesis and evaluation this side, not knowledge and comprehension, if I am able to analyze something I know the knowledge and comprehension. They are not final goal, they are required, they will be taught at unit level and module level, but they are not the final goal, course outcome is the final goal should be in this side.

If you see the module objective can start from here and unit objective can start from here, okay. Now if you see this course, this course objective is not correct why? because if module level I have taught some objective in synthesis level, but in course level I have not claim that means I taught much but claim less. Similarly, you write the objective analysis, synthesis, evaluation level, but none of the module and unit objective and that level that means you are not actually taught that level, so your course is not correct.

So this graph use of the graph to see the priority between the module, unit and course, what I claim whether that I develop in the module and unit or not and if I develop more my claim may be less, okay. So, this development was development can be a spirally model you initially write down your course objective develop the whole course then modify the course objective, based on your achievement, okay, so that way you can develop the course.

(Refer Slide Time: 51:59)



Once one your course is developed there will be a button called final submission one should give the final submission, all courses will be visible in here, okay. So, I will modify the page better way so that you can told your student go to this URL and click this course we will see course, okay so that is the whole about this software. And the software will include that format in diagnostic test format evolution by which I can take a test of 400 students and identify the misconception and cater to all student individually because every student, since that it is a self-learning material, I am encouraging the student to learn by themselves., so I cater to different large class room.

In large classroom the distribution of the student will be different, some maybe fast learner, and slow learner may be mediocre learner. So, I have said this is the goal, this is the material and this is the test item, it is your responsibility to reach the goal, come to the class, and discuss about this conception only. So, it is not that a student will attain the class after the class, he forgot everything, go to the hostel sleeps and then before the semester only 7 day reading and give the exam, if this is available then it is learner responsibility to achieve the goal.

Now, if it is available industry can say okay those are the outcome is available for this program and this institute my project requirement is match with this outcome I should go to that institute and find out whether the students had that skill or not. They only test whether a student has that skill or not. So, none of the student can claim, okay sir this was in the syllabus but my teacher is not cover that you cannot claim it. Whoever is teaching the subject, the curriculum is specify what a learner has to be achieved, it may be not discuss in the class.

It is his responsibility to acquire the skill outside the class also, he can interact with the MIT fellow, he can interact with any expert and achieve that outcome.

So, learning is no longer kind of a 4 wall classroom kind of things, it is a collaborative learning, it is a teamwork learning, it is a self-learning and it enhance the students self-learning ability and also, this cater to teacher training that whoever taught the course, the quality would be remain same, okay thank you.

Course on Outcome based Pedagogic Principles for Effective Teaching
Professor Shyamal Kumar Das Mandal
Centre for Educational Technology
Indian Institute of Technology Kharagpur
Module 3
Lecture No 14
Assessment and Evolution

Ok, so let us talk about that assessment and evaluation, so before I go into this topic I just ask one question, why we require assessment and evaluation. If you say that in a technical education that while we take a lecture and at the end there is a end semester exam, mid semester exam why this examination system is there. In the beginning I have asked these questions that evaluation and assessment is not only for providing the grade to the students. I compare with that suppose some doctors prescribe you a pathological examination, examination itself is not the treatment.

Once the based on the examination the doctor prescribe the medicine, then the treatment is completed, so the assessment and evaluation if I say only to provide the grade to the students then it is a open ended there is no close end of that loop that means the assessment and evaluation only for grade assign a grade or to assign a marks to the student is not the purpose. Purpose is that assessment and evolution is also applicable to final the lacuna and loop holes of our teaching learning process and intended outcome what we have fixed for this course.

So what I meaning, the suppose I taught a course X, a course has a goal that means outcome of the course lets A, B, C, D are the outcome of the course. If I say student add the purpose of the assessment and evaluation is that to check whether each and individual learner has attend that goal or not. Whether each and individual learner has achieved or reached that goal or not or other hand to test whether the learner has acquired the skill what I intended to be, whether they have or not.

Once I done it, then let us after examination I found most of the learner cannot attend the goal seeks, then as a teacher I have to find out why the learner is not able to attend the goal seeks. If the goal seeks, which I have defined is not achievable is the goal seeks which I have define is not specific. The goal which I have defined is not scattered the teaching-learning process I have adopted. May be the teaching-learning process I have followed which not scattered to the capability building of the goal seeks.

So once I analyze that things and take it to consideration in my to modify the teaching-learning process then I say the examination system that teaching-learning or assessment and evaluation is reinforce by teaching-learning process. So purpose of the assessment and evaluation is not to provide not only to provide the grade or marks to the student but also reinforce the teaching-learning process or as a teacher the correct, the teaching-learning process, which I have adopted or to correct the outcome of the courses.

Now I give you some practical example. Many of us lets in engineering education give question paper like that write a short note on this, describe this, and explain this. Now if you see the intended outcome for the 4 year graduate students is the in higher cognitive level. They should able to design, they should able to analyze, they should able to evaluate, they should able to design experiment, and they should able to use modern tools.

Now at the end semester I design a question paper write a short note on X, write a short note on Y, describe this, explain this, see that this cannot be a B.Tech or four year graduate question paper, this may be a ITI question paper. ITI engineer suppose to know how the system is work, how the different block diagram is work that things but not for the graduate engineer. Any question paper if you find many of us are scattered to that part only, which is totally wrong perception actually we are decreasing the student engagement, we are responsible for decreasing the student responsible. Student know that within the effort of seven days before the semester I can clear this subject, so I do not have to engage throughout the semesters, so this is the problem in assessment and evaluation system present system.

So how should I design my assessment and evaluation process such that it should reinforce the teaching-learning at an increase the student engagement ok that is the one part of the design and assessment and evaluation system. When your boss says what should be the pass mark, let I say that a university has created a pass mark on 35% and your question paper is designed like that out of 8 answer any 5. Once you do that out of 8 answer any 5, students has only knowing the 70% of the syllabus or 70% of the skill set which have defined the that this is the minimum skill set required to be expertise on that subject, 70% of the expertization give me the 100% evaluation marks that means that it is 35 I know the subject with 100% even if I only cover the 70% of the syllabus that means that total motion that out of 8 answer any 5 is totally wrong.

Yes it is possible I can give out of 8 answer any 5, if it is possible that any five students has attempt to answer is covered the 100% of the syllabus. So as a question paper setter, I should

able to say that any 5 the student will attempt he or she has to know the 100% of the syllabus. If I able to do that, then I say yes the question paper is correct then present scenario see that out of 70% knowing I can get 100% marks, 35% marks is the pass marks, so 35% 3 into 7 so only knowing the 21% of the syllabus roughly 21% of the syllabus I get promoted in the next class.

Think about the situation in the technical education let us I say, the somebody getting 20% knowledge in analog electronics promoted to the course on VLSI what will happen to that student? 21% knowledge on analog electronics promoted to as class on VLSI design, am I said that that student will capable taking the subject on VLSI design. So totally it is a wrong that we are not it is not that problem of the teachers. Teachers give them pass marks, it is not the problem of the teachers, it is a problem of the learner without getting confidence in one subject he or she has promoted to the next subject and with a difficulty is that he does not know the first subject how you acquire the second subject.

So it is the problem of the learner it is not hampering the teachers, so it is hampering the students itself, so what kind of assessment and evaluation system we should promote so that we have guaranteed that while the student is promoted in the next course or next level of the course, he has acquired or acquired the skill set which is desired for the course 1 and then he goes to course 2 if we able to do that then assessment and evaluation system is 100% correct. Think about why I should I should say that this is 4 years study in the particular university becomes a graduate engineer. I have initially said that if I am claim that I am a graduate engineer of this discipline then I should able to know that what are the skill I have acquired which does not have by the common man so that myself is different from the common man that I am a graduate engineer, it is not differentiate by the certificate.

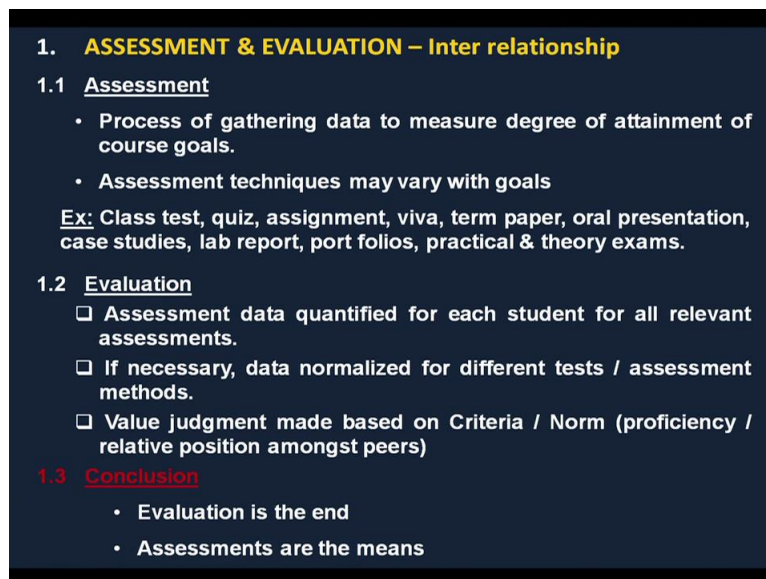
So think about the near future will come and somebody can say that yes I can become a graduate engineer at the age of 60, no problem you define those are the skill set is required to become to declare myself as a graduate engineer. If the skill set are defined and if I acquire that skill set in anyhow, lets come MOOC let us see open online courses I acquire those skill set. Once I acquire those skill set let us there is exist a free and fair evaluation system where somebody will judge me whether I have that skill or not. Once somebody certify me with a free and fair evaluation system that yes I have those skills then I am able to declare myself that I am a graduate engineer. So that means the purpose of the evaluation system is to test

whether the student has the minimum skill set which require to declare in a pass or you can say the promote in the next grade of that course.

So how do you do that? So it is essential it is a criteria based evaluation system, our assessment and evaluation system for the course is a nothing but a criteria base assessment and evaluation system. So I will talk about the criteria based and non-reference based evaluation and assessment system. So it is a criteria based assessment and evolution system, so if I criteria is known to me, then I can do it. Now not as a present are you thinking the present grade co-relate with the student knowledge of the subject. Student might get excellent grade X Grade that means more than 90% marks in a subject that is mean you ask anything after the examination of three or five months he cannot say anything that is possible why because the assessment and evaluation system is not test the student skill set is only test the student surface knowledge, which make him a surface learner and he just passed that exam.

Many of many of experience with that things students whose CGPA above 9, if you ask any first year subject on him, he will say I just forget it because if you ask any student why you are not studying throughout the semester exam he said sir if I can solve the last 2 or 3 year question paper, I am very sure that I can guaranteed 75% marks of that course by guessing the question paper 75% cases I will succeed that I will guess the question paper I just read it and give the exam, nothing else, so the purpose of the examination system is totally exploited. So, that means as a teacher I should know what is the correct assessment and evaluation system, what is the correct process of assessment evaluation which re-enforce the teaching and learning of that subject.

(Refer Slide Time: 14:31)



1. ASSESSMENT & EVALUATION – Inter relationship

1.1 Assessment

- Process of gathering data to measure degree of attainment of course goals.
- Assessment techniques may vary with goals

Ex: Class test, quiz, assignment, viva, term paper, oral presentation, case studies, lab report, port folios, practical & theory exams.

1.2 Evaluation

- Assessment data quantified for each student for all relevant assessments.
- If necessary, data normalized for different tests / assessment methods.
- Value judgment made based on Criteria / Norm (proficiency / relative position amongst peers)

1.3 Conclusion

- Evaluation is the end
- Assessments are the means

So let us come here what is assessment, assessment is a process of gathering data to measure degree of attainment of a course goal. Course goal means course outcome, if I say those are the course outcome, so I have to gather the data whether the student or learner has received or have achieved the outcome or not of acquired that outcome skills or not that may be a class test, may be a quiz, may be a assignment, term paper, presentation, mini project many-many is the process those are the process of gathering data whether a student has acquired the intended skill or not. So assessment is a process for gathering the data. So what is evaluation? Assessment data quantify for each student for relevant assessment.

If I say I am assessing I evaluating a students for whether a students have can be qualify for going to the next level of semester exam, so second whether he able to clear that analog electronics subject or not that that should be criteria based. So assessment has two evaluation is a 2 type either it can be criteria based or either they can be non reference. Why it is criteria based? Most of the cases in our class exam or our university level exam are criteria based because we have pre-defined criteria that if a student said I am passing in analogue electronics, he is suppose to have this skill A, B, C, D.

My question paper will test whether the student has skill A, B, C, D or not, if that all skills are present I give him excellent marks and promote to the next class. If none of the skill has present I cannot pass the students I can say the students to better to repeat this course acquire the skill and then go to the next level ok and that is called criteria based assessment system and always a non-reference that is not necessary for our teaching learning process but it is

required for when I have to say I have to rank my all class 1, 2, 3, 4 then I have to go for the non-reference.

When I teaching a course my intension that every student should acquire the every goal, so in that case assessment and evaluation is criteria reference. Now, if somebody said that yes I want to take your past 10 students can you rank them, so maybe in my assessment may be there is a 20 student who acquire the all the course goal so everybody got ex. All course goal is acquired by the 20 students, but I have to rank them 1 to 20 then I have to take a assessment I have to take a examination which is non-reference that means criteria is that I have to select I have to arrange them 1 to 20 like that our JEE exam.

It is a non-reference because let us 300 marks question paper if I design how many students I can rank, 300 students. Or I can take a physics, chemistry, mathematics permute whichever section that section and get a permutation, combination, and then also it is not possible to scatter 5 lakhs students ok. So same marks can be obtained by the several students then my question paper should follow a long reference that that means elimination process that should be some question paper whose discrimination index is very high.

Few students can attempt that question paper, so I can arrange them so that is a non-reference and criteria based. Most of the our assessment in as a teacher in the class room assessment all are criteria based ok. In conclusion, evaluation is the aim and assessment are the means, it is not that semester examination only test the students skill.

Suppose I design a course and write a skill which require the use of modern tools , if you are a NBA guideline and Washington guideline, it is said that students must be exposed or must be know or must be have a skill on modern tools uses and they should know the limitations of that tools also. So at the end semester examination it is impossible to me to test whether know the tools or not, so assessment one part of the assessment may be on that so I can give an mini project to the students using that tools whether they have completed that mini project or not that can be assessment for that objective. So for every objective I should plan what kind of assessment I should take to test whether every learner has reached that skill or not that is the teachers plan, then I can assess the students then I can evaluate the results of the assessment data and provide them the competence certificate whether they have a skill or not whether they have a skill or not whether they have a skill or not ok, so that is the purpose of the assessment and evaluation.

I already shown this block diagram so this is the block diagram, where I have said once the criteria that course outcome is known, if the criteria is known then based on the criteria I test the different assessment but different assessment process I test whether the student has attend the expected criteria or not once they have yes then I assign grade or rank or certify the competence. If they do not, then I have to evaluate the effectiveness of the teaching-learning process as well as the course outcome, so there will be one arrow should be pointing to here also ok. So both of them I have to modify so that next time they have attend this criteria, so that that is the flow diagram, how the examination system is real course the teaching-learning.

Now think about it, today we are talking about the great transfer, transfer of grade from one institute to another institute that depends on the quality of the institute but nobody said, suppose some students has completed the course on thermodynamics on some X university, now X university want to transfer the grade to university Y and university Y is not willing to take that grade because that university ranking is not below to the. So it depends on the institute ranking, it does not depend what kind of thermodynamics taught in institute X and so that grade can be transferred.

So suppose some MD Doctor prescribe and that guaranteed that medicine is very good it not it may not be, so it may not be, some others may be give prescribe very good medicine so that means I should know the institute X thermodynamics, what is the skill set they should taught that is the criteria. Once I know the criteria that a thermodynamics for B.Tech level should have these these these skill sets on the students.

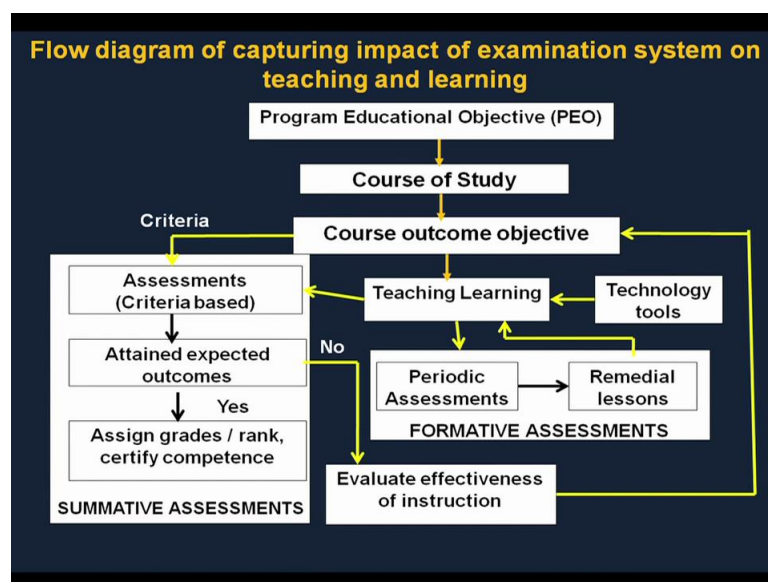
So develop these these skill set and let us take that there is an assessment system is valid and fair and they are tested on that skill set and assign a grade, now institute B said yes my criteria my criteria for thermodynamics that means compatibility criteria that that skill what X is developed University X is developed is also required for the skill for my university, then grade can be directly transfer without any hesitation. But somebody said that the yes some institute X has very good ranking and he developed the thermodynamics course on some students as grade A, my institute does not match with that thermodynamics knowledge because the skill set required by institute A is different the skill sets require by institute B.

It is not guaranteed that if I follow the IIT syllabus I will become the very good institute it cannot be. My intention of producing the different kinds of skills students which will be cater to the different purpose not the intention of the IIT. Suppose IIT said my students will go into

the high and research as a institute X outside the country or is a low resource institute, I cannot say that my students will have the capability to go into the high and research. I should produce the student to supply the manpower for certain industry. So the course taught on that institute X is may not be suitable for me, so I cannot say grade assign by the IIT will compatible with me I cannot say that, but if I say I certify that yes course X are looking for those are the skill and I am certifying the students has those skill, then as a institute Y I can say yes I can take you take these students grade because I also looking for same skill, so grade transfer is very easy.

Unless it is curriculum is designed in outcome based curriculum and transfer of grade is totally unscientific. I cannot say the institute X is very good institute so you can take the grade of institute A, maybe that skill does not match with my institute skill. So that is the purpose so the basic question on the grade transfer lie on that what kind of skill you are certify by the grade among the students. Today, I cannot say that grade reflected the student skill, somebody getting a X grade that grade is not valid at all because he does not know the subject at all but grade X, so that means the purpose of the evaluation system is not designed correctly.

(Refer Slide Time: 25:44)



Now I come to the again scientific aspect of assessment and evaluation. If you say assessment and evolution, the issue I should raise some issue I am raising how can we reliably measure grade and certify outcome at different domains and levels of planning. How can I design an assessment system that will certify outcome at different domain and level of planning? Assessment what kind of assessment, while I should take the assessment, how much

assessment I should take, how I take the assessment, how can use the results of assessment to evaluate the students, so all scientific aspect of this also has to be discussed. What are the different functions of assessment, how can we ensure the validity and reliability of the assessment and evaluation.

If I can say suppose I design a question paper today for basic electronics on the circuit theory of the students and I have guaranteed the student has these these skill, then after the exam after one month if I test the cell setup of student again can I guaranteed that the grade will be co-relate? Cannot guarantee that the grade can be co-related, if it is not guaranteed that means my assessment is not correct, my assessment is not reliable not valid, then what are the kinds of interpretation can we make.

If I say my grade is reflected the students skill then I can make interpret but if it is not what kind of interpretation what I take. How can I make good assessment plan throughout the semester how can I make a good assessment plan, what are the important statistical tools which I can use for the assessment planning the assessment like that item analysis all kind of scientific aspect of assessment and evaluation item analysis, question paper design all kind of things.

What is the current status in R&D in this field, I will not going to the R&D part because there is a computer based assessment , computer based question paper all kinds of things can be discuss, but as per this course I have not going to the computer risk assessment ok. So next class I will talk about the assessment and evaluation different aspect of assessment and evaluation ok Thank you.

Course on Outcome based Pedagogic Principles for Effective Teaching

Professor Shyamal Kumar Das Mandal

Centre for Educational Technology

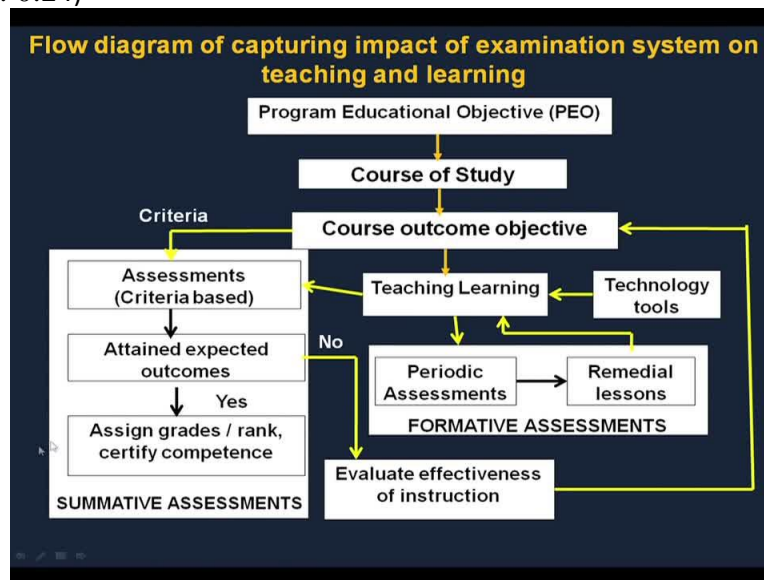
Indian Institute of Technology Kharagpur

Module 3

Lecture No 15

Lecture 15: Assessment and Evaluation (Contd)

(Refer Slide Time: 0:24)



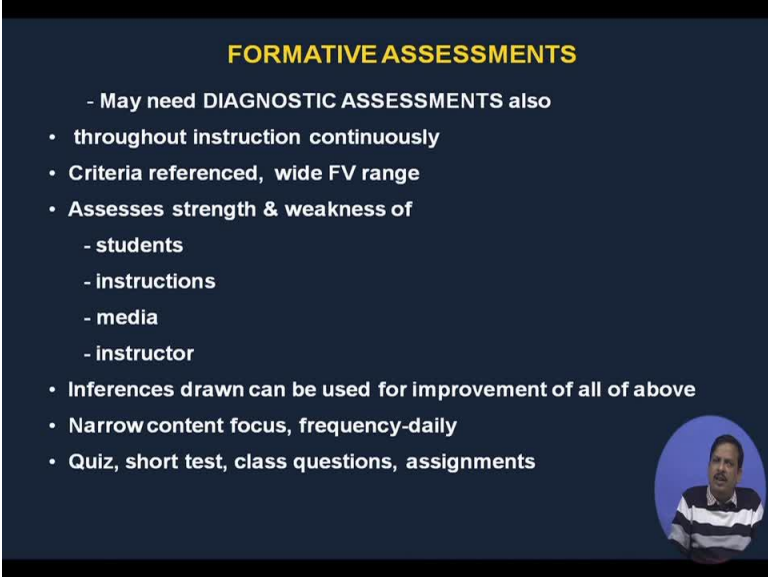
Okay, so we have discussed about that criteria based assessments systems and we have said that that criteria based assessment system for summative assessment and then we have given that example of non-reference and criteria reference. Now we go for the formative assessment, in formative assessment basically use for diagnostic analysis of the student misconceptions. So if you see that any kind of formative assessment is required in periodic, this is the periodic assessment, that means formative assessment.

Suppose you define your course outcome, now during the teaching learning process the students are attaining one outcome at a time. So they have suppose you have six or seven outcome course, then you have a module outcome, lecture outcome all outcomes are written down, then you have to say test whether the student has attain those outcome or not. Periodically I have to test whether they have reached understand the first module 1 outcome or not, then course or maybe the course objective 1 is related to the module 1.

So how did the module 1 after completion of the module 1, whether they understand the course level outcome or not. So that kind of test we have to perform periodically during the teaching learning process. And that process is called formative evaluation, this may be (diagnost) is a formative evolution may be may need the diagnostic assessment also. So as I said the purpose of the assessment is to find out whether the student achieve the intended skill or not.

So periodically, suppose you thought the students are achieved the skill and the end of the semester you find none of the student is achieve those skill. So at the time is gone, so that time there is no revision lesson can be provided to the students.

(Refer Slide Time: 2:27)



FORMATIVE ASSESSMENTS

- May need **DIAGNOSTIC ASSESSMENTS** also
 - throughout instruction continuously
 - Criteria referenced, wide FV range
 - Assesses strength & weakness of
 - students
 - instructions
 - media
 - instructor
 - Inferences drawn can be used for improvement of all of above
 - Narrow content focus, frequency-daily
 - Quiz, short test, class questions, assignments

So instead of doing that, I can take the formative assessment for each and every outcome during the teaching learning process, that means that is periodic and that may be a diagnostics, what do you mean by diagnostics? The purpose of this test is to find out there misconception regarding the topic.

I can give a simple example. Suppose if I taught let us I have given a simple example which is very simple even if this primary level may be in not class five level, 2 to the power 3 is equal to what? So you want to your outcome is that students should know a to the power b calculation what is the value decimal value that kind of things you want to taught.

So 2 to the power 3 correct answer is 8 , okay. Now if I design a formative assessment and what are the misconception as a teacher I know. If I give 2 to the power 3 the student misconception is either they can add this two number $2 + 3$ is equal to 5 or they can multiply these two number, or they can give the correct answer.

This three are possible, so both I have to now after the class suppose I have a I take a one hour class, let us one hour lectures and you said that within this one hour students should achieve this outcome 1, 2 and 3 let us three is the your lecture outcome. Just before the end of the five minutes of the lecture you should spend to test whether the student has achieved that outcome or not.

Now teacher may say that I have a 400 students, how can I test whether the student has achieved the outcome or not? Give me one problem 400 students in my class, so I am unable to test whether the student has achieved the outcome or not. How do I test it? Now that is possible. We are developing that software let us the I have a multiple just question answering software where you everybody know the clicker technology or some other multiple choice answer kind of technology is there.

Now as a teacher, I create the question paper which is multiple choice, but the all choice are not arbitrary. There is a correct answer and there will be a choice which related to a possible misconception. So if I say 2 to the power 3 , the choice is not $8, 7, 6, 5$ I have to give the choice $6, 7, 8$ 2 to the power 3 means one choice is may be adding the two number 5 , other choice is multiplying two number 6 , other choice is 8 . So if a students, so I make that question to all the 400 students from my laptop and everybody let us there is a smartphone or there may be a everybody has a mobile phone now as student.

So give the answer. Was the click the answer choice a let that is 5 , then you know what is their misconception then you can whether they have by chance give this answer or not, you can again make a question paper which is less 3 to the power 5 , then give the choice, again you have given the question answer is 8 that means you are ensure that his misconception is he is adding these two number.

Now you identify those students because roll number you know and you call them that since you have a misconception like this, so please read this material to overcome this misconception. So I can design a diagnostic test that formative assessment system which can be used for formative assessment of the students to test whether they achieve the skill and if they does not achieve the skill, what is their misconception.

But the role of the teacher is very important, what is the role of the teacher? To design a question paper and find out what should be the possible misconception of this question paper. So testing a student you asking a question to the student is not to embarass the students. You are asking a question to the students to find out what is the possible misconception of the students.

So to do that, today ICD can help greatly to find out the possible misconception and provide their remedial lesson this can be done, even right now the many peoples know the Moodles. Moodles can be used to find out the misconception but that is not diagnostics. We are developing one software which will be diagnostic test based formative assessment so that as a teacher I can find out what is the possible misconception of the student, okay?

(Refer Slide Time: 7:31)

ASSESSMENTS – Selected sample of uses

ITEM ANALYSIS

Three Important Characteristics of Test Items

FACILITATION VALUE : (FV) How easy is it?

- Everyone answered it right, FV = 1
- No one answered it right, FV = 0
- Half the students answered it right, FV=0.5

Ru = Right answers of upper group
 RI = Right answers of lower group
 n = Number of students in each group

$$\therefore FV = \frac{R}{N} = \frac{\text{Total right answer}}{\text{Total no of students}} = \frac{Ru + RI}{2n}$$

DISCRIMINATION INDEX : (DI) How good is it in separating the top scorers from the bottom scorers?

$$DI = \frac{Ru - RI}{n}$$

Now, there is another question is come that is called item analysis, many of you know the assessment the, suppose I want to make a question, I test item analysis test item analysis question

test item whatever I have make the question paper, I want to analyze whether this questions is appropriate to the students or not.

So what I said? If it is criteria based, then question paper will be designed based on the criteria. What I want to test, it is already communicate to the students and I will test only that things, that is called criteria based. So once I designed the criteria based test item, let us say I want to find out the test item analysis that whether this test item is suitable for finding out the skill of the students or not.

Now, there is a test item analysis with different component, one is called facilitation value. What do you mean by facilitation value? That is how easy is that question. So I design a question and I want to test how easy is this questions. How do I test it? it is not that I can test it for the present students, so suppose this type of question paper I have already defined designed and I have the result of the previous last 10 year student result.

From that result I can find out what is the facilitation value of this type of question paper, means how easy it is? How you do it? Let us I have a students of 40 students in my class, I make a test item and I test take the test. Out of 40 students, all students give the correct answer, which I intended if it is criteria based, my purpose is solved all students know the skill.

But if I want to say that rank the students, then all students if give the answer I cannot rank them 1 to 100. So facilitation value is that question paper is how easy it is if all the students give the correct answer, that means everybody give the correct answer facilitation value is 1, facilitation value is 1 everybody gives the correct answer. I make a test item where out of 40 student, none of them give the answer, that means facilitation value is 0, none of the student can give the answer, so facilitation value is 0.

(Refer Slide Time: 10:38)

FileHomeInsertDesignAnimationsSlide ShowReviewViewAurat

CopyPasteFormat PainterClipboardNew SlideSlide SorterDelete

LayoutResetBackground

FontParagraphDrawing

Text DirectionAlign TextAlign to Object

Shape OutlineShape Effects

FindReplaceSelect

SlidesOutline

Slide 9 of 24 - Office Theme

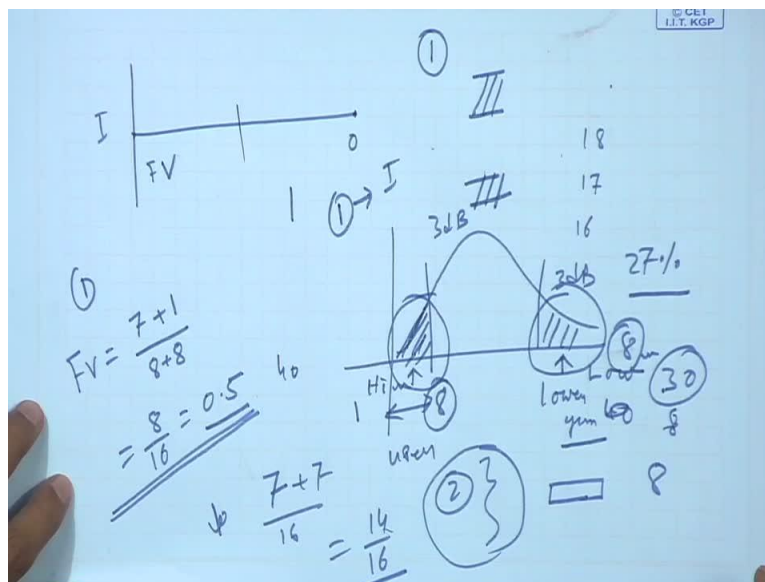
100%

5:36 PM12/29/2023

STUDENT RESPONSE ON MC ITEMS

Rank	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
1	C	A	C	B	A	C	A	B	D	D	A	C	A	C	A	C	B	C	D	10	8											
2	C	A	C	D	B	A	C	A	B	D	D	C	C	A	C	A	C	B	C	A	10	8										
3	C	A	C	C	B	A	C	A	B	D	D	C	C	C	A	C	A	C	B	C	A	9	9									
4	A	A	C	C	B	A	C	A	B	D	D	C	C	A	C	D	C	B	C	A	9	8										
5	C	A	C	C	B	A	C	A	C	B	D	D	C	C	A	C	A	C	B	A	8	8										
6	C	A	C	C	B	A	C	A	B	D	D	C	C	-	-	C	A	D	A	C	C	8	8									
7	C	A	C	C	B	A	A	A	B	B	C	C	B	C	A	C	B	C	B	8	7											
8	C	B	C	C	D	A	C	A	B	D	D	C	C	B	C	A	C	C	A	9	6											
9	C	A	C	C	B	A	C	A	B	B	A	A	C	D	C	A	C	B	C	D	9	6										
10	B	A	C	C	A	A	C	A	C	D	D	C	C	A	C	A	C	B	D	A	6	9										
11	C	A	C	C	D	A	C	A	B	C	B	C	C	-	C	A	C	B	C	A	8	7										
12	C	A	C	C	A	A	C	A	C	D	D	C	C	A	C	B	C	B	A	A	7	8										
13	B	A	C	C	C	A	C	A	B	D	B	C	C	-	-	C	B	C	D	6	7											
14	C	A	C	C	D	B	C	C	B	B	A	C	A	C	A	C	B	C	A	8	5											
15	C	A	C	C	D	B	C	A	C	B	D	C	C	A	A	C	B	C	A	7	6											
16	C	A	C	C	B	B	C	D	B	B	C	A	C	A	C	A	C	B	A	7	6											
17	C	A	A	D	A	A	C	A	A	B	B	C	C	B	C	A	C	B	C	A	7	6										
18	C	A	C	C	B	B	A	B	B	B	C	C	A	A	D	C	B	C	A	7	6											
19	C	A	C	D	C	A	C	C	C	D	D	C	C	B	C	A	C	A	B	A	7	5										
20	C	A	C	C	C	B	C	B	B	B	A	C	B	C	A	C	B	C	A	7	4											
21	B	A	C	D	C	A	C	C	C	D	B	C	C	A	A	C	A	C	A	5	6											
22	B	B	C	C	C	A	C	A	A	C	D	A	A	B	C	A	C	B	C	A	6	5										
23	A	C	C	A	A	C	A	C	A	C	D	A	A	C	A	C	C	B	C	A	5	5										
24	A	C	C	C	B	B	C	B	B	C	D	D	C	C	A	C	B	C	A	5	6											
25	A	C	C	A	A	C	B	D	B	A	C	B	C	C	C	B	A	C	5	5												
26	A	C	C	C	A	A	C	B	B	A	C	B	C	C	C	B	A	C	4	8												

Click to add notes



So now if I have a question paper of 40 questions and all students give that correct answer, then the facilitation value is 1 FV and if none of the student can give the correct answer facilitation value is 0. So FV varies from 1 to 0. Now in between value how do I find out? So suppose I have a 40 students if you see this I have 40 students let us talk about multiple choice question first, then I come to the summative type question paper. So let us I have a 10 questions 1, 2, 3, 4, 20 questions I have and the correct there is multiple type questions there is a 4 choice A, B, C, D and correct answer is C.

Now out of 40 students, let us test item 1, I found some of the students choice is B, some of them C, some of them are A all kind of things are there. So now after taking the test, let us I rank the students that I know that those are the students I take that 20 test item is there I take the test and then I find out the best on the total score, I rank the students.

Somebody get 18 let us every question is 1 mark, somebody 17, somebody 16 so I rank them 1 to 40. So once I rank them 1 to 40, then there is a you know everybody knows that first portion of the good students and least last portion of the bad students who not performed well. So generally, the marks distribution of the students should be a Gaussian marks, Gaussian distribution marks of the student should follow a Gaussian distribution.

Everybody know what is upward down 3db down, what do you mean by 3dB? Is 27 percent is the 3dB. So if I say those are the highest marks and this is the low students so this is 1 this is 40 rank students, so if I rank them and up to this portion, this portion is called upper group and this portion is called lower group, okay. So if I want to find out how easy is this question let us test item 1, I have to know how many students of upper group give the correct answer, and how many students of the lower group give the correct answer, okay or not?

So now, if it is 27 percent so 40 students roughly if I say 8 students is come 40 students means or if it is 30 students ohh here is 30 students. So if it is 30 students if I have the 30 students, then roughly 8 students is the upper group and 8 student is the lower group. If it is 40 students, so you need to find out how many students in upper group and how many students in the lower group.

So let us 40 students, then 8 students is in upper group, 8 students is in lower group, okay. I said the facilitation value FV is how many students of the upper group give the correct answer and how many students of the lower group give the correct answer and divided by the group size, is clear or not.

So if I say out for test item 1 out of upper 8 students only 7 student give the correct answer and for the lower group I found 1 student give the correct answer C. So 1 student give the correct answer divided by the group size $8 + 8$, so it is 8 by 16 so it is 0.5 . So facilitation value of the test item 1 is 0.5 is clear or not.

I said if I want to find out the facilitation value of a test item I have a class size and rank them after the taking the test I rank them 1 to 100 or maybe 1 to 40, 1 to 400, then I take the upper group and lower group of the 30 percent of the students and lower 30 percent of the students. How many students of the upper group give the correct answer + how many students of the lower group give the correct answer divided by the group size if each test is each test item test item is corresponding to 1 marks, is clear? clear? So facilitation value is 0.5 in test item 1.

Now similarly, if I see the test item number 2, correct answer is A, in upper group is up to 8 is 1 upper group student give the correct answer, sorry 7 upper group student give the correct answer and 7 lower group student give the correct answer, $7 + 7$ divided by 16 so 14 by 16 almost 1 close to 1. So that means test item 2 is very easy even the lower group student can give the answer, is clear.

But in our cases, since it is criteria based assessment system, this kind of test item analysis is not that much required because I want to test whether the student achieve the skill or not. But if I want to assign them a rank, then I have to do the test item analysis and I have to design the question paper such that I can rank the students 1 to 40, okay. So that is called facilitation value. Similarly, let us instead of 1 marks multiple choice questions.

(Refer Slide Time: 17:22)

R	1	2	3	4	5	6	7	Odd	Even	Total
1	15	11	13	14	8	8	7	43	33	94
2	15	11	13	14	8	8	7	43	33	94
3	14	11	13	14	7	8	7	41	33	92
4	12	11	13	13	8	8	7	40	32	89
5	13	11	12	14	8	7	7	40	32	88
6	13	11	13	13	8	8	6	40	32	88
7	12	11	10	12	7	8	7	36	31	82
8	15	10	10	10	7	7	6	38	27	80
9	13	10	8	10	8	8	7	33	26	79
10	12	10	10	10	7	7	7	36	27	78
11	16	11	13	8	8	8	7	34	29	78
12	10	8	12	7	8	8	6	38	23	74
13	8	8	13	9	7	7	7	35	24	72
14	8	8	12	8	8	8	7	35	24	72
15	7	8	10	8	8	8	6	31	24	68
16	7	8	11	7	6	7	6	30	22	65
17	7	7	10	8	6	8	6	29	23	65
18	5	8	8	7	8	8	6	27	23	63
19	9	8	8	8	6	7	6	30	23	65
20	8	8	8	8	6	8	6	23	24	63
21	7	7	8	11	6	8	5	26	26	63
22	7	6	8	10	6	8	5	26	24	61
23	7	5	8	8	8	8	8	29	21	61
24	7	5	7	7	8	7	5	27	19	57

(7)
 ①-15
 15
 12 10
 A + A
 100

$$FV = \frac{\sum UP + \sum LV}{8 \times 15 + 8 \times 15} = \frac{\sum + \sum}{16 \times 15}$$
 1 2 3
 30

Suppose I have a question paper which let us there is a 7 question in the paper, each question has 15 marks each question is 15 marks. So let us 7 into or I can say I have a 7 question number 1 is 15 marks, question number 2 is maybe 12 marks, 3 is maybe 10 marks like that and within 7 question I have a total 100 marks question paper, is okay or not, okay? So 100 marks question paper.

So now question number 1 15 is the highest, so within the 100 marks question paper first after the test I rank them rank the student 1 to 30, 1, 2, 3...to 30. Now I find that for question number

1 the upper group is up to 8 and question number 1 lower group is 27 to 30. So I will sum up the total marks of the upper group, what is total marks?

Question paper full marks obtained by the individual students of the upper group. So sum of upper group marks + sum of lower group marks divided by total marks in upper group 8 into 15 + 8 into 15. So generalized formula is that if the question marks is A, let the marks of the question is A and upper group student sum of upper group student marks + sum of lower group student marks divided by 16 into full marks of the question paper, is a facilitation value, okay this is a facilitation value?

(Refer Slide Time: 19:14)

ASSESSMENTS – Selected sample of uses

ITEM ANALYSIS

Three Important Characteristics of Test Items

FACILITATION VALUE: (FV) How easy is it?

- Everyone answered it right, FV = 1
- No one answered it right, FV = 0
- Half the students answered it right, FV = 0.5

Ru = Right answers of upper group
RI = Right answers of lower group
n = Number of students in each group

$$\therefore FV = \frac{R}{N} = \frac{\text{Total right answer}}{\text{Total no of students}} = \frac{Ru + RI}{2n}$$

DISCRIMINATION INDEX: (DI) How good is it in separating the top scorers from the bottom scorers?

$$DI = \frac{Ru - RI}{n}$$

Handwritten notes on a blue background showing calculations for Facilitation Value (FV).

Top left: (7) ①-15

Top center: $\frac{2}{12}$ } 7

Top right: 100

Bottom left:
$$FV = \frac{\sum UP + \sum LV}{8 \times 15 + 8 \times 15} = \frac{\sum + \sum}{16 \times 15}$$

Bottom center:
$$FV = \frac{R_U + R_L}{2 \times n}$$

Bottom right:
$$\frac{\sum R_U + \sum R_L}{2 \times n \times 15}$$

Far right: A vertical bar with numbers 1, 2, 3, 30 inside it.

So I can generalize in theory that facilitation value is nothing but a total right answer by upper group + total right answer by lower group or RI divided by 2 into group size n, okay if it is multiple one marks question paper. If it is summative question paper then I just only multiply sum the upper group marks sum the lower group marks divided by n 2 into n into full marks of the question paper, okay.

So if I give you the data for any test item, then you can easily calculate what is the facilitation value of the test item. In assignment I will supply some data and you will solve calculate the facilitation value of those test item, is clear? So this is called facilitation value. Then there is another terminology we call discriminative index, how good is the test item to differentiate between the good students and bad students.

So if I say I am designing a question paper for JEE, my discriminative index value of that question should be very high so that only top students can answer that questions and lower students cannot answer that question so that I can choose the good students from the large pool of students. If I give the discrimination is very low question paper all everybody is give the answer that question does not create any value to the JEE question because JEE is the non-reference examination.

So suppose I in JEE there is a one question everybody 5 lakhs students everybody give the correct answer, what is the value of that question? No value because using that question I cannot

differentiate the good students to bad student because JEE exam is only find out the good student from the among the 5 lakhs student who are the top good student who are the less top like that way I have to run them, okay.

So discriminative index is nothing but a how good is my test item so that it can differentiate between the good students and bad students, okay.

(Refer Slide Time: 22:06)

Item	1	2	3	4	5	6	7	8	9	10	11	12	Score
4	A	A	C	C	B	A	C	A	B	D	D	C	9
5	C	A	C	C	B	A	C	A	C	B	D	C	8
6	C	A	C	C	B	A	C	A	B	D	D	C	8
7	C	A	C	C	B	A	A	B	B	B	C	C	7
8	C	B	C	C	D	A	C	A	B	D	D	C	9
9	C	A	C	C	B	A	C	A	B	A	A	C	9
10	B	A	C	C	A	A	C	A	C	D	D	C	9
11	C	A	C	C	D	A	C	A	B	C	B	C	7
12	C	A	C	C	A	A	C	A	C	D	D	C	8
13	B	A	C	C	C	A	C	A	B	D	B	C	7
14	C	A	C	C	D	B	C	B	B	B	A	C	8
15	C	A	C	C	D	B	C	A	C	B	D	C	7
16	C	A	C	C	B	B	C	D	B	B	B	C	7
17	C	A	A	D	A	A	C	A	A	B	B	C	7
18	C	A	C	C	B	B	A	B	B	B	C	A	7
19	C	A	C	D	C	A	C	C	C	D	D	C	7
20	C	A	C	C	B	B	C	B	B	B	A	C	7
21	B	A	C	D	C	A	C	C	C	D	B	C	6
22	B	B	C	C	C	A	C	A	A	C	D	A	6
23	A	C	C	A	A	C	B	B	A	C	A	C	8
24	A	C	C	D	B	B	C	B	D	D	C	C	8
25	A	C	C	A	A	A	C	B	B	A	C	B	8
26	A	C	C	D	A	C	B	B	B	A	B	C	4
27	A	C	C	A	A	A	B	B	A	C	B	C	5
28	C	C	C	D	A	B	B	C	C	A	C	C	5
29	A	C	C	B	D	C	B	B	A	C	C	D	4
30	A	B	B	A	C	D	B	B	C	C	A	B	2

Now same things, if I say I take a test for next 30 students and again I found next item number 1 correct answer is C and upper group students give the correct upper group all 7 students of upper group give the correct answer and 1 student give the wrong answer, in the correct answer in the lower group student. So I said how good it is differentiate between the upper group and lower group.

(Refer Slide Time: 22:35)

Handwritten mathematical formulas on a blue grid background:

- Top left: $DI = \frac{R_U - R_L}{n}$
- Top right: (15)
- Middle left: $DI = \frac{7-1}{8} = \frac{6}{8}$
- Middle right: $\frac{\sum R_U - \sum R_L}{n+15}$
- Bottom center: $DI = \frac{8-8}{8} = 0$
- Bottom left: $FV = 1$

So that means correct answer given by upper group minus correct answer given by lower group divided by the group size. That means that is equal to DI, how good is the question paper to differentiate between the good students and bad students? That means the correct answer, the number of student give the correct answer of the upper group number of student give the correct answer in the lower group minus divided by n.

So in case of question number 1, in this example I can say the 7 students of the upper group give the correct answer, only one student of the lower group give the correct answer and divided by group size is 8. So it is 6 by 8 is the DI, okay. So discriminating index is nothing but a 7 minus 1 by 8. Similarly if it is summative type question paper if it is a long answer question paper if instead of multiple choice, let us my question number 1 highest marks is 15, then the sum of the upper group students sum of the marks of the upper group students minus sum of the marks of the lower group students divided by the total marks n into 15, is okay or not?

I will upload this power point presentation when some something is already calculated you can go through it, but you have to understand the theory first. That what is what do you mean by discriminative index? Now you see, If the facilitation value is 1 what should be the DI? All students are give the correct answer, that means facilitation value FV is equal to 1.

So DI will be upper group correct minus upper group lower group correct divided by correct is equal to 0 discriminative index is 0. So that means if I provide a question paper in case of a ranking the student and every student give the correct answer that question does not use or does know does not have any effect on the ranking of the students.

So I should not use that type of questions to ranking the students, but yes I will use that type of questions if it is criteria based evaluation I want to test whether the student achieve this skill or not in case of our semester examination, I should provide the question paper which can every student give the correct answer because every I want to test the criteria not the discriminating them to provide the rank, okay.

So I can use this kind of formula to test that item which is called item analysis to find out the hardness and how easy is the question paper from the previous year data set, okay. So there is lot of workout problem.

(Refer Slide Time: 25:49)

Item 1	A	B	C*	D
Higher 27%	1	0	7	0
Lower 27%	0	7	1	0
Whole Group	1	11	18	0
Effectiveness of Distractors	-0.125	+0.875	*	0
Facility Value = $(7 + 1) / 16 = 0.50$ Discrimination Index $(7 - 1) / 8 = 0.75$				

Item 7	A	B	C*	D
Higher 27%	1	0	7	0
Lower 27%	2	2	2	2
Whole Group	3	4	21	2
Effectiveness of Distractors	+0.125	+0.25	*	+0.25
Facility Value = $(7 + 2) / 16 = 0.56$ Discrimination Index $(7 - 2) / 8 = 0.50$				

If I say that this is this group that item number 1 effective discriminative index facilitation value is 0.5 and discriminative index is 0.75 6 by 8, okay. So some workout problems are already there, you can go through this slides and see that discriminative value and facilitation value. Now there is another point is called effectiveness of the distractor. Designing of multiple choice question paper is not that so easy.

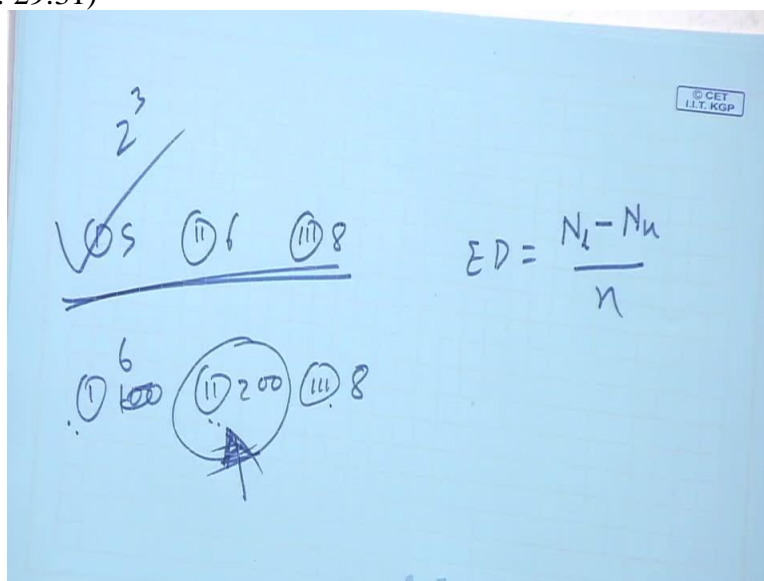
When you design a multiple choice question paper and if you have a 4 choice the choice is not arbitrary, even I seen that my daughter is preparing for Olympiad exam in maths and I found he is giving the choosing the correct answer of a three digit number multiple by a three digit number within a fraction of second, then I asked how do you select the correct answer without doing the multiplication, he said it is very simple if you see the four choice, let us there is given a number whose last digit is 5 and another 3 digit number whose last digit is 5 so he said that what should be the result last digit will be the 5.

Now if you see the four choice only one answer has the last digit 5, so obviously that will be the correct answer. So if I said I want to test whether a student is able to multiply a three digit number by a three digit number using multiple choice questions and I give this kind of option, then without doing the multiplication or without doing the correct multiplication of three digit number students can give the correct answer.

Then my purpose of the evaluation is totally lost. If you see many of the cases that our JEE exam all our coaching center are try to do this this only. They want to prepare the students how good are they using minimum time can find out the correct answer or they can reject the wrong answer so that they can distinguish the correct answer. So that is mechanized practice and mechanized, this does not test the student deep knowledge or deep understanding about the subject.

So this does not develop the skill set of the student, this kind of mechanism is used. In training you see that all JEE coaching center several test they have taken and several kinds of test they have taken to only facilitated the students how do you select that answer quickly. So if I want to really design a very good multiple choice questions, my each of the choice should not be arbitrary.

(Refer Slide Time: 29:31)



So suppose if I want to design a multiple choice option for 2 to the power 3 what are the possible misconceptions I have to find out? misconception 1 is 5 adding the number, 2 is multiplying the number 6, and 3 is correct. So only three options are there. So choice should be only three. Out of three if anybody choose option 1, I know his misconception is he is adding the two number. So purpose of the evaluation is to find out whether the student has that skill or not.

If I want to find out so I have to know what are the possible misconception if I this give this kind of question paper. So if I 2 to the power 3 and I give a choice is 100, 200 and 8, then none of the students or let 100, 6 and 8 none of the students choose this 200 option 200, what is the meaning?

The effectiveness of the distractor so choice of the distractor each and individual choice are the distractor so that the students I want to test the misconception of the students. So if the distractor choice is 0, none of the student if choose the distractor 2, then the effectiveness of the distractor 2 is 0. So whether I give that choice or not does not matter, so the effectiveness of the distractor is that how effective is each of the choices.

So effective of the distractor in mathematics I can say number of student of the lower group choose the distractor minus number of students of the upper group choose the distractor divided by the n.

(Refer Slide Time: 31:34)

Question	A	B	C	D	Score
1	C	A	C	B	10
2	C	A	C	B	10
3	C	A	C	B	9
4	A	C	C	B	9
5	C	A	C	B	8
6	C	A	C	B	8
7	C	A	C	B	8
8	C	A	C	B	9
9	C	A	C	B	9
10	B	A	C	C	8
11	C	A	C	D	7
12	C	A	C	C	7
13	B	A	C	C	6
14	C	A	C	D	8
15	C	A	C	D	7
16	C	A	C	B	7
17	C	A	D	A	7
18	C	A	C	B	7
19	C	A	D	C	7
20	C	A	C	C	7
21	B	A	C	C	6
22	B	B	C	C	6
23	A	C	C	A	6
24	A	C	C	D	6
25	A	C	C	A	5
26	A	C	C	D	4
27	A	C	C	A	5

So if I say question number 1 I have a four choice A, B, C, D. C is the correct answer. So A, B and D are the possible distractor, now if you see none of the student is choose D as a (de) distractor. That means that effectiveness of the distractor choice D is 0, so effectiveness of the distractor A is how much? Number of students of the lower group choose A, how many student choose A? Nobody. Nobody choose A minus number of students of the upper group choose A only 1 divided by the n.

Effectiveness of the distractor choice B, number of student of the lower group choose B 1, 2, 3, 4, 5, 6, 7. So 7 minus upper group student how many? None, 7 minus 0 divided by 8.

So B is the good distractor from the item analysis item number 1. So designing a multiple choice question paper is not that easy. Each of the choice should be test the possible misconception of the students, okay. So effectiveness of the distractor how to calculate? how to calculate facilitation value? how to calculate discriminative index? I have covered in this class, next class I will say how to design or there is another one guessing problem and then I go for go to the validity and reliability of the evaluation, okay, thank you.

Course on Outcome based Pedagogic Principles for Effective Teaching

Professor Shyamal Kumar Das Mandal

Centre for Educational Technology

Indian Institute of Technology Kharagpur

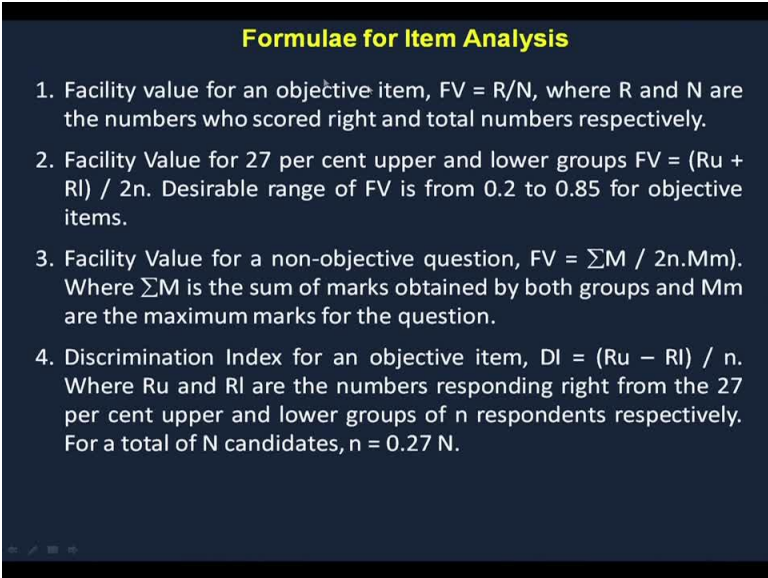
Module 3

Lecture No 16

Lecture 16: Assessment and Evaluation (Contd)

Okay so in the last class we have discussing about that item analysis, discriminative index, facilitation value and that effectiveness of the distractors.

(Refer Slide Time: 0:30)



Formulae for Item Analysis

1. Facility value for an objective item, $FV = R/N$, where R and N are the numbers who scored right and total numbers respectively.
2. Facility Value for 27 per cent upper and lower groups $FV = (R_u + R_l) / 2n$. Desirable range of FV is from 0.2 to 0.85 for objective items.
3. Facility Value for a non-objective question, $FV = \sum M / 2n.M_m$. Where $\sum M$ is the sum of marks obtained by both groups and M_m are the maximum marks for the question.
4. Discrimination Index for an objective item, $DI = (R_u - R_l) / n$. Where R_u and R_l are the numbers responding right from the 27 per cent upper and lower groups of n respondents respectively. For a total of N candidates, $n = 0.27 N$.

So in nutshell the facilitation value of an objective item is nothing but a facilitation value FV is nothing but a R by N, that means that in facilitation value if the each and each questions is getting single marks, then it is total marks R divided by N. So RN at the number whose score right and total number of respectively.

So suppose I have taken a test facilitation value is how easy is the test, so number of correct answer given by the upper group + number of correct answer divided by given by the lower group divided by the total number, okay and we have explained it in simple manner by giving an example. And I will share with this ppt there is a some example is already done, so you can go through it and check your things that whether it is correct or not and you can go through it.

Next is that if you see a facilitation value for that non-objective test item like that if the question papers question carries a different marks like that some question carry 5 marks, some question carry 10 marks, some question carry 20 marks like that way then also facilitation value is the total marks obtained by the upper group + total mark obtained by the lower group divided by the total question marks of that whole question set, okay.

That means that suppose there is a 10 questions and each question is 5 marks, then total marks is 10 into 5 50 marks questions, okay. And into multiply by the total group size, okay so this is where formula is given. Similarly, discriminative index the correct answer given by the upper group minus correct answer given by the lower group divided by the N, N is the group size, okay.

Now this desirable range where discriminative index is 0.3 to 0.65 for the objective test item and facilitation value you know that you get the facilitation value. So if the facilitation value had value 0, what is the meaning? Facilitation value 0 means nobody of that nobody can answer that question. So total marks obtained by the upper group 0, total marks obtained by the lower group 0 divided by the group size is 0.

So that means if a test item has a facilitation value 0 that indicate this test item is not suitable for taking the test because either this item may be taken from taken from such a way that it is out of the syllabus of the learner or it may be not achievable but it cannot be done within this examination systems, so that is the indication. So facilitation value 0 does not have any meaning.

Now if I doing a non-reference summative evaluation suppose I taking a JEE examination, if a test item has facilitation value 1 that means everybody can give the answer of the test item, no use of use that test item as a non-reference examination. That does not indicate that who is the good student who is the bad student. So facilitation value 0 to 1 it can vary, now if it is 0 test item is not worthy, if it is 1 then also test item is even if it is closed to 1 also not worthy.

So it is a when you design a question paper based on your test, that suppose I want to design a question paper for semester examination, then it is criteria based test. That means I have already defined my outcome of the course and I already told the students you have to achieve that

outcome I have to only test whether you achieve the outcome or not, how do I do it? I design a question paper based on the criteria which is defined by my course outcome.

If a student give that correct answer, then he achieve the outcome, if he does not then he not achieved the outcome, okay.

(Refer Slide Time: 4:37)

5. Desirable range of DI is from 0.3 to 0.65 for objective items.

6. Discrimination Index for a non-objective question

$$DI = (\sum Mu - \sum MI) / n \cdot Mm$$

Where $\sum Mu$ are $\sum MI$ the sum of marks obtained by the candidates from the upper and lower groups of n each respectively.

7. Effectiveness of a distraction in a multiple choice item,

$$Ed = (nl - nu) / n$$

Where nl and nu are the numbers choosing it from the lower and upper groups respectively. Negative and zero values of Ed imply bad distractors. Values approaching unity refer to good distractors.

Similarly effectiveness of the distraction, very important very important because many people are designing the multiple choice question paper and if you see let us I can give you the example, suppose you in kids nursery level there is Olympiad exam or some other exam suppose you give a question like that a three digit number multiply by the three digit number, your objective is that student should know how to multiply a three digit number by a three digit number.

Now if you design a question paper like that 225 last digit is 5 and again the last digit is 5 of another the number. So the multiplication number also have a last digit 5, now out of four choice if you only one choice which is out last digit is 5, so the student without doing the three digit multiplication they can give the answer.

So actually objective was I want to test whether they are able to multiply three digit number by a three digit number is not tested. So effectiveness of the other distractors are not relevant, okay. So that means effectiveness of the distractor are very important and I you know that how to

calculate the effectiveness of the distractors. And also the distractors are the valid misconception of that question paper.

So it should not be like that arbitrary distractor does not help you to test the students whether they have attained the skill or they do not attain the skill, okay. Now I therefore the another part which is called guessing, in multiple choice question paper I can either design the question paper for the negative marking that means I am discouraging the guessing, negative marking means I am discouraging the guessing, I told the student if you do not know the answer do not answer it without guessing.

But suppose in any many cases we should allow guessing, okay. So based on the requirement whether you can allow guessing or you may not allow guessing. If you allow the guessing, then how do you correct that guessing factors? There may be there may be some guess is done so you can get the correct number by the guessing.

(Refer Slide Time: 6:57)

GUESSING – Is it a problem?

- No: if everyone guesses equally.
- Encourage to guess, give explicit direction
- Informed guessing is how we operate
- In very special situation use the correction formula:

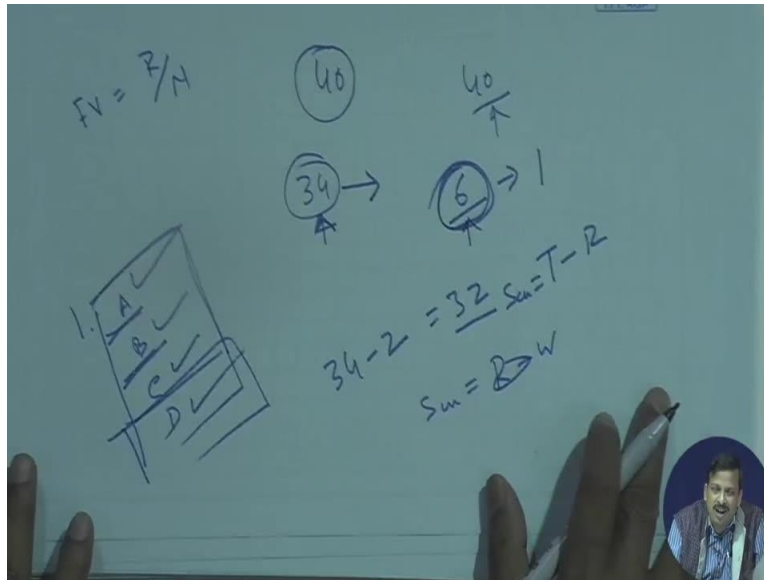
$$\text{Score} = \text{Right} - \frac{\text{Wrong}}{n - 1} \quad n = \text{no of alternatives}$$

Ex: Total items = 40, $n = 4$, Wrong = 6

$$\text{Score} = 34 - 6/3 = 32$$

Assumption

If a student guesses some answers, then for every 3 answers he guesses wrongly, he is likely to guess one answer correctly. So, we may conclude that for six wrong answers resulting from guess work, two right answers are also the result of guess work.



So there is a simple solution for correction of the guessing I described and this is one way, you can do other way also. So my method is that what I am saying that that suppose I take a test for 40 marks question 40 test item and 40 marks. A student got 34 marks, I want to correct the guessing factor. Maybe student does not guess by in general I assuming student guess it, so if he got 34 marks then what would be the correct marks which is without guessing?

Okay. Now I have a four choice each test item has four choice A, B, C, D, okay so if I guess if I say my correct answer are randomly distributed over the 40 questions means I should not design a question paper where all the A are correct answer. I should not design a question paper where all the B are correct answer, where the correct answer are randomly distributed over that 40 question paper, 40 question so some question have A correct answer, some B, some C, some D, okay.

Now if a student got 34 that means, he has done mistake on 6 test item out of 40. So if he done mistake on 6 test item, what is the meaning? That if I if I have a four choice, out of three wrong choice I can get a correct choice. Out of three wrong choice that is a possibility that I can get **get** a correct choice if I tick by guessing, okay.

So if there is a six wrong answer, that means every three wrong answer every three wrong there is a possibility that student get one correct answer. So actual marks will be 34 minus 2 because 2

6 is wrong answer, so 2 is the guessing factor 2 marks is get by the guess, okay. So 32 marks is the correct marks without guessing, okay. So what is the general formula?

Right answer the score is nothing but the right minus wrong answer right answer minus wrong answer, okay wrong answer so score I got so 40 so 40 is the total marks. He write 34 sorry total marks minus wrong answer is the score of the student, okay.

So if I say what is the how much marks he is wrong? Wrong means how many marks he has done mistake.

(Refer Slide Time: 9:51)

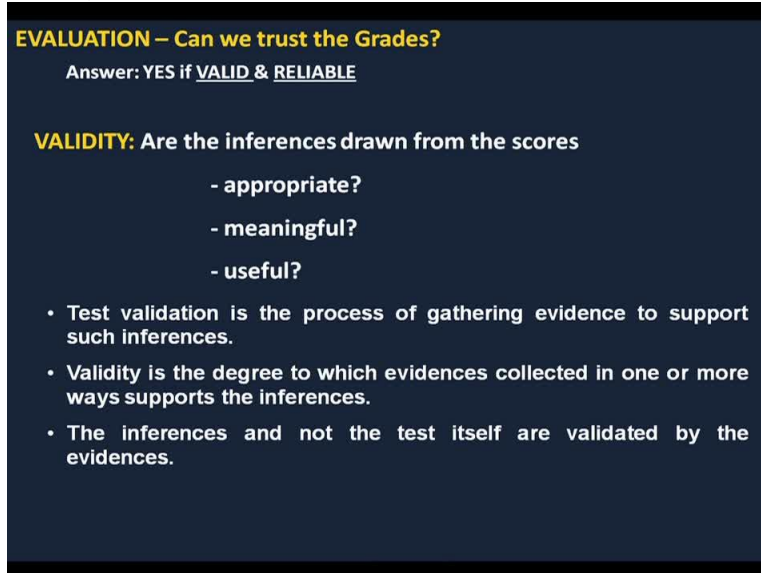
The image shows a whiteboard with handwritten mathematical formulas. At the top, it says $T - W =$. Below that, the formula for the score is given as $Score = R - \frac{W}{n-1}$. This is then substituted with the values from the example: $= 34 - \frac{6}{4-1}$. The final result is calculated as $= 34 - 2 = 32$. A small inset video of a man is visible in the bottom right corner of the whiteboard image.

So that means total marks minus total marks he got means right answer is equal to the total mark the number he may be wrong. So if I say without guessing what should be his number? So score will be right answer right score whatever he get minus wrong score how many number he get by wrong number divided by the number of choice minus 1.

So if say 40 is my total score, so he get 34, he got 34 now how many wrong? 6 marks is wrong divided by how many choice? 4 minus 1 is equal to 34 minus 6 by 3 is equal to 34 minus 2 is equal to 32. So right score minus wrong score divided by choice minus 1 number of choice minus 1, okay. That is the guessing factor, okay.

So if a 40 marks question paper is designed, if somebody get 34 that means he is supposed to actually get 32. You may allow guessing, you may not allow guessing that depends on your choice but if you allow guessing you can correct the guessing factor, okay.

(Refer Slide Time: 11:29)



EVALUATION – Can we trust the Grades?

Answer: YES if VALID & RELIABLE

VALIDITY: Are the inferences drawn from the scores

- appropriate?
- meaningful?
- useful?

- Test validation is the process of gathering evidence to support such inferences.
- Validity is the degree to which evidences collected in one or more ways supports the inferences.
- The inferences and not the test itself are validated by the evidences.

Next one is that, yes now I know the item analysis but yes item analysis only valid I can do item analysis if I do suppose take the examination today and then I done the item analysis of this this examination. So when I design the next question paper, if that such kind of item analysis is done for thousands of questions, then probably design a question paper will be very easy to me.

Because if I tagged each and every item analysis after item analysis is tagged the score, every question paper there facilitation value, there discriminative index and effectiveness even multiple choice effectiveness distractor all are stored in my question bank. Now if I want to design a question paper let us it should be discriminative should be I require a test item whose discriminative should be for like this to this, I can pick up I require a test item whose facilitation value is like this and this, I can pick up, okay.

But when you doing a summative assessment for the semester examination, the criteria based examination there is nothing do with that facilitation value and discriminative index because I want my in my class all student should get 100 by 100 because if all are attain that skill. So my question paper is only for testing whether they are achieved the intended outcome or not.

Thumb rule is that do not provide a test item which is already discussed in the class. If you provide a test item which is already discuss in the class, then it is not that skill, it is nothing but a remembering level. Suppose you taught a design of something and you give the same design in the examination system, actually you are testing the memory of the students, not whether the students is able to design that things or not.

So do not provide a set of question paper whose all test items will be new but using the same concept. So that means I should not provide a test item for testing the competence of the two student which I have already solved. Because if I already solved the same test item, then the student will be just remember and deliver like that if you see history question paper of our higher secondary level kind of the this time the shahenshah has come, next time so Babar will come, everybody know the next time I have to write the Babar.

So everybody just mug up Babar has come in the examination center and examination hall and give that. So it is not you should test the concept of the student, okay. Then I go to the evaluation validity, suppose I design an evaluation is this evaluation is valid?

That means that can we trust the grade? valid evaluation validity means that suppose I provide a x grade to a student, can I trust that his skill is equivalent to x grade or if I take today a test more or less we will get the x grade, that is the validity. So validity means once I assign a grade to the student I evaluate the students, is my evaluation is valid?

If I say this is correct, this is the skill set of the students and yes the students acquire that skill set that is important, the validity of the skill set. So how do you design the validity? How do you test the validity? Suppose like that that half the inference drawn from the course appropriate, meaningful, useful. Suppose I taught in the class AC machine design some kind of AC machine design given specification, this complexity of AC machine design I taught.

Now in question paper I solved a problem in the class and I give the same paper in the test. So a student get x grade, are he validate his the test is validate? nowhere. The next time if I test with a another set of design, he may not be able to answer. So my test is not validate, I am not saying that processed exam of that is another process. I am saying the student is honestly giving the exam but my question paper is such that my test is fail to validity.

So it should be appropriate, meaningful, useful. That means suppose I taught a mathematics subject differential calculus and I taught the solving of differential equation of second order in the class. Now I design a question paper to solve the third order differential equation, none of the student can give the answer, so my test validity is not there. Similarly this is not appropriate, now suppose for a BE engineer I taught a subject which is supposed to be analysis, synthesis, application and evaluation level and my whole question paper is write a short note, define this, explain this, draw the figure, then what is the validity of this test?

Student may got the x but he does not know the application of the subject, he does not have the skill in higher cognitive level application, evaluation, synthesis and analysis level which is desired for a BE engineer. So that means if I design a question paper which is only the knowledge and comprehension level and I taught that this course is meant for that BE engineer course which made the NBA guideline whole things is wasted.

Because the student who has got the ex marks he only know the definition and derivation. So write a short note in a engineering question paper is not a valid choice, okay. So validity will be not there, so your question must be appropriate, meaningful, I will describe meaningful later on also. You should not design the question paper such that it is not no meaning of that question, it should be meaningful means it should indicate the criteria outcome of your course then it should be useful.

I should not taught the definition entropy only in case of BE engineer. If I ask in summative evaluation what is the definition of entropy? That is not that BE engineer examination, that may be ITI or like that. So it has to be useful for that group of students, so useful should be there. So validity can be inferred from the different inference if you say content does the sample test item adequately represent the content domain.

(Refer Slide Time: 18:32)

<u>Types of Evidences</u>	<u>Relevant Questions</u>
1. Content – Related	<ul style="list-style-type: none">- Does the sample test items adequately represent the content domain?<u>Ex.</u> Adequate samples? Not too easy / difficult?- Adaptive Testing such as CAE/GRE takes care of both.
2. Criteria – Related	<ul style="list-style-type: none">- Predict related future performance? (predictive)<u>Ex.</u> GRE/SAT- Estimate current performance?<u>Ex.</u> Matches certified level of competency.
3. Construct – Related	<ul style="list-style-type: none">- Relates to psychological characteristics<u>Ex.</u> reasoning ability, creativity

There is another scenario is there, if you see many university or many colleges or many institution has their system that out of 8, answer any five. If I remember in math exam of higher secondary examination system there is a syllabus permutation combination then there is a call Taylor series expansion all are there in the syllabus, but beginning their teacher said without touching the permutation combination and Taylor series it is possible to get the 100 marks.

Why? Because question paper is designed out of 8 you have to answer any 5. So that means if 8 represent the 100 percent coverage of the syllabus, so 5 represent 5 by 8 percent coverage of the syllabus. That means almost 30 percent of the syllabus I do not know. Still I score 100 marks. That means the validity of the question paper is gone. Then if you say okay your pass mark is 35 percent. So 70 percent syllabus 35 percent I know, that means eventually I know only 21 percent of the syllabus roughly and I passed the exam, what is the validity of that test?

Now for me because I do not know anything about the subject but I pass the examination. So the examination says does not set the validity. So the does the sample test item adequately represent the content domain? That means yes I can give any 5 you can answer any 5 out of 8 no problem. But any 5 you choose, you have to cover 100 percent of the syllabus. That means I have to design the question paper such a way that any 5 student can choose you have to cover that 100 percent of the syllabus or 100 percent of the criteria.

That means this is criteria related. It should not be just take a test it should be criteria related, I want to test these criteria so this test item. I want to test this criteria, this test item. So it should be criteria based. Like that if I say my course objective is apply, design, evaluate, synthesis and I design a question paper describe this, define this, explain this, write a short note, so none of the criteria of my course is match with this examination system.

So that means the validity of that examination is gone. Then construct related to the that is characteristics physiological characteristics of that is there. Reasoning ability, creativity they should have applied their knowledge, not that remember and deliver. I should make a question paper they should think and apply so conceptualization of engineering problem in case of Btech engineer.

So they should think my question paper should apply a test item which they have to think, apply their knowledge to solve that problem. Prove fx equal to fy , I said it is little bit of a kind of a not validate test fx equal to proof that this equal to this, there may be the derivation is available in the book and he remember and deliver it. What is the meaning of that test item? Nothing.

I am not testing his skill. So instead of doing that I should apply I should I should design a test item which they have to think and which can they have to eager or they have to acquire that higher cognitive level skills instead of just remembering knowledge, this knowledge is not wisdom remembering knowledge, okay. So this is the validity of the test paper.

Then reliability. Again suppose today I take a test a student get 100 marks. If I design a equivalent question paper and I take the test one month after, are the student get the not the 100 marks even if 80 marks. If it is not, then what is the reliability of the test? If it is skill, suppose I acquire that skill, skill cannot be forgettable. So if I today I take a test, tomorrow I take a test pre test post test whatever I take it should be reliable over the test.

So if I design the question paper only test the skill, then it will be reliable test, okay.

(Refer Slide Time: 23:35)

A solid inverted cone floating in an 8ft³ cubical tank filled to a depth of 1 ft with a height of 20cm and a diameter of 25cm has a 10in³ copper block on it. The cone is 15cm deep. At a certain time the block which has specific gravity of 8.92 is carefully removed and dropped in the tank. What does the cone, which has a specific gravity of 0.75, do? Note that 1 in = 2.54cm.

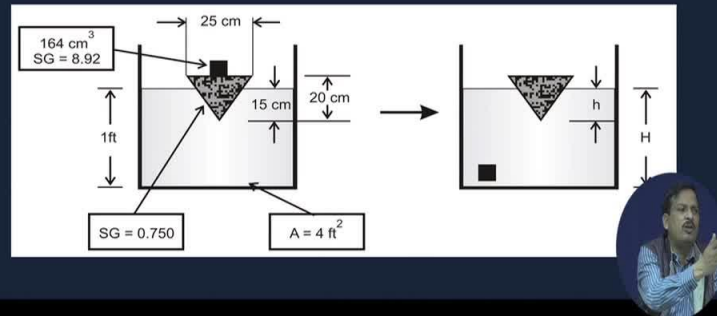
Then there is another point, suppose this question. This question taken from a some book or some internet example suppose this is the questions, if you write your question like that way and student is totally confused, what has to be done? So purpose of the evaluation system is to find out whether student attain that skill or not. Purpose of the evaluation system is not to confuse the student.

As a teacher I am very much clear I want to test this skill set so my test item should clearly mention that skill set, testing of that skill set. It is not that I give a very long questions and see what does the cone do? What is the meaning? Nothing. Suppose I want to know whether the students is know how to calculate the density, how to calculate the volume, how to calculate that kind of things.

But if you say that if I give this test item I cannot figure out whether they know this, whether they know this I know this or know this.

(Refer Slide Time: 24:47)

A solid cone of base diameter 25.0 cm, and specific gravity of 0.750, floats point downward in a liquid of unknown density. A copper block with a volume of 164 cm³ and a specific gravity of 8.92 rests on the base of the cone. The cone is immersed to a depth of 15.0 cm. The tank is a cube 2.00 ft on each side. The liquid level is half the height of the tank. At a certain time the copper block is lifted off the cone and gently immersed in the tank.



- Calculate the masses of the cone and of the copper block. Recall that $V_{\text{cone}} = \pi r^2 h / 3$, where r and h are the base radius and height, respectively. [Marks: 20]
- Use Archimedes' Principle to determine the density of the liquid (g/cm³). [Marks: 30]
- Assume the solution to Part b) for the liquid density is 2.700 g/cm³. (It might not be.) Calculate the vertical distance (cm) from the liquid surface to the base of the cone after the block is immersed in the liquid. [Marks: 30]
- Assume the solution to part c) is 6.00cm. (It might not be). Calculate the vertical distance (cm) from the bottom of the tank to the base of the cone after the block is immersed in the liquid. *If you have no time to work out the numbers, outline a solution procedure.* [Marks: 20]

So instead of giving this, if I design the question like that way and make the question like this way calculate this principle to determine this, identify this then I know what exactly I want from the student. And my problem statement should very clear what has to be do. I should not I may not be provide this block diagram I may provide this text, student has to draw this block diagram and answer one by one question.

So every test item is indicated one type of skill. Later on you can do that suppose there is a multiple step of a problem, now suppose a student does not have that skill but next skill student

has. So if you he cannot do this problem this problem is linked to this problem so the value of answer of the problem 1 will be used in the answer of the problem 2.

And the student does not know the answer of the 1, then my test item should be designed such that okay if your answer if your assume that answer of the first question is within this range, do the next item. So I can specifically I can identify which skill student does not have. So purpose of the evaluation system is to test whether student has the skill or not, not to confuse the student and not to provide the marks to the student.

If you design a question paper write this, define this, square this, write a short note on this, useless that does not mean to the skill for engineering education. So when you design a question paper for BE engineer it should design that your course objective as per the Washington accords. So that has to be tested, that is the test item design and test item analysis and evaluation and assessment.

Maybe suppose you are doing a that doing a evaluation for a seminar for a project what is doing? That, okay seminar somebody giving a seminar, somebody is sitting there and giving a marks. Student does not know which area teacher are marking him, which area he has a less confidence, which area he has a right confidence.

So before you take the presentation, you define the rubrics. Okay your presentation style will be this marks, your slide content flow will be this mark, this will be this mark so criteria you define and give it to the student before you take an assessment, then take the assessment and provide the marks and give the feedback to the students that you does not have this skill this skill this skill, now this skill you required to improve, so specifically you have to mention which skill he is required to improve.

So evaluation is not only purpose for just providing a marks, it has to tell the students yes you give the exam but your this skill and this skill is not present, so he will be acquire that skill. Now whether he acquire or not it is student responsibility, learner responsibility learner will done. But any evaluation criteria must be well defined, criteria for evaluation project evaluation you have to define the criteria okay you have to do this this marks, you have to do this this marks, you have to do this this marks, total this marks.

So I can when I take the evaluation I can tick that this marks this skill does not, this skill has, this skill has, so I can provide the marks so instead of seeing the face of the students and I use most of the lab exam we take that given a report and we ask the student to give a viva and ask a question and see the face of the student you put a marks. That does not evaluate the student, again give a marks but it does not evaluate the student.

Student does not know anything if you see most of the time lab report are same from year after year. And if you ask them they does not know anything what is the problem? Problem is that as per the Washington accords or NBA guidelines student has to know how to design the experiment, how to interpret the data, how to analyze the data, how to collect the data all skill I have to test all and individual skill and provide the marks.

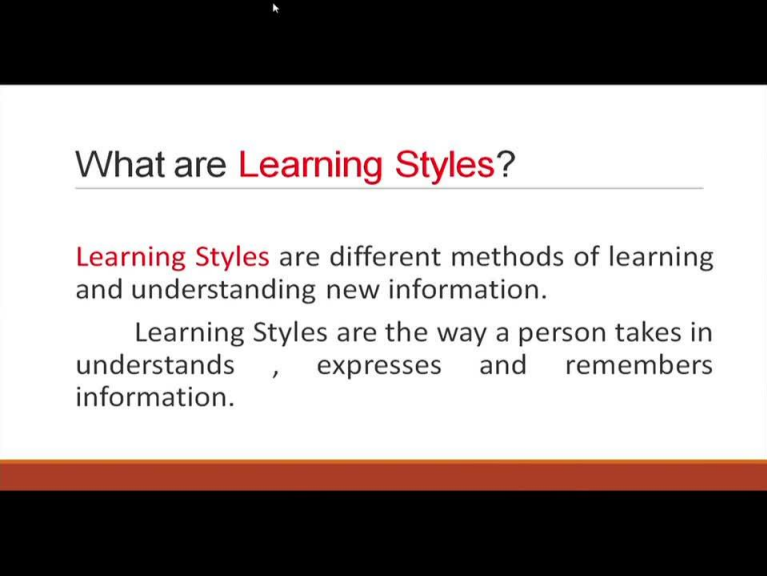
Then I can say yes my course design is fulfill the evaluation system. So I design a course like that I have a syllabus huge tough syllabus is available but nothing is taught, what is the use of the syllabus? Nothing. So syllabus does not improve the quality of the student, so I can say I have designed the skill, defined the skill and my examination system is only okay define this, describe this, draw this, derive this, finish then I am not testing the skill.

So examination system is not valid, examination system is not reliable, test items are not valid they are not reliable, they are not criteria based all kind of things are there, okay. So that is was about the assessment and evaluation technique, okay thank you.

Course on Outcome based Pedagogic Principles for Effective Teaching
Professor Shyamal Kumar Das Mandal
Centre for Educational Technology
Indian Institute of Technology Kharagpur
Module 4
Lecture No 17
Lecture 17-Learning Style

Good afternoon. Learning styles. Here what do we do? We mainly do here the cold model and the Felder Silverman's Model. Now first what are learning styles? Learning styles are different methods of learning and understanding new information. One Learner style of learning is different from another learner style of learning. So as a teacher we should understand that the learning styles of the learners are different.

(Refer Slide Time: 0:59)



What are Learning Styles?

Learning Styles are different methods of learning and understanding new information.

Learning Styles are the way a person takes in understands , expresses and remembers information.

So learning styles are the way a person takes in understands, expresses and remembers information.

(Refer Slide Time: 1:08)



So here in this picture this cooking we have to this lady she is taking step by step and she is cooking this vegetable. So she is following on the step by step method, but this lady you know what is she doing? She the picture idea of this cooking this vegetable it is in her mind.

So she is just cooking you know. So her style and her style, this lady style and this styles are very different, ok. One is following the step by step method, another is following the picture idea of that from her experience she is doing. So David Cole did his Ph. D in Social Psychology from Harvard University and he published and his principles of learning styles in the year of 1984.

Cole shows that how people perceive and process information through a learning cycles and a learning styles, will explain his learning styles and his learning cycles. So the learning styles, cycles it has the four processes and then he developed the four different learning styles. Now David Cole here he mainly number one he believes in constructivism, the six principles he and the experimental learning I will explain the what the six principles of learning he is following.

Learning is the process whereby knowledge created through transformation of experiences, from the experience only a learner is learning not the he is not believe in the outcome based but from the experiences he is giving importance to the experiences. And so Cole explaining ensure

learning theory, learning is the process whereby knowledge is created through the transformation of experience from the experience the knowledge is transformed.

Knowledge results from the combination of grasping experience and transforming it. So Cole experiential learning theory is recognized as launching the Model Learning Styles Movement. So Cole six principles of experiential learning what is that? Number one is that learning as a process, what is that? Learning is a continues process, grounded in experiences. So knowledge is continuously derived and tested out in the experiences of the learner.

Suppose you cannot you cannot do trigonometry if you do not know the algebra, right. So if you know algebra that you can apply in the trigonometry. So so how can you apply this learning as a process? It is the constantly building on previous content scaffolding. So this is that the learning as a process. The second point is the learning is relearning, what is that? Students ideas must be drawn out, discussed and redefined.

So it is you know it is a relearning, ok. Suppose I am cooking something so I am cooking coffee. In a different method I can improve. So from it is I am learning this method of coffee making, another you know so in a different way I can try. So it is nothing but a relearning. So in that case application we can is the group work we can apply, theory testing and the critical thinking exercises also. So it is a learning is a relearning.

Now third point is the emotional learning, emotional reflection. What is that? Learning request are resolution of dielectrically opposed modes of adaption of the world that the learners must move between opposite modes of reflection and external feeling of thinking. Suppose what that? Suppose in the class suppose in the I am in the history I am teaching. In that case I can ask the of my learner that is anybody in your family is suppose I am in the history I am talking about the freedom fighting that time you know, is your anybody in your family is the freedom fighter so what is your.

So I can involve them you know emotionally and that is in that way they can and I will allow time for students to reflect. So after any discussion, I can discuss and understand their emotional reflection. So have learner skipped journal. So that is very important in the emotional reflection in history, sociology anywhere in different subjects.

The fourth point is the holistic learning. What is that? learning affects the entire learner. The total holistic learner, ok uses a cross disciplinary curriculum. Suppose I am teaching economics right if I am teaching economics with that I can give I can see their maths background or if how, so because the mathematics and economics is related so total of the holistic things.

If I am teaching them English literature or I am teaching them social studies with that I am talking in the English grammar and these things. So it is like that the total one holistic approach. So in the cross disciplinary curriculum I can use. So always improve every aspects of the learner's education. So always I will try to improve the all the aspects of the learners education.

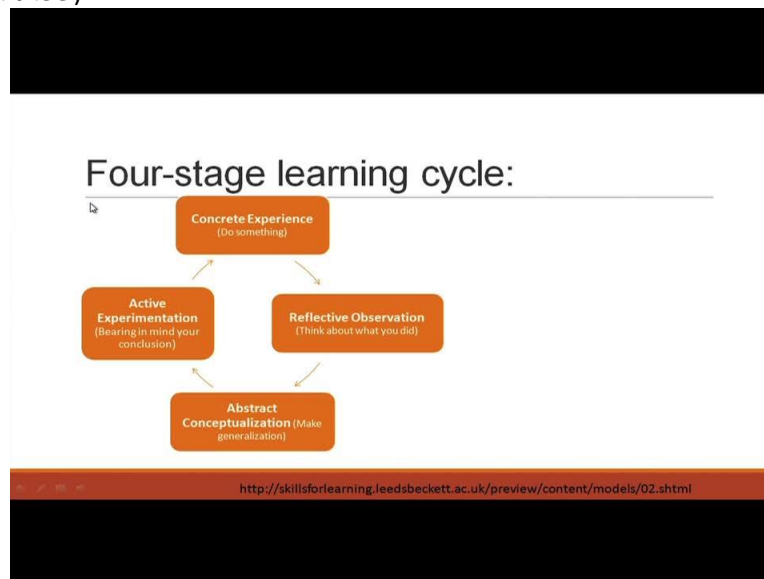
Environmental. Here any biological science or not only biology, in the engineering also in the environment how you are using, ok. So we should emphasize, as a teacher we should emphasize them. So learning involves interaction between the learner and the environment and how I will apply along time for experimentation in the environment where they can experiment and applications the learner's idea, learner will think on their own and they can apply it, right.

The last is the constructivism and Cole believe in that constructivism is that constructivism views that learning as a process in which the learner constructs knowledge they builds they constructs knowledge based on their past experiences. So knowledge is constantly building up on itself. So how application? You know account file we can see the different viewpoints, ok between the students.

So each student's experiences is constantly growing right. With the learner's experiences constantly growing and creating and the unit lens for the student. So these four things so whole experimental learning theory sets out four different learning styles or preferences which are based on four stage learning cycles, ok? What are those learning cycles?

One is concrete experiences, two the reflective observation, third one is abstract conceptualization and the fourth one is active experimentation. Now the just see here.

(Refer Slide Time: 9:53)



Here the four stage of learning cycles. The first is the concrete experiences, what is that? Do something. So here life is full of experiences we can learn from right. Whether at home or at the work or out and about there are countless opportunities for us to kick-start the learning cycle, so the first is to do it. The do things that is the concrete experience do something.

The next one is the reflective observation, what is that? It is nothing but think about what you did, you just think first concrete experience you are doing without thinking and here the reflective you know think and do it. So here reflection involves thinking about what we have done and experienced. So in that some people are naturally good at this but others train themselves to be more deliberate about reviewing their experiments experiences and recording them. So this is the second part.

The third one is the abstract conceptualization, what is that? This is the thinking thing means logical analysis of ideas and acting on intellectual understanding of the situation. So logically you are analyzing, this is the third part that is called the abstract conceptualization. And the fourth is the active experimentation it is just doing. So here ability to get things done by influencing people and events through action includes risk taking.

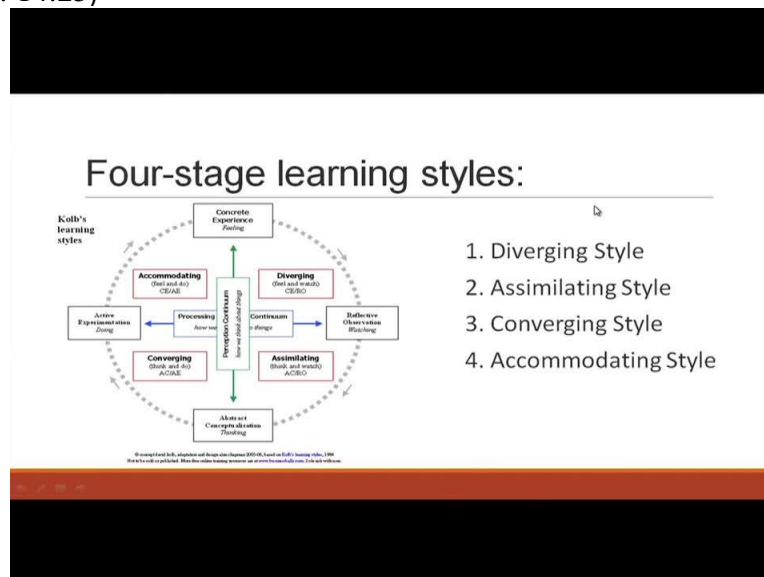
So I will just give one example, suppose learning to ride a bicycle, ok. So here reflective observation is that thinking about riding and watching another person ride a bike. You are

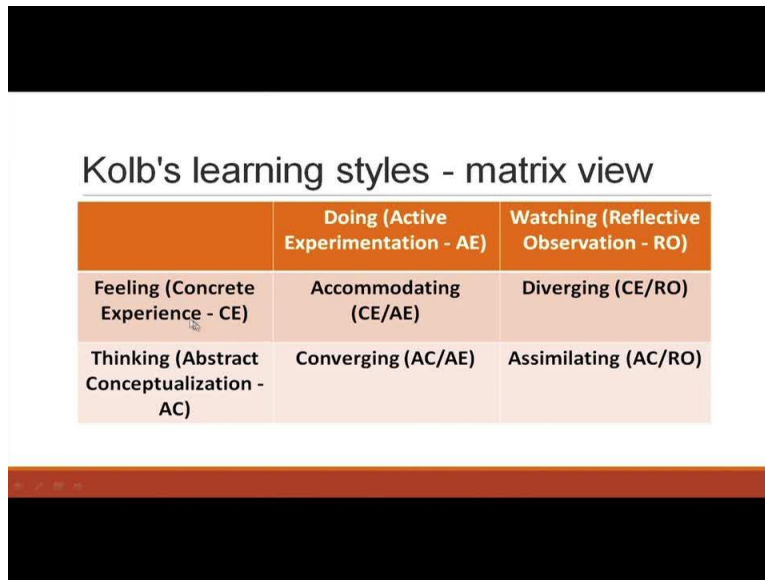
thinking and you are watching that another person is riding the bike. So this is the first part we call is reflective observation.

The second one is that the abstract conceptualization what is that? Understanding the theory and having a clear grasp of the biking concept. How you have to understand the theory and the concept. The third one is the concrete experiences, what is that? Receiving practical tips and techniques from a biking expert. You can ask that how you are doing this, how you are biking this thing. So if the practical experiences from the person and the last one is the active experimentation is that user leaping on the bike and have go at it. Suppose another learning algebra, here abstract conceptualization I can say that listening to explanations on what it is.

So this is the abstract conceptualization, concrete experience going the step by step through an equation that is the concrete experiences. Active experimentation is nothing but practicing and reflective observation is recording your thoughts about algebraic equation in the in a learning cloud. So these things now Cole learning cycles has one the one is the east west axis we call the processing continuum and the north south axis does the processing perception continuum.

(Refer Slide Time: 14:25)





Kolb's learning styles - matrix view

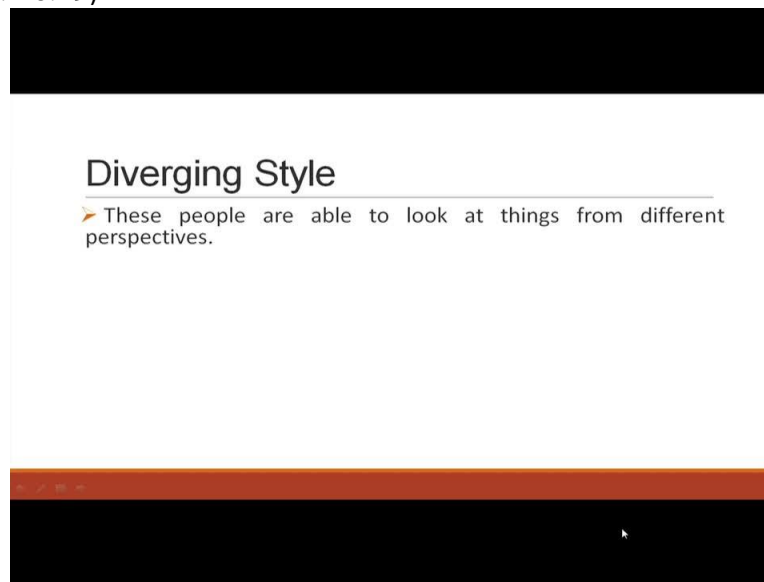
	Doing (Active Experimentation - AE)	Watching (Reflective Observation - RO)
Feeling (Concrete Experience - CE)	Accommodating (CE/AE)	Diverging (CE/RO)
Thinking (Abstract Conceptualization - AC)	Converging (AC/AE)	Assimilating (AC/RO)

First I will see this picture here. Here just here the concrete this in this picture concrete experience is nothing but here, here four stage learning style just see the picture. Concrete experience and the abstract conceptualization, so this is nothing here and here the reflective observation and active experimentation that is doing. So here filling and watching, so here this is fill and watch this is called the diverging style.

Here reflective that reflective observation that is watching and abstract conceptualization that is thinking in middle we call that assimilating cycle. Assimilating cycle means think and watch. This side active experimentation that is doing and abstract conceptualization that is thinking in the main here this is converging style that is thinking and doing.

And here concrete experience that is filling and active experimentation that is doing here accommodating that is fill and do. So there are four different learning styles, diverging style, assimilating style, converging style and accommodating style. So here in that matrix I can see here filling experience concrete experience doing active experimentation so accommodating is CE and AE. Watching that is reflective observation here filling and watching that is diverging styles.

(Refer Slide Time: 16:19)



Thinking and doing that is converging styles and thinking and watching that is assimilating styles. Now I will explain now what are the different styles, ok. The diverging styles here these people are able to look at things from different prospective they are sensitive. The learners who are in the diverging styles they are very sensitive. They prefer to watch rather than do.

Tending together information and use imagination to solve problems, they are best at viewing concrete situations several different viewpoints and these people inform better in situations. That require ideas generation for example brain storming, right so these are the diverging styles. Now the assimilating styles what is the assimilating styles? They prefer the learning preference to be the concise logical approach where ideas and concepts are more important than people, ok.

They these people require good, clear expansion rather than practical opportunity. So they just want clear explanation, they excel at understanding wide ranging information and organize and organizing it as a clear you know logical format. And people with this assimilating learning styles are less focused on people and more interested in the ideas abstract concepts, they are most interested in that.

So people with this style are more attractive to logically sound theories than approaches based on the practical value. The third style is the converging style people with converging learning styles can solve problems and will use their learning to find solutions to practical issues. So they prefer

technical tasks and less concerned with people and inter personal you know inter personal aspects.

So in that case they are best in finding practical users for the ideas and theories, whatever the ideas and theories you know the assimilating styles their belief but in the converging styles they only they are they just you know based at the finding the practical users for these ideas and theories. And they can solve problem and make decision by finding solutions to questions and problems. They are asking questions, the problems they are you know like that.

So people with this converging styles are more attracted to technical tasks and problems then the social and interpersonal issues. So these are the converging styles. The fourth one is the accommodating style, what is that? The accommodating style is the hands on believe and they realized that on you know intuition they just believe in the intuition rather than the logic.

So these people use their people analysis and prefer to take practical and the experimental approach. So they are attracted to the new challenges and experiences and to carrying out plans and they commonly act as a gut instinct you know rather than the logical analysis. So people with these accommodating style, learning style will tend to rely on others for information than carry out their own analysis. So these are the four learning styles according to Cole.

Now we will go to the learning styles at the Felder Silverman's Model. The Felder Silverman's Model identify five different types of learning styles. One is the processing, there in the processing two parts, one is the active learner another the passive learners. The perception from the perception point of view two different styles, one is the sensory learner another is the intuitive learner.

From the input point of view, one you know the visual learner another is the verbal learner. From the understanding point of view, some are the sequential learner and some are global learner. And from the organization point of view you know some are inductive learner and some are the deductive learner. So there in the net you will get if you will just give a search the questionnaire will come, so from that questionnaire you can get the index of learning styles ILS if i write Felder Silverman's Model it will come.

So you are students, you can find out what type of learning styles they are they prefer, ok. So there are many measures of the learning styles but here one we are considering this here the Felder Silverman's Model that is the index of learning styles. The ILS it is developed to help the students and teachers you know of the undergraduate sciences and engineering courses and there already I mentioned that these different learning styles are there.

So the active learners. Who are they? The active learners tend to retain and understand information best by doing something active on it. They are doing it and they are learning it, so this is the active. So discussing or applying it or explaining it to others. So they are actively they are very involved, so these are the called the active learners. So their main aim is the let us try it out, ok and how it works? So they are the active in an active learners phase.

So they prefer group work. In the group work they do work, actively they are participated so they are active learners and they find this is difficult to sit just in the lectures and taking the notes, it is really difficult for the active learners, right. They just want to do that, ok.

So when you are teaching you have to understand that the few are active learners. So for that you after teaching you can give them this work you do it, or this assignment or this problem do it, then they learn quickly. But the reflective learners they retain and understand information best by thinking about it first. Not they do not believe in the do thing they just think it, so they are let us think it through first.

So they prefer they do not love group work, they just working you know they prefer working alone. They are just thinking and they do it. So they need thinking time during lectures. So after the lectures you should give them sometime ok let us think it, ok and then discuss. So this is you know the reflective learners they prefer that only the lectures and after that you should give them some thinking time.

But the sensing learners what is that? Let us like to learn facts. So like to solve the sensing problems using well established methods and you know dislike complications and surprises they do not want that, they do not want any surprises. They just solve the problem well established methods and they tend to be you know patient with details and are good at memorizing, ok.

And facts and they do you know hands on work and they are they are very good in the lab work, or in the project work and in that they tend to be they are more practical and they are very careful. They do not like the courses that have no apparent connection to the real world. Because where they can apply right.

So in that in the real world where they can apply that these learners they prefer there, but intuitive learners they prefer discovering possibilities and relationships. So they like innovation and dislike repetition the same topic they do not want they do not like repetition, may be better at grasping a new concepts very fast and are more comfortable with abstract material and mathematical formulation.

But you know they intuitively they learn it, ok. But they tend to work faster and more innovative but they may be at the careless mistake they make do in the they understand very the total idea they the total concept they can understand but you know in the exam time they can do mistakes.

So they do not like courses that involve you know that the memorization and the routine calculation that they do not like. The visual learners most of the people we are visual learners, ok. You learn best when the information is presented visually from the any power point the point this things you learn in a visually you learn best text books and class notes, list of essentials point.

You know after these points you have to cover, if you mention those points you know the visual learners they are ok these points they can keep it in their mind. So color coding and highlighting, ok. Summarize the key information. So visual learners they remember what they see the pictures, the flowcharts and you know timelines, films, demonstration they really all we are visual.

So the verbal learners get most out of written and spoken explanations. Benefits from writing summarizes or outlines of the course material and the working in groups you know here the classmates explanation sometimes with the classmates the verbally they understand that the verbal learner they do.

In most college or classes very little visual information you know is present in the remote only they can use in the remote suppose rural school only they can use the black board, so they have to mainly so the students have to listen the lectures and read materials, ok written on then chalk

boards and in the text books like that but (unfortunate) already mentioned that most peoples are visual learners which means that most students you know do not get nearly as much as they would if more visual presentation were used in class.

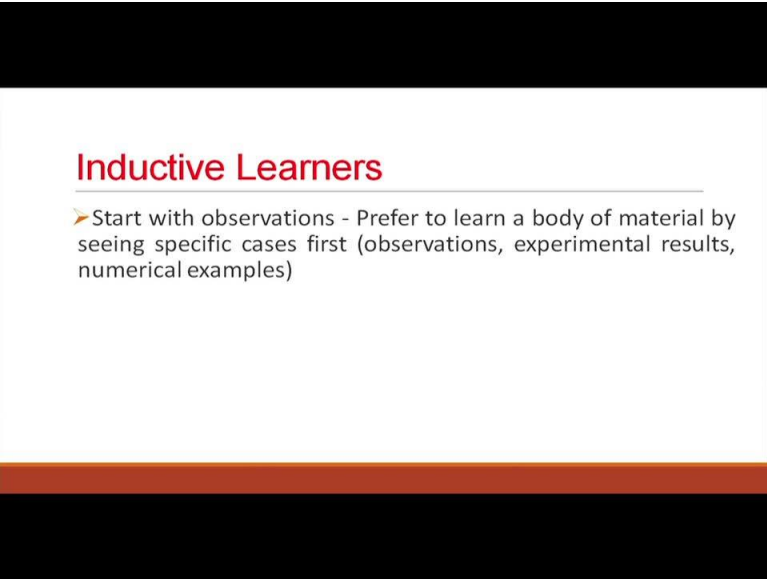
So and good learners for them it is visual or verbal they just learn. The sequential learners, what is that? The learners gain understanding in small sub sequential logical steps, this after that this step after that this steps after that in the they just prefer you know step by step so they tend to follow the logical step wise points while problem solving.

So may not understand, you know the material fully right but they are still able to solve the problems and pass the test. So in that case may know a lot about the specific aspects of the subject but may have trouble you know relating them to the different aspects of the same or different subjects. The step by step only they can do, ok they may not relate to other subjects or like that. But a global learners you know the learners seems to learn a large junk, absorbing the material almost randomly and without seeing the connection but they just getting it, ok.

So it is that may be able to solve the complex engineering problems, complex different problems very quickly or put things and together in the novel you know that this is the answer. But in the step wise there may not but the totally you know they can do it. So the strongly the global learners may have severe difficulties in solving problems when they have not grasped everything, ok.

So may have difficulty in explaining you know the knowledge but as a whole they can do it.

(Refer Slide Time: 30:35)



Inductive Learners

- Start with observations - Prefer to learn a body of material by seeing specific cases first (observations, experimental results, numerical examples)

Now the inductive learners is that the starts with observations prefer to learn a body or material by seeing specific cases first. You know the observation, experimental results, numerical examples and they prefer to begin you know with general principles and to deduce consequences and applications.

They infer, explain natural human learning styles and the deductive learners they starts with the principles deduce. So this is the last part the deductive learners they start with the principles they deduce, derive and this is so. In this lecture we understand the different types of learners are there, their different learning styles are there and in the next lecture I will tell you the different types of learner from the learning approach point of view, ok.

This is the different types of learner from the learning styles point of view but in the next lecture learning different learners from the learner approach point of view there are deep learner, there are surface learners and there are achievers, ok. So this is for today, thank you.

Course on Outcome based Pedagogic Principles for Effective Teaching

Professor Shyamal Kumar Das Mandal

Centre for Educational Technology

Indian Institute of Technology Kharagpur

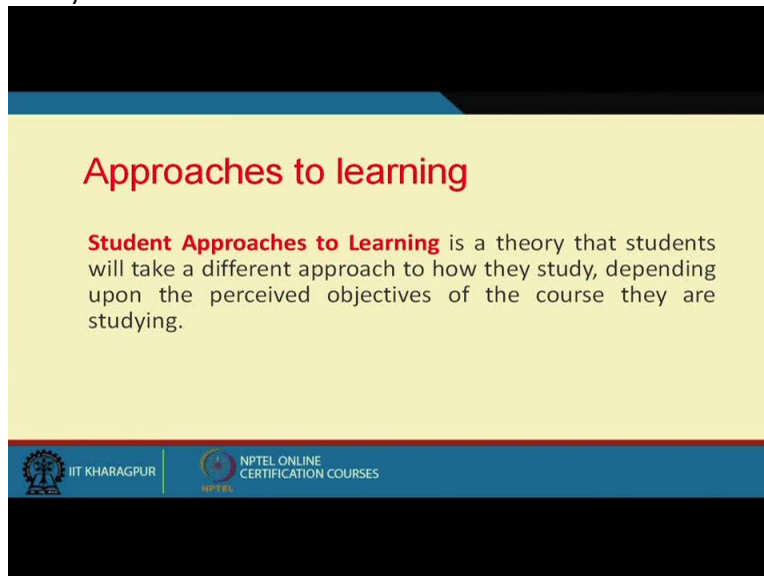
Module 4

Lecture No 18

Lecture 18: Learning Approach

Good Afternoon, today I will tell you the learning approach. Yesterday in my class, I will I explained you the learning styles different types of learners are there from the learning styles point of view and today I will explain learning approach point of view, different types of learners. So what we do mainly we will do the approaches to learning and SOLO taxonomy. Now approaches to learning. What is that?

(Refer Slide Time: 0:58)



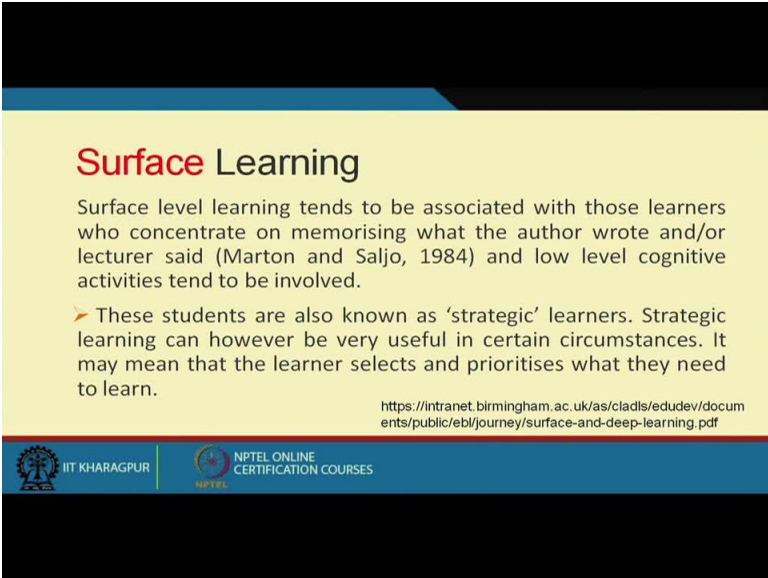
Students' approaches to learning is a theory that students will take or different approach to how they study depending upon the perceived objective of the course they are studying, right? So the approaches the two you know the clinical studies you know two educational psychologist one is Ference Marton and Roger Saljo, both of them they divide there are two distinct group.

One those who took the understanding level of approach, that understanding level of approach. Another who took the reproduction level of approach only the reproduce, right. Understanding level of approach they are known as the Deep Learner and those who are just only reproduce to

pass the exam their motive they are known as the Surface Learner. So two components are there in the learning approaches, one is that the motive and other is the strategy.

Motive is that why I am engaging in learning, that is the motive and the strategy is how in this case will I go about my learning that is the strategy. So keeping this motive and this strategy, the surface learning what is that? This learning tends to be associated with those learners who concentrate on memorizing the rote learning, ok. So what the author wrote and the lecture said, so and it is a low level of cognitive level activities.

(Refer Slide Time: 2:33)





Surface Learning

Surface level learning tends to be associated with those learners who concentrate on memorising what the author wrote and/or lecturer said (Marton and Saljo, 1984) and low level cognitive activities tend to be involved.

➤ These students are also known as 'strategic' learners. Strategic learning can however be very useful in certain circumstances. It may mean that the learner selects and prioritises what they need to learn.

<https://intranet.birmingham.ac.uk/as/cladls/edudev/documents/public/ebi/journey/surface-and-deep-learning.pdf>

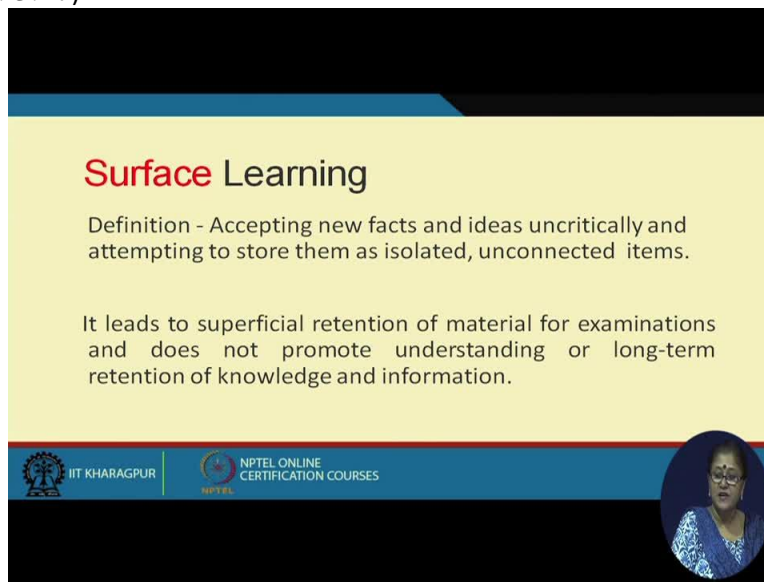
 IIT KHARAGPUR

 NPTEL ONLINE CERTIFICATION COURSES

So these students these are the strategic learners. what is the mean of the strategic? Strategic learning can however be useful in certain cases just before the exam to pass one or two points, strategic learners in certain circumstances it is useful. It may mean that the learner selects and prioritize what they needed to learn. So this year they usually in the five years question paper they see and they say this year this is very important.

So we have to pass the exam only this so he prioritized, right. So these are the strategic learner, right. So what is the definition of the surface learning? Accepting new facts and ideas uncritically and attempting store them as isolated, unconnected items, right?

(Refer Slide Time: 3:27)



Surface Learning

Definition - Accepting new facts and ideas uncritically and attempting to store them as isolated, unconnected items.

It leads to superficial retention of material for examinations and does not promote understanding or long-term retention of knowledge and information.

IIT KHARAGPUR | NPTEL ONLINE CERTIFICATION COURSES

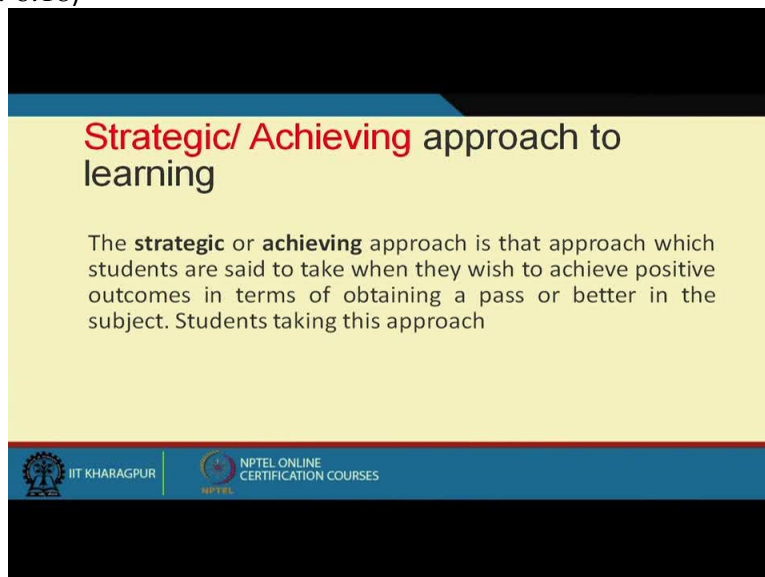
So they just remember it, right? It leads to a superficial retention of material for examinations and does not promote understanding or the long term retention of knowledge and information just to pass the exam. So the characteristics of the surface level of learning one is that try to learn in order to repeat what we have learnt. Memorize information needed for assessment. Third point is make use of rote learning, had taken a narrow view, they always take a narrow view and concentrate on detail not the total overall view no, only the narrow view and fail to distinguish between principles and examples.

What are the principles are there and the examples are there sometimes they can not relate it, just memorizing to pass the exam. Tend to stick closely to the course requirements. What are the requirements in the course only that thing not extra any other reading materials or any other they do not want, right. So in that case they are motivated by the fear of failure.

So that is their aim to pass, so they are the learning approach is the surface learning those learners are Surface Learners. So what is the motive and strategy of the Surface Learners? Surface Learners instrumental motive is main purpose is to meet requirements minimally and get a degree with pass only aspiration, that is the motive. What is the strategy? Tendency to rote learn they are essential, so that is the strategy.

So strategy now the this is the you know surface learning. The next type of learning that is the strategic or the achieving approach to learning little difference from the surface to the achieving. Achieving means you know to get the good grade, more or less surface type but to get the good grade that is sometimes some students get very good marks you know we feel that they are very good student but actually they may not. Because only that the grade is very important to them.

(Refer Slide Time: 6:18)



So the strategic or achieving approach is that approach which students are said to take when they wish to achieve positive outcomes in terms of obtaining a pass or better in the subjects. So students they taking this approach, the achieving approach.

So there some characteristic are there. One is intent to obtain high grades, right? Their main is to obtain high grades. Organize their time and distribute their effort to greatest effort, they time they just calculate it and you know. Ensure that the conditions and the materials for studying are for appropriate or not. If it is appropriate they will you know study, but if it is you know any extra thing they will not.

(Refer Slide Time: 7:15)

Characteristics of a **strategic approach to learning**

Students taking this approach:

- Intend to obtain high grades
- Organise their time and distribute their effort to greatest effect
- Ensure that the conditions and materials for studying are appropriate
- Use previous exam papers to predict questions
- Are alert to cues about marking schemes

IIT KHARAGPUR | NPTEL ONLINE CERTIFICATION COURSES

Use previous exam papers to predict questions or alert to cues about marking (systems) schemes rather they are very alert in this.

So that is the difference between the surface and the achieving. So the motive of the achieving approach is based on competition and the ego enhancement. I am you know the first my grade is 9 point something. So that is the ego thing you know. So attainment of highest possible grades, irrespective of that whether the material is interesting or not, it does not matter to them, right to get the good grade and what is the strategy? is based on organizing ones time and contain and behave as a model student.

(Refer Slide Time: 7:58)

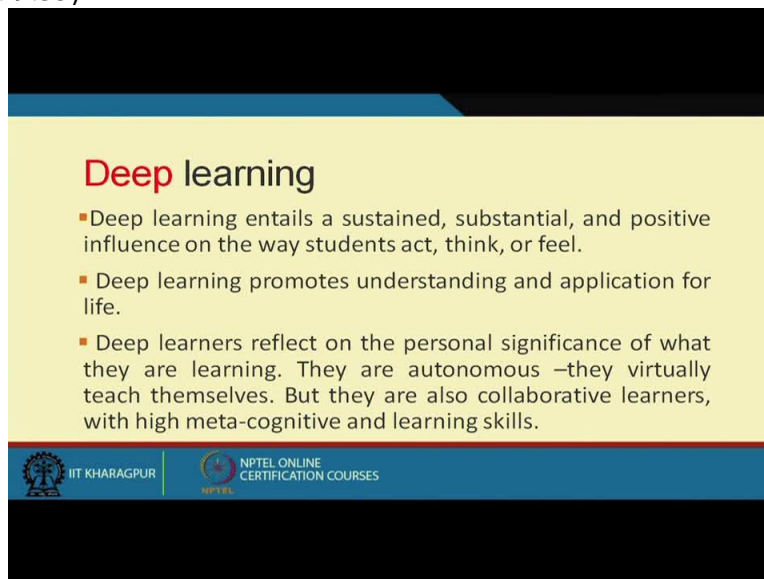
ACHIEVING	
Motive	Strategy
Based on competition and ego enhancement: attainment of highest possible grades irrespective of whether the material is interesting or not.	Achieving strategy is based on organizing one's time and content and behave as a 'model student'.

I am a model student in that way to get good marks somehow they have to achieve this. Look at me attitude, always like that. So the deep learning is different. What is that? It is an approach an attitude to learning where the learner uses higher cognitive level. That is analysis the ability to analyze, ability to synthesize, ability to solve problem, case studies you know the meta-cognitively in order to construct a long term understanding. That is very important.

So it involves the critical analysis of ideas, linking them to already known concepts whatever they know concepts in the new idea they just link them and the principles they are using them, right. Because they understand the concept, that is why they are using it right. So understanding can be used where problem solving for problem solving in real life situation unfamiliar context, new context anywhere, right?

So the Deep Learner if you know the principles, theories properly then you can apply it or analyze it. So it is a higher cognitive level of approach. So deep learning entails a sustained, substantial and positive influence on the way students act, think, or feel.

(Refer Slide Time: 9:35)



Deep learning

- Deep learning entails a sustained, substantial, and positive influence on the way students act, think, or feel.
- Deep learning promotes understanding and application for life.
- Deep learners reflect on the personal significance of what they are learning. They are autonomous –they virtually teach themselves. But they are also collaborative learners, with high meta-cognitive and learning skills.

IIT KHARAGPUR | NPTEL ONLINE CERTIFICATION COURSES

So the thing is that for the Deep Learners the teachers role is very important because the teacher you know teacher have to be is a role model so that if you teach in such a way through that the Deep Learners are motivated and then they will read different books, different materials, different things so that they can apply in a in the they can analyze they can create this right?

So deep learning promotes understanding and application for life, right? So Deep Learners reflect on personal significance of what they are learning. They are autonomous, they virtually teach themselves. The Deep Learners actually what I am learning sometimes is ok so this is this things I learnt. So ok where I can apply that? They are thinking on this the automatically you know they just as if they are virtually they teach themselves, ok.

But they are also collaborative learners, with higher meta-cognitive and learning skills. But usually they are you know very much you know give importance to the understanding level, not the marks but marks they are getting or you know of course marks is there but in that case the understanding approach is very important.

(Refer Slide Time: 11:04)

Characteristics of a deep approach to learning

Students who take a deep approach have the intention of understanding, engaging with, operating in and valuing the subject. Such students:

- Actively seek to understand the material / the subject

The slide footer contains the logos of IIT KHARAGPUR and NPTEL ONLINE CERTIFICATION COURSES.

So what are the characteristic student who take a deep approach, have the situation of understanding, engaging with operating and the valuing the subjects? So those students actively seek to understand the material what I am repeatedly telling that actively you know understand the material or the subject. Interact rigorously with the content.

Make use of evidence, enquiry, evaluation. So take a broad view not the narrow view, the broad view and relate to one another the concept they relate to one another this is the Deep Learners approach. They are motivated not by the marks but by the interest, suppose to I will make a something robot how I will make that, right.

So the their interest is like that, in different societies the nowadays the students in a different society is they are doing you know mainly they are deep learning so they want to make you know like that, suppose in automobile I want to make a car to a model car so how you will do that in that case only the pass out mechanism or the surface or achieving mechanism it will not work, they have to apply it, right desired to learn.

So relate new ideas to previous knowledge what are the previous knowledge they are using it and relate concepts to everyday experience.



(Refer Slide Time: 12:46)



DEEP	
Motive	Strategy
Intrinsic: Study to actualize interest and competence in particular academic subjects	Mean: wide reading and interrelation with previous knowledge.

Tend to read and study beyond the course requirement what are the course requirements they always you know read more than that from different nowadays in internet all the materials are there. So they can read from anywhere right. But they just want to do it.

So what is the motive of that? Study to actualize interest and competence in particular academic subjects. And what is the strategy? Wide reading and inter relation with previous knowledge, they are relating it. So inter relation, right? That they can do. So what is the difference between the deep and surface learning? In the deep learning knowledge is constructed, the learners they are constructing the knowledge.

(Refer Slide Time: 13:40)

Difference between Deep and Surface Learning	
Deep learning	Surface learning
Knowledge is constructed	Knowledge is received
Learners learn by integrating new knowledge with existing knowledge.	Knowledge is transmitted from the teacher to the student. Thus, knowledge is received.
Search for meanings	Search for facts
Higher-order cognitive skills	Lower-order cognitive skills
http://www.julianhermida.com/algoma/law1scotldeplearning.htm	
 IIT KHARAGPUR	 NPTEL ONLINE CERTIFICATION COURSES

Difference between Deep and Surface Learning	
Deep learning	Surface learning
Intrinsic motivation	Extrinsic motivation
We learn best what we feel we need to know	Motivation is a product of good teaching, not its prerequisite. Students are not unmotivated. They are not responding to the methods that work for other students.
Intrinsic motivation remains inextricably bound to some level of choice and control	Students are prompted by the fear of failure and the need to satisfy assessment requirements.
Motivation should be a product of teaching. The art of good teaching is to communicate the need to learn where it is initially lacking	
 IIT KHARAGPUR	 NPTEL ONLINE CERTIFICATION COURSES

But in the surface learning, knowledge is received. So learners learn by integrating new knowledge with existing knowledge, right in the deep approach but here the surface learning knowledge is transmitted, right from the teacher to the student. So knowledge they are just only receiving it.

So this is the difference from the knowledge point of view for the Deep Learner and the Surface Learner. Deep learning search for meaning but for the Surface Learners search for facts and

Deep Learner this is the higher order cognitive skills. But in the case of the Surface Learner this is the lower order cognitive skills.

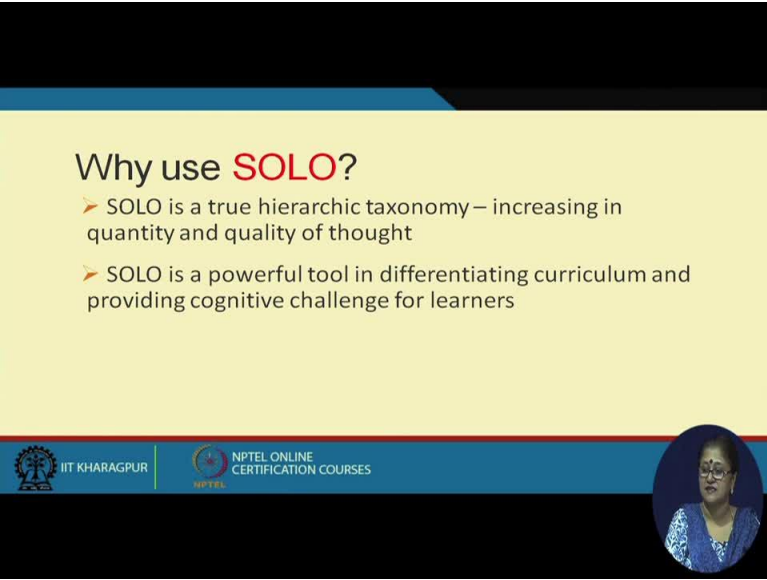
So there is another is the Intrinsic Motivation and extreme deep learning is that intrinsic inside the motivation right but the Surface Learner that is the Extrinsic Motivation, what is that in the case in the deep learning we learn based what we feel we need to know, right. So motivation should be a product of the teaching, right. So the art of good teaching is very very important to communicate the need this type of learners.

But in the Surface Learner it is Extrinsic so in that case motivation is the product of good but not at speed increasing. Here students are not motivated but they are not responding to the methods that work for other students, they just only want to pass the exam, right.

So this is the difference between the so it is clear that the Surface Learner, achiever achieving learning and the deep learning approach. Now levels of thinking. As we know not all thinking or knowing is the same, yet 80 percent of all the question if you go if you check the question most of the question spoken or written anywhere it is the lower order cognitive skills. Mostly in the recall or remembering or by knowledge by sampling handlings so of restricted set of ideas set of knowledge so in data so if we develop students higher order cognitive skills in that case we should enhance the meta-cognitive abilities and their learning.

So we should you know we should give the higher order cognitive level of questions it to analyze something or to apply something. So not that the what this what you know or that is not the important. So there is another taxonomy, we call it SOLO. SOLO is a true hierarchical taxonomy increasing in the quantity and the quality of thought. So it is a powerful tool in differentiating curriculum and providing cognitive challenges for learners.


(Refer Slide Time: 16:59)



Why use SOLO?

- SOLO is a true hierarchic taxonomy – increasing in quantity and quality of thought
- SOLO is a powerful tool in differentiating curriculum and providing cognitive challenge for learners

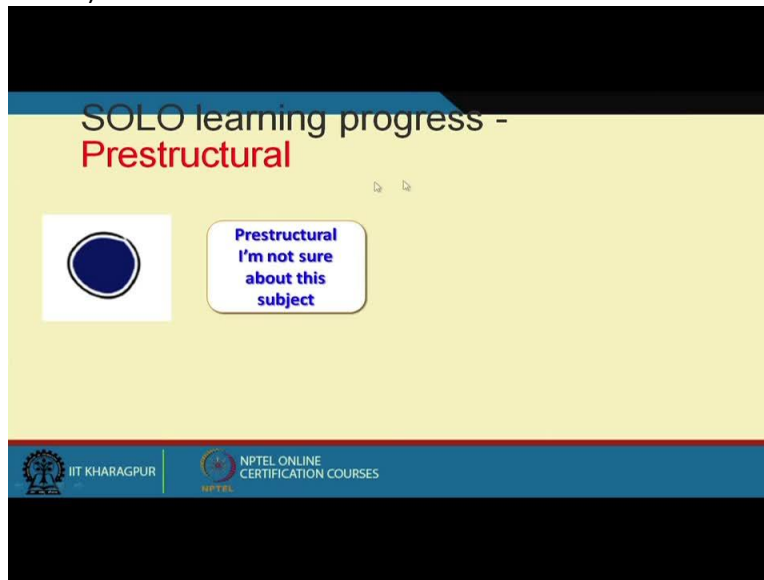
IIT KHARAGPUR | NPTEL ONLINE CERTIFICATION COURSES




It allows the teachers and learners to ask deeper question without creating new ones and it is a powerful meta-cognitive tool. First I will explain what is that. SOLO is a structure of observed learning outcome. It is developed by Biggs and Collis. So in that case the SOLO is a framework of understanding there are five levels in the SOLO structure taxonomy Prestructural, Unistructural, Multi Structural, Relational and Extended Abstract.



So here what is that? It is a model of learning that helps to develop a common understanding and language of learning that helps the teachers to understanding the learning process. How to evaluate the question paper or the learning process this taxonomy is very important.

(Refer Slide Time: 18:02)



SOLO learning progress -
Prestructural

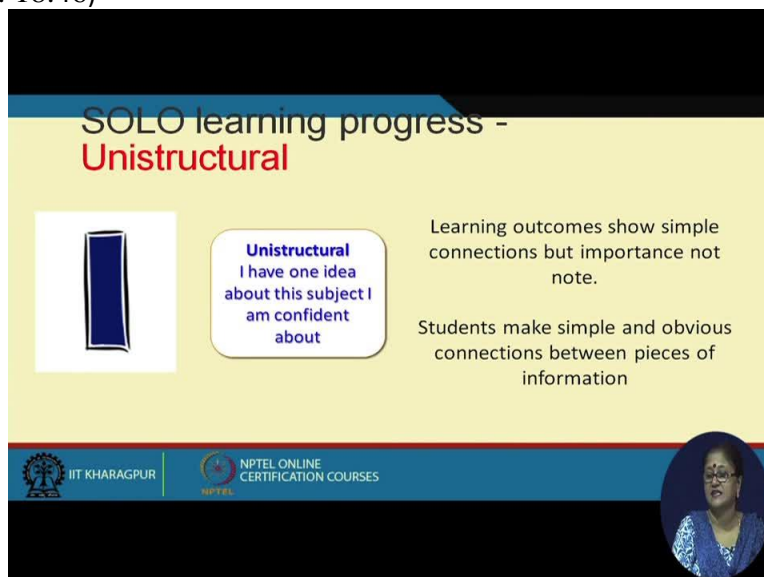
 **Prestructural**
I'm not sure
about this
subject

 IIT KHARAGPUR  NPTEL ONLINE
CERTIFICATION COURSES


Now the verb SOLO learning process prestructural just here I am not sure about this subject Prestructural. Here it means learning outcomes shows unconnected information, no connection is there unconnected, no organization. So that is the SOLO the first part, Prestructural.

The next part is the Unistructural I have one idea about the subject and I am confident about the subject. So that is the Unistructural level. Learning outcome there shows simple connection but importance not note.

(Refer Slide Time: 18:46)






SOLO learning progress -
Unistructural

 **Unistructural**
I have one idea
about this subject I
am confident
about

Learning outcomes show simple
connections but importance not
note.

Students make simple and obvious
connections between pieces of
information

 IIT KHARAGPUR  NPTEL ONLINE
CERTIFICATION COURSES



What is that? Students make simple and obvious connection between the pieces of information, that only that is the Unistructural.

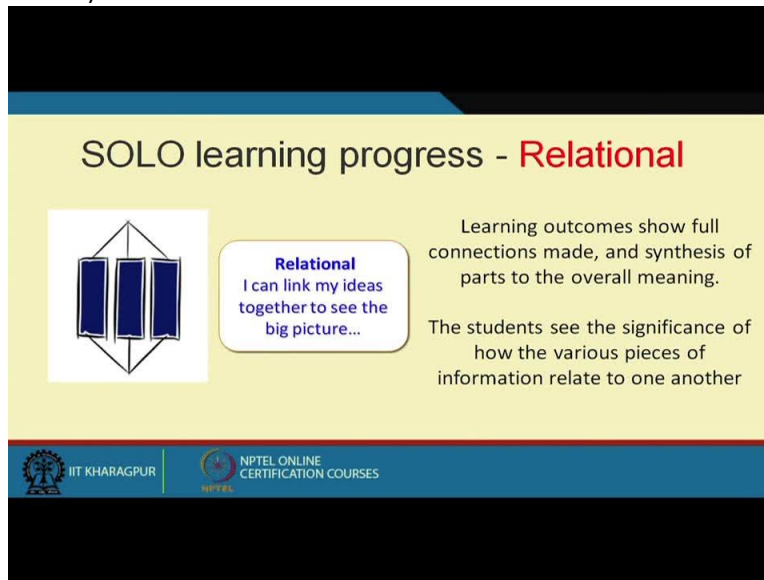
(Refer Slide Time: 18:56)




The slide is titled "SOLO learning progress - Multistructural". It features a yellow background with a blue header and footer. In the center, there is a white box containing three blue vertical bars of increasing height, representing the Multistructural level. To the right of this box, a speech bubble contains the text: "Multistructural I have several ideas about this subject". The footer includes the IIT Kharagpur logo and the NPTEL Online Certification Courses logo. A small circular inset in the bottom right corner shows a woman speaking.

But when it comes to the Multistructural I can see several ideas about the subjects where learning outcomes show connections are made but significance to overall meaning is missing. They cannot you know overall significance of the missing that is missing but there is a connection. So a number of connections are made but not the meta-connection between them. These things are there the meta-connection that is not between them that is the Multistructural level.

(Refer Slide Time: 19:38)



SOLO learning progress - Relational



Relational
I can link my ideas together to see the big picture...

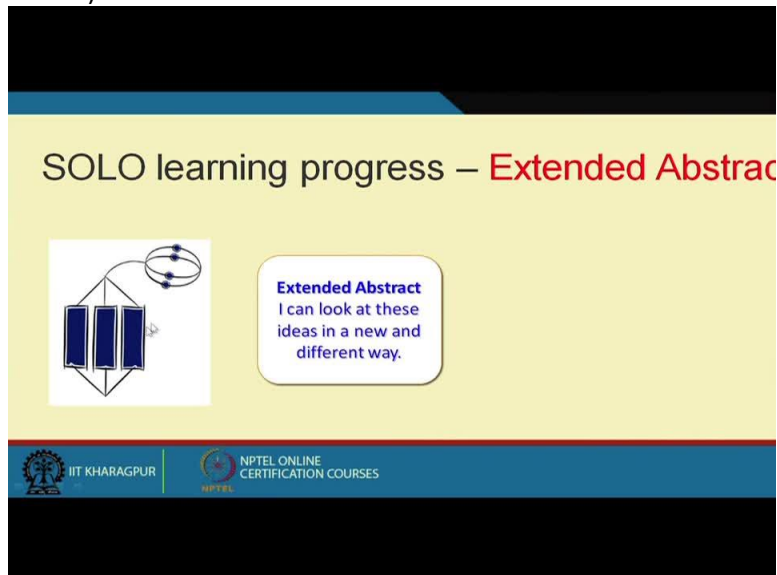
Learning outcomes show full connections made, and synthesis of parts to the overall meaning.

The students see the significance of how the various pieces of information relate to one another

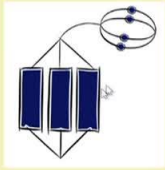
IIT KHARAGPUR | NPTEL ONLINE CERTIFICATION COURSES

But in the relational level just see there is you know that one relation tree level that one relation, that the students can do. So I can link my ideas together to see a big picture. So you can understand that Unistructural and Multistructural in the relation when they can link the ideas it is in the relational level. So learning outcomes show full connection made and synthesize of the parts of the overall meaning. So the students see the significance of the how various pieces they are informational relate to one another. So this level is higher than the Multistructural level.

(Refer Slide Time: 20:24)



SOLO learning progress – Extended Abstract



Extended Abstract
I can look at these ideas in a new and different way.

IIT KHARAGPUR | NPTEL ONLINE CERTIFICATION COURSES

And extended abstract level is that you know here that outside I can look at these ideas in a new and different ways. They can relate and with a new ideas they can connect. So that is the extended abstract level. So here learning outcome it go beyond the subject and makes links to the another concepts right.

So at this level students can make connection beyond the scope of the problem of questions to generalize or transfer learning into a new situation. So that is the highest level in the SOLO taxonomy.

(Refer Slide Time: 21:06)

Example of SOLO Taxonomy

- 4 questions in SOLO level order in Mathematics : You are given a machine that change numbers. It adds the number you put in, multiplies it three times and then adds 2 more. So, if you put in 4 it puts out 14.

(U) If 14 was put out what number was put in?

(M) If we put in 5, what number will the machine put out?

(R) If we get out a number 41, what number was put in?

(E) If Y is the number that comes out of the machine when the number X is put in, write down the formula which will give us Y for any value of X?

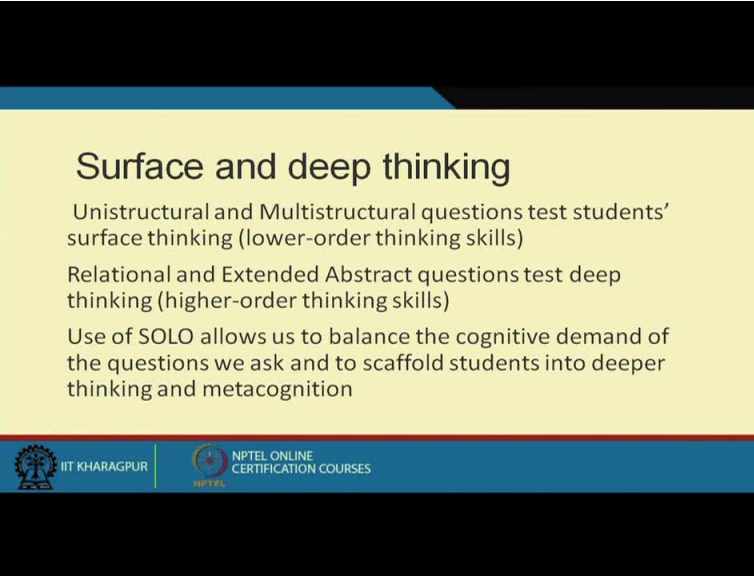
Logos for IIT KHARAGPUR and NPTEL ONLINE CERTIFICATION COURSES are visible at the bottom.

Just I will give an example. Four questions in the SOLO model, you are given a machine that changes number. It adds the number you put in, multiplies it three times and then adds 2 more, so if you put 4 it puts out 14. So if 14 was put out what number was put in? It is there in the question, so it is 4.

If we put 5, the number what number will the machine put out? So in that case $5 \times 3 + 2$, it is 17. So in that case it is easy, it is the Multistructural from this side to that side. But the relational if you get out the number 41 what number was put in? This outcome is 41, so what number we pretend 17 into $3 \times$ so you are using the relational that concept so that is the relational level. So you put 13, that is why this is 41.

But if Y is the number that comes out on the machine when the number is X is put in, write down the formula. In that case Y equals to $3X + 2$. So that is the you are developing a equation an equation so it is the extended abstract concept. So Unistructural, Multistructural level these are lower order cognitive thinking skills.

(Refer Slide Time: 22:39)



Surface and deep thinking

Unistructural and Multistructural questions test students' surface thinking (lower-order thinking skills)

Relational and Extended Abstract questions test deep thinking (higher-order thinking skills)

Use of SOLO allows us to balance the cognitive demand of the questions we ask and to scaffold students into deeper thinking and metacognition

IIT KHARAGPUR | NPTEL ONLINE CERTIFICATION COURSES

But you know relational and extended abstract is the higher order cognitive skills. So in that case the SOLO taxonomy, what is the beauty of the SOLO taxonomy. The SOLO taxonomy helps the teachers help the faculty members to develop the question which goes from the different levels which can cater the different levels right. The cognitive demand of the question we ask and scaffold students into deeper thinking and meta-cognition.

(Refer Slide Time: 23:18)

Desired in Objectives/ Used in Learning	SOLO levels	Deep	Surface
reflect apply: far problems hypothesise	Extended Abstract	↑ ↓	↑ higher- level activities missing
relate to principle apply: near problems explain argue relate	Relational		
comprehend: main idea describe enumerate	Multistructural		↓ ↑
paraphrase comprehend: sentence identify, name memorise	Unistructural		
	Prestructural		

So here in this here I can see that Uni, Multi, Relational and Extended Abstract but the surface level this Relational and Extended this high level of activities is missing. So how you create the deeper questions? Take a Unistructural questions and then ask for at least two or more things, in that case it will become a Multistructural questions. Now put the least for the things into the question, now ask what they have in common.

In that case the common means when relation will come so it will go to the Relational level.

(Refer Slide Time: 24:09)

How can I create deeper questions?

Take a **unistructural** question

- ask for a list of 2 or more things
→ **multistructural** question

Put the list of things into the question

- ask what they have in common
→ **relational** question

Ask what class of event, personality, situation, rule, etc. applies?

- generate list of possible wrong answers to go with correct answer to create a multi-choice question
→ **extended abstract** question

And if you generate if when the class event personality rule all these if you apply if you generate, least of possible wrong answers to go and the correct answers you create a multi choice questions these things and what is your idea about these critically analyze these type of question if you do it will go to the Extended Abstract level.

So in any topic or in anything you can develop the questions from the Unistructural to Multistructural, Multistructural to Relational and Relational to Extended Abstract and if you develop them then only you know these that that is the then only the students or the learners can think the higher order level of cognitive level of they can analyze. Main thing is not the wrote learning.

Now the learners they have to apply in their real life. So these we should as a teacher we should help them to think the higher order cognitive level. So these different and we have to keep it in mind the different three types of learners are there from the learning point of view that the learning approaches point of view Deep Learner, Surface Learner and the Strategic and Achiever and how can we use the SOLO taxonomy to develop the and how the SOLO taxonomy is useful. Thank you.

Course on Outcome based Pedagogic Principles for Effective Teaching
Professor Shyamal Kumar Das Mandal
Centre for Educational Technology
Indian Institute of Technology Kharagpur
Module 4
Lecture No 19
Lecture 19: Good Teaching Attribute

(Refer Slide Time: 0:21)



Good Teaching Attributes

So let us start the lectures on Good Teaching Attributes, ok. The primary objective of this lecture is that the idea is came from two things. One is can we measure good teachers that means which is required by every student. How do you measure a good teacher? There are somebody said this is a good teacher, somebody sees a good teachers. So how do you measure the good teachers?.

Next one is that can if I able to measures the good teacher can I able to produce good teachers or can I train the new comers to becomes a good teachers. So this is the two main objective of this research. So if you see in normal university practices there is a student evaluation about the teachers form and everything is there. But if you consider nobody believes the result which is come out from the student's evaluation about the teachers is reliable and validate.

This is the problem many cases. If you search the literature then a lot of research is going on how do I measure the good teachers? Although in my pedagogy lecture I said nowadays specially in higher education teaching is not only delivering the content, teaching is different. So we said do not deliver the content only in the class. Now if I analyze what is good teaching and how can I

measures the good teachers, you find some of the points also revealed that teaching is some kinds of a something else.

So first objective is that I want to measure the quality of the teacher, second objective is that if I want if I able to measure the good teachers can I produce good teachers, ok. So anything if I want to measures if I am everything if I want to measure something I require certain parameter on respect I can measure the things this is good, this is bad based on those parameters. Without parameters I cannot quantify this is good and this is bad.

I may be express my assumption or my perception about the things this is good and this is bad. If I ask why you said this is good and why you said this is bad then I require some parameter based on which I say this is good and this is bad. So what are the parameter? It is nothing but the attributes. So if I say good teaching attributes, can I do a serious research to find out what are the attributes for becomes a good teachers?

On the other hand if I reverse side if I say suppose I know year after year the person X is a good teacher. Can I measure with respect to some attributes what he or she has done in the class with respect to certain parameter so that he becomes a good teacher. Once I know those parameters she dancing in the class, she changing the voice all kinds of parameters if I know and once I know those are the parameters are correlate to becomes a good teacher to declare his or him or her as a good teachers those are the parameters are correlate then I can say yes those are the attributes 1, 2, 3, 4 are the attributes to become a good teacher.

If those attributes value are very high then he or she becomes a good teacher. Now in the second side once I know that then can I this evidence I can transfer to the newcomers teachers who are coming in the recent in this teaching field. Those are the point to become point has to be practices to become a good teacher. So I can train the teachers how to become good teachers.

I am not going by this philosophy the good teachers are born, good teachers cannot be produced. If that is the then there is no need of science. So idea is that I have to study what are the attributes for good teaching, detailed study on the attributes, there are lot of research has been done on this area, many university, many years, throughout the many years to find out the attribute which are producing it or which can make a teacher as a good teachers.

And once they know those are the attributes, can I ask that newcomers teacher to practice those attributes to become a good teacher. Because people are saying that in in the teaching community the numbers of good teachers are very few. But I have to find out what are the parameters to produce a good teacher. And even I cannot may not be produce a very high quality good teacher but at least I can say yes, if you practice those are the points your teaching quality is increases.

That is also a valid achievement. So there is a lot of research is done in abroad, unfortunately in India we do not have that systematical study the attributes of good teaching. Many universities, many institutes have designed and teacher evaluation question where they collect the feedback. Suppose somebody said I my teacher feedback is 4.5 by I does not know what is the correlation between that rating with my teaching attributes and I do not know vice versa then somebody said that with teacher feedback is nothing but a students are copying from somewhere, they are doing some programing to provide the feedback.

So the data and feedback does not have any valid conclusion. So I have to design that such feedback system scientifically such as the data which will be collected from the student can be has a valid feedback it is not to assign a grade to the teachers. It is for the teachers what are the lacuna, what are the attributes he lacking to becomes a good teacher. So feedback of the two student for the teachers is not for defined this teacher is 4.5 ranking teacher. This teacher is 5 ranking teacher.

This is not the purpose for the student feedback. Purpose is that to collect the feedback with respect to certain attributes which is measurable that those are the attributes which is measurable and find out the valid conclusion about those attributes. Suppose as a teacher A does not have attribute A and B high score, then I can ask the teacher you do not have this attribute or this attribute high score, try to practice it. Ok?

So that that means I helping the teachers to becomes a good teachers. To do that I have to know which are the attribute and which are the most important attributes. If I have to design a questionnaire and if I design a 200 questions nobody will give the answer. So I have to design a scientifically design a questionnaire based on which I can say ok this attribute may be related to this characteristic. So this is very important so keep it.

(Refer Slide Time: 9:54)



There is a lot of research if you go through these slides, there is a two books names I have mentioned in the slides. Book 1 and book 2, if you go through these 2 books you find there is lot of research has been done to find out the attributes of good teaching or attributes of scholarship teaching. So it is in the higher education some they low inference behavior teaching behavior so I will come on that low inference and high inference behavior and scholarship teaching attributes.

So how do you measure the good teachers? See of course student learning, main objective is that whether the student has learned or not. That means if I say if I taught a multi section class and this is section is taken by different teachers, if some and the students are randomly distributed among the section it is not that good student is one section and bad student is one section. Let us randomly distributed among the classes and the student outcome is the marks then. So student performance the measurement of the good teachers one.

If it is student performance is important. And assuming the evaluation process is valid, reliable and scientific and whatever the question paper is make is also valid, reliable then for a multi section class the result of the students might reflect the good teaching behavior, good teachers, ok this teacher is a good teacher is one of the one of the way to find out the good teachers. Other way that if you ask the students who is the good teacher everybody even including me also if I close my eyes and ask who is the good teacher in my life I have one or two names.

Ok those are the teachers are good teachers, may not be I have done I get 90 percent on their subjects but I belief that those teachers are good teachers. That is the teachers who is influence me to take the further study on the same subject can be a good teacher who motivate me. So one is the student performance and another is the student motivation.

So if I want to find out the good teacher attributes I have to know who are the good teachers and then some attributes I will written down and I will take a feedback based on those attributes what students, what that teacher is done in the class that attributes will reflect and then I know ok this teacher student say the teacher X is good teacher and teachers A is done this attributes, this attribute, this attribute, this attribute in the class that is why he becomes a good teacher I am assuming.

Then I can find out the correlation of those attribute with the student performance is one. If the student performance declares the teacher is a good teacher then I said the attribute one what is the correlation with the student performance of the attribute one with the student performance. That means a student gets 9 CGPA and I take a question was and ask the question ask the MOS scoring of question number attributes number one then you will say ok I will give 4.

Then I ask another student, I get back and then I find out the student performance and their attribute value what is the correlation. The attributes which are more correlate with the performance are the important attributes, the attributes which are less correlate with the student performance are the less important attributes. So while I design a questionnaire where I can say initial final questionnaire I can say those are the attributes which are very important and those are the attributes are less important.

So I can discard the discard the less important attributes and take only the high important attributes. And then can (kind) find out the feedback and then give the feedback to the teachers all teachers that those are the attributes which are which are valid for becomes a good teacher but while your feedback is not so high on those attributes try to make those attributes very high or practice those attributes to becomes a good teachers, ok.

(Refer Slide Time: 14:53)

Teacher Effectiveness Research –

- ▣ **Student Learning – Mean Student Performance on a common final exam in a multi-section course.**
- ▣ **Student motivation for further learning – frequency of students enrolling in advanced courses in the teacher's area of study**
- ▣ **Student Instructional ratings**
 - **most frequently used criteria:**
 - Provide both student satisfaction with instruction and Indirect/"proxy" measure of outcome variables such as student learning and student motivation.

So I have to study the teacher effectiveness, I will come this in later on.

(Refer Slide Time: 15:02)

Correlation between specific evaluation of Instructional Dimensions and student achievement

<u>Instructional Dimension</u>	<u>Average r</u>	
Teacher Preparation: course Organization	0.57	1
Clarity	0.56	2
Perceived outcome of instruction	0.46	3
Stimulation of interest in course/subject	0.38	4
Encouragement of questions/discussions	0.36	5
.....		
Teachers enthusiasm in the subject	0.27	11

5 Point scale:: 1-Poor, 2-Below Average, 3-Good, 4-Very Good, 5-Outstanding				
#	Question Text	Response		
		Mean	Median	C
I .1	Knowledge of the teacher in the subject area	4.72	5.0	
I .2	Clarification of the objectives of the course	4.64	5.0	
I .3	Stimulation of interest in the subject area	4.59	5.0	
I .4	Promotion of analytical/logical thinking	4.64	5.0	
I .5	Clarity of presentation	4.56	5.0	
I .6	Inclusion of recent developments with real life examples	4.59	5.0	
I .7	Encouraging questions in class	4.67	5.0	
I .8	Challenging tests	4.54	5.0	
I .9	Quality of evaluation	4.46	5.0	
I .10	Prompt and detailed feedback	4.38	5.0	
I .11	Help in the course work available outside the class	4.38	5.0	
I .12	Friendly and helpful towards students	4.54	5.0	
I .13	Enthusiasm of the teacher towards the subject	4.74	5.0	
I .14	Participation/academic interaction during class	4.67	5.0	
I .15	Quality of assignments and tutorials	4.49	5.0	
I .16	Number of assignments / tutorials (1=Too fast/too slow/uneven 5=Just right)	4.46	5.0	
I .17	Pace / speed of teaching (1=Too fast/too slow/uneven 5=Just right)	4.56	5.0	
II.1	Rating the course structure	4.35	5.0	
II.2	Registered Students academic effort in studying the course	4.03	4.0	
II.3	Overall rating of the teacher	4.70	5.0	

There is a several study exist in different literature, I named the two books. Based on the two books, I can say there is some attributes which is the higher attributes. Means that course organization, clarity, perceived outcome of instruction, simulation of interest course subject, encouragement of question and discussion and teacher enthusiasm.

So all are I have if you see here also we have given the all are higher attributes, higher level attributes, what do you mean by higher level attributes? I say the clarity these are attributes, what do you mean by clarity? So clarity is in higher attributes. I can say let us the human face, your face is good, your face is bad. So face is an attribute but why I say this face is good and this face is bad, may be based on some parameter.

So I can say my face is define by my eyes, my skin tone, my nose, my eyebrows, all are the lower attributes of the face. So face is a higher attribute, this face is good, if I told you why you said this face is good, you may say the attributes number one eyes, nose, mouth, skin tone, eyebrows all are one one one attributes. Then you can find out which attribute contribute more to declare the face is good.

Then I can say although there is a several attributes exists on the face, those are the attributes which are more important to measure which face are good and bad. Similarly here also course organization is in higher level attribute. So if I want to do a research that I have to find out what

do you mean by course organization. Then course organization has to be brought in several other attributes which is called low inference attributes or lower level attributes.

And which is contribute to the higher level attribute course organization and course organization is directly can be related to the teachers behavior. So teachers attributes has two parts, one is I define some higher level attributes and under the each higher level attributes there is some lower level attributes by which I can measure that higher level attribute is ok, ok.

So now if I take the correlation, this is study based on those two books. This is not based on the data of Indian students. So if I say the correlation between the specific value of instructional dimension those are the attribute and students achievement if I correlate the feedback of the students on all each and every course higher level attributes with the student achievement means students grade then I found this is the correlation.

(Refer Slide Time: 18:42)

Correlation between specific evaluation of Instructional Dimensions and student achievement		
<u>Instructional Dimension</u>	<u>Average r</u>	
Teacher Preparation: course Organization	0.57	1
Clarity	0.56	2
Perceived outcome of instruction	0.46	3
Stimulation of interest in course/subject	0.38	4
Encouragement of questions/discussions	0.36	5
.....
Teachers enthusiasm in the subject	0.27	11

That means rank number one is course organization. Student say that I the student get higher marks or higher grade if the course is organized, if the course if the teaching is clarity in the teaching is very high. If the perceived outcome of the instruction is well defined, stimulation of interest is there, enthusiasm encouragement of question and discussion is there. So that is important 5. So rank number 1, 2, 3, 4, 5. So there is lot of higher level attributes is there. You can see and we can put them together and discuss that the lower one let us take that ok.

The attributes which is correlate correlation coefficient more than 0.25 take those then other attributes will be discarded. Then there is a teacher enthusiasm in the subject is 11. So there are lot of attributes are there, if you read those book you will get that those attributes name. I am explaining how they find out the correlation and what is their rank.

So what I have done let us clarity, they said that this teacher is a good teacher you know this teacher is a good teacher. Now he may say he may taught in a one section class. So now I ask the students what are the score that in mean opinion scoring 5 point or 3 point scale. What is the score of clarity about this teachers then I get the score from the students, I know the student grade or student percentage marks. Then I correlate student marks with their clarity grade and that correlation becomes 0.46 that means or 0.56 and then I got the position and find out the rank of the each and every attribute.

So these are ranking based on the student achievement or student performance.

(Refer Slide Time: 20:53)

Correlation between specific evaluation of Instructional Dimensions and overall teacher rating	
<u>Instructional Dimension</u>	<u>Importance</u>
Teacher Preparation: course Organization	6
Clarity	2
Perceived outcome of instruction	3
Stimulation of interest in course/subject	1
Encouragement of questions/discussions	5
.....	
Teachers enthusiasm in the subject	11

Same feedback if I taken overall teacher rating that means same feedback if I taken after 3 or 4 years of teaching the subject means when student realize what the teacher has taught is value what is the value in his personal life or his official life or how the teacher effect his life based on the motivation of the teachers then his perspective of the good teacher is changed.

That means if I collect the teachers feedback before after the examination or publishing the grade or after the examination there might be some parameter will be very high but it may not be true the same parameter will be high if I take the same feedback after 3 or 4 years. So if I take that feedback then it is found the stimulation of interest and course subjects become 1, rank 1.

(Refer Slide Time: 22:10)

Correlation between specific evaluation of Instructional Dimensions and student achievement		
<u>Instructional Dimension</u>	<u>Average r</u>	
Teacher Preparation: course Organization	0.57	1
Clarity	0.56	2
Perceived outcome of instruction	0.46	3
Stimulation of interest in course/subject	0.38	4
Encouragement of questions/discussions	0.36	5
.....		
Teachers enthusiasm in the subject	0.27	11

So that means if I see previously when I correlate with the student achievement the stimulation of interest or motivation of by the teachers is rank 4. The motivational factors of the teacher is rank 4, but when they pass out in and practice their life, they found that teacher might I might be get the small score or bad grade in that subject. But the teachers is motivate me enough to take the subject further to change my life.

(Refer Slide Time: 23:00)

Correlation between specific evaluation of Instructional Dimensions and overall teacher rating

<u>Instructional Dimension</u>	<u>Importance</u>
Teacher Preparation: course Organization	6
Clarity	2
Perceived outcome of instruction	3
Stimulation of interest in course/subject	1
Encouragement of questions/discussions	5
.....	
Teachers enthusiasm in the subject	11

Correlation between specific evaluation of Instructional Dimensions and student achievement

<u>Instructional Dimension</u>	<u>Average r</u>
Teacher Preparation: course Organization	0.57 1
Clarity	0.56 2
Perceived outcome of instruction	0.46 3
Stimulation of interest in course/subject	0.38 4
Encouragement of questions/discussions	0.36 5
.....	
Teachers enthusiasm in the subject	0.27 11

So that means if I take the feedback from the pass out students then they said the primary factors for the good teachers is stimulation of interest in course or subject. But clarity perceived outcome 2 or 3 remain same. But if you see course organization was supposed to be number 1 is becomes number 6. Since I am not considering by the performance is the criteria that time that is why course organization does not matter to me.

Only clarity, perceived outcome of instruction, stimulation of interest become number 1. This is true for everybody if you just close your eyes and think who is the good teacher right now. You find that somebody who is motivate you is the good teacher, ok. So this can be done in our case also, this kind of study can be done in we do not have that systematic study but we have started that study in center for educational technology IIT Kharagpur one of the research scholar started this work to find out the parameters higher level and lower level both parameter correlations with the good teacher.

If you see why you should do that, today if you see that we cannot measure the quality of teachers. That is why the teaching the quality of teaching is not taken in consideration during the promotion also. If you see that during promotion time people will ask how many papers you have published, how many journals, how many do a research may be good researcher may not be a good teacher, a good teacher may not be a good researcher it is also possible.

So teaching is an art, so that means there is a no valid measurement criteria of teaching quality that is why we cannot quantify who is a good teacher on based on what purpose or all kinds of things. So that is why you cannot take that consideration, the teaching quality is one of the parameters for your promotion. And yes it is possible to measure the quality of teaching in scientifically and did if you study statistically validate my data collection and statistically validate that point then I can say or we can say those are the attribute which can produce good teachers, if the teachers are follows those attributes the students will say that this teacher is a good teacher.

So if I collect the feedback only of those attribute and statistically correlate then we will find that teachers if teachers follows this parameter teacher rank is very high then this teacher is a good teacher, scientifically validate study. So it is not arbitrary that ok this this teacher is good teacher

based on the student performance, this teacher is good teacher. Some teacher giving a very easy grade so student say he is a good teacher.

But for that time, but if you collect his opinion when he is passing out you never give the marks to the good teacher who give him the liberal grade. But they will give the marks to the teacher who is encourage them, who is motivate them to study the subject. So this what I said is this is not directly related to the pedagogy outcome based pedagogy but yes if you see the perceived outcome of instruction in both the study has rank 3.

That means if you do not define your goal of teaching then the teaching will be a very tough. So I can say if I define the goal of the teaching which is the most important parameter both the cases it is number 3 parameters to become a good teacher. Then if you see clarity is number 2, both the cases it is number 2. So that means clarity perceived outcome of the instructions very important point for good teaching.

Stimulation of interest is very important point for good teaching. So how do you stimulate, I have said in my pedagogy lectures that in our structures the course our be not only contain the coverage of the courses but also how you motivate the students to take your class, how you motivate the students about the subject so that they are motivate enough take the further reading of that subject very important parameter, ok.

So next class I will discuss about that what are the low inference parameter related to each of the attribute and they how they contribute to the teaching attribute, ok thank you.

Course on Outcome based Pedagogic Principles for Effective Teaching
Professor Shyamal Kumar Das Mandal
Centre for Educational Technology
Indian Institute of Technology Kharagpur
Module 4
Lecture No 20
Lecture 20: Good Teaching Attribute (Contd.)

(Refer Slide Time: 0:25)

Correlation between specific evaluation of Instructional Dimensions and student achievement		
<u>Instructional Dimension</u>	<u>Average r</u>	
Teacher Preparation: course Organization	0.57	1
Clarity	0.56	2
Perceived outcome of instruction	0.46	3
Stimulation of interest in course/subject	0.38	4
Encouragement of questions/discussions	0.36	5
.....		
Teachers enthusiasm in the subject	0.27	11

Ok, so in last class I had said that high inference behaviors like the clarity, course organization, perceived outcome of instruction, stimulation of interest and encouragement of the questions and discussion which is very important. Now what do you mean by clarity? This is very important question because people will say your presentation and clarity is not good. What do you mean by clarity? What kinds of things I should practices so that the clarity of my teaching is increases?

So if I brought down the clarity in lower attributes which is called low inference behavior or I can say lower attributes then I can define ok, if those are parameters are very high, those attributes are very high that means clarity is increases. Those parameters are low that means clarity are decreases. If those parameters are not effected clarity that much so I have to know that.

(Refer Slide Time: 1:28)

LOW INFERENCE TEACHING BEHAVIOURS


- ▣ **HIGH INFERENCE BEHAVIOUR : CLARITY**
- ▣ **LI 8 Item Teaching Behaviour Inventory (TBI)**
 - I. Gives several examples of each concept
 - II. Uses concrete everyday examples to explain **1**
 - III. Fails to define new and unfamiliar terms
 - IV. Uses graphs and diagrams while explaining
 - V. Repeats difficult concepts several times **3**
 - VI. Stresses important points by voice modulation **2**
 - VII. Suggests ways of memorizing difficult ideas
 - VIII. Writes key terms on blackboard/ overhead
 - IX. screen

So there is a lot of study on it and if you find there is a teaching behavior inventory (TBI) eight item teaching behavior inventory about the clarity, this is not our study, this is taken from the that book.

(Refer Slide Time: 1:54)

LOW INFERENCE TEACHING BEHAVIOURS

- ▣ **HIGH INFERENCE BEHAVIOUR : CLARITY**
- ▣ **LI 8 Item Teaching Behaviour Inventory (TBI)**
 - I. Gives several examples of each concept
 - II. Uses concrete everyday examples to explain **1**
 - III. Fails to define new and unfamiliar terms
 - IV. Uses graphs and diagrams while explaining
 - V. Repeats difficult concepts several times **3**
 - VI. Stresses important points by voice modulation **2**
 - VII. Suggests ways of memorizing difficult ideas
 - VIII. Writes key terms on blackboard/ overhead
 - screen



So there is sorry, there is a mistake this will be not bullet ok. So now if you see so what are the parameters they said, the clarity means as per the teacher behavior inventory give several example of each concept, use concrete every day example to explain, fails to define new and unfamiliar terms, repeat use graph and diagram while explaining, repeat difficult concepts several times, stress important point by voice modulation, suggest way of memorize difficult idea, write key terms on black board and overhead screen.

So as per the TBI those eight are the points of attribute which contribute towards clarity, ok. So give several example of each concept, use concrete everyday example to explain. So as per their study not our study, they rank attribute number two use concrete everyday example to explain becomes rank one means correlation is very high. That means these parameters contributed more to the clarity.

So that means if I use everyday example to explain concrete explain some certain idea use that every day to day life example then student said that yes clarity of this teacher is very high. Next one important is repeat difficult concept several times. The teachers who repeat the difficult concepts several times is also increase the clarity of teaching. Second one stress important point by voice modulation, this is the rank two stress important point by voice modulation that is why teaching is an acting.

Students said or study said that the clarity of teaching will be increases if you use or stress important point by voice modulation. So instead of speaking in the class flat monotonous tone, if you does not change your tone the clarity of teaching is not increases. You may find if you correlate right now find the teachers who came in the class and same voice say that and this danainain like that you say that the clarity of that teacher is not that good.

So clarity is increases if you stress important points and use voice modulation in the class, this is very important parameter. So as per their data the important point is used concrete everyday example to explain. Second important point is stress important point by voice modulation. Third is repeat difficult concept several times, repeat difficult concept several times is an important parameter.

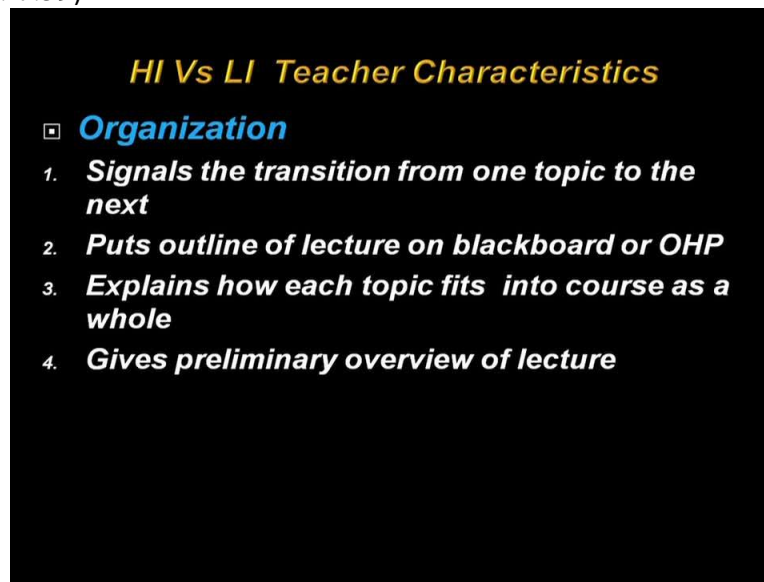
So those are the 1, 2, 3 rank out of 8 attributes which are most contribute to the clarity. So their white factors or correlation with the clarity is very high. How do you find out suppose I told you take an experiment or what kind of experiment we should do to find out this kind of result. This result is based on those book, which they have studied from the several university of I think Europe. Several across the year, across the teachers all the I will show you how many teachers they have studied kind of things.

But we can do it, we can define clarity can be define already I have said that we have just initiated the same study doing here also and not only the study the higher attribute but also break down the higher attribute find out. Because my aim is different my aim is to produce good teachers. Our purpose is to what kinds of training I should provide to the fresh teachers so that they can becomes a good teacher.

Our purpose is not only to take a feedback from the student and find out who is good teacher and who is bad teacher, find out no problem after the examination how to improve that is very important parameter. That is why I said that in evaluation also I said unless it is reinforced your teaching learning process the study does not have any effect. I studied those are they ways to define the good teachers I define he is a good teachers and where this is one way look.

So you examine your blood you find the sugar is very high, if you do not take the medicine then why you examine the blood? Same thing is in here also, that if you study take the study find out the study and you have to find out who I have to practices to becomes a good teacher, ok. So that can be done so clarity there is another point organization.

(Refer Slide Time: 7:59)



What do you mean by course organization? Signal the transition from one topic to next, put outline of lecture on blackboard or OHP, explain how each topic fit into the role as a whole, give preliminary overview of lecture. Course organization is also one of the important parameters. So if I say if you use the pedagogical framework the tools so course organization is taken care by the tool, do not do have to worry about the course organization.

So all point signal the transition from one topic to another topic there is a module there is a unit, put outline of lecture on blackboard that is the objectives of the lectures, explain how each topic fit into the course as a whole that is the unit summary or module summary, then give preliminary overview of lecture sorry preliminary overview with the unit summary, explain how each topics fit into the course is the module summary.

So the course organization is well taken by the pedagogical framework software, ok.

(Refer Slide Time: 9:16)

LOW INFERENCE TEACHING BEHAVIOURS


- ▣ **HIGH INFERENCE BEHAVIOUR : CLARITY**
- ▣ **LI 8 Item Teaching Behaviour Inventory (TBI)**
 - I. Gives several examples of each concept
 - II. Uses concrete everyday examples to explain **1**
 - III. Fails to define new and unfamiliar terms
 - IV. Uses graphs and diagrams while explaining
 - V. Repeats difficult concepts several times **3**
 - VI. Stresses important points by voice modulation **2**
 - VII. Suggests ways of memorizing difficult ideas
 - VIII. Writes key terms on blackboard/ overhead screen

Now this clarity is your presentation but we said that using outcome based curriculum design do not have to teach, but yes we have to teach in the class of different concept while teaching those concept if you want to use this kind of parameters use stress important point by voice modulation, repeat difficult concepts several times. While you are explaining the misconception or while you are doubt clearing the student use this kind of attributes to explain that, that increase the clarity of teaching and that students will be enjoying, ok.

(Refer Slide Time: 9:59)

HI Vs LI Teacher Characteristics

- ▣ **Enthusiasm**
 - 1. Moves about the room while teaching
 - 2. Shows inflection and variation in tone of voice
 - 3. Gesture with hands and arms
 - 4. Maintains eye contact with students



Next one is the enthusiasm, teachers enthusiasm about the subject somebody said very important parameter but study said that it is not that important but it is important. But how do you measure the enthusiasm that is why take while sitting in this chair and taking the lectures is not that perfect or that it is not fit to me also I am also not satisfied I sitting in a chair and taking the lecture unless I am allowed to move around the room. That is also one of the parameters.

Move about the room while teaching, some teacher came in the class and facing the backside of the student tries deriving one equation after equation in the black board, none of the students will be interested. So move about the room while teaching, very important parameter. Show inflection and variation in tone of voice, sometime you have to crack a joke and all kinds of things you have to do it.

Gesture with hand and arms, very important. While teaching hand gesture and arm gesture is very important. Maintains eye contact with the students, you have to maintain eye contact but see if I have to do this in a 400 student class how can I do it? very important. Can I make an eye contact of the student with the 400 student class I cannot. So that is why we said let us a blended teaching organize the course material, improve the clarity only you take the lecture to removal of the misconception.

So then I can say yes it is possible to eye contact because somebody said that this is my misconception, those group you can make eye contact with them. So you know whether they are understands or not and they can you can give several example everyday example to explain that idea, ok.

(Refer Slide Time: 11:59)

<i>Pooled data for N=424 teachers</i>		
<i>Teaching Behavior</i>	<i>Inter rater Reliability</i>	<i>Correlation with student rating</i>
Clarity		
<i>Uses concrete Examples</i>	0.76	0.47 (a)
<i>Stresses most Important points</i>	0.78	0.61 (a)
<i>Repeats difficult Ideas</i>	0.66	0.30 (a)
(a) significant at 0.05 level		

Next one is some data I will presenting, if you see the clarity use concrete example as per their study it is correlation is 0.47 with the student rating. Stress most important point is 0.61, repeat difficult idea is 0.30 so all kinds of they have done some validate data so that based on that data I have prepare this presentation and make this given to you. But this is I have mentioned already the two book name, so those books name are there you can read all kind of this data is available there.

(Refer Slide Time: 12:42)

Teacher Effectiveness Research –

- ▣ **Student Learning – Mean Student Performance on a common final exam in a multi-section course.**
- ▣ **Student motivation for further learning – frequency of students enrolling in advanced courses in the teacher's area of study**
- ▣ **Student Instructional ratings**
 - **most frequently used criteria:**
 - Provide both student satisfaction with instruction and Indirect/"proxy" measure of outcome variables such as student learning and student motivation.

Scholarship teaching and Learning in Higher Education: An Evidence Based Perspective
Ed: Raymond P Perry, John C. Smart
Springer; 2007;

"Low- Inference Teaching Behaviors and College Teaching Effectiveness : Recent Developments and Controversies"
by: Harry G. Murray, University of western Ontario
murray@uwo.ca

So if you read these two book these two book you can get the idea how about that teaching attributes and how they were measured, how they validate those attribute. And those attributes can be used for the measurement of the quality of teaching. So purpose of good teaching attributes is to find out the parameters by which I can really measure how to become I can really measure the good teachers and if I practices on those attributes I can produce a good teacher.

So two way, one is the measurement of the teaching quality and one is the if I want to improve the teaching quality what kinds of practices I have to make? If you see several procedures is

there in several institutes. Some institute allow that may be all the new teachers have to sit with a sit in lectures of good teacher while good teacher taking the lectures. So he can get some idea what the teachers is doing in the class he get that idea.

Another way is that while teaching a new teacher sit teaching in the class some experience teachers in siting in the back and he rightly noted down what are the points he had following and what are the points he had not following and then he give the feedback to the teachers, ok you have follow those are the point in my experience those points are attributes of the good teaching you do not follow those are the point, you follow it.

So this is the one way of doing that teaching teacher training or teaching attributes training to the new teachers. Other way do is that find out the good teaching attributes which correlate with the student performance and students opinion and find out what is while the teacher is teaching in the class what they are doing and collect the student opinion about that attributes and give the feedback to the teachers that ok you have followed this kind of attributes, this attributes you have score high, this attribute you score low, this attribute score like that, so please do this something so that you can on high things in this attributes, high grade in this attributes or high feedback in this attribute.

(Refer Slide Time: 15:09)

5 Point scale:: 1-Poor, 2-Below Average, 3-Good, 4-Very Good, 5-Outstanding			
#	Question Text	Response	
		Mean	Median
I .1	Knowledge of the teacher in the subject area	4.50	5.0
I .2	Clarification of the objectives of the course	4.43	5.0
I .3	Stimulation of interest in the subject area	4.64	5.0
I .4	Promotion of analytical/logical thinking	4.50	5.0
I .5	Clarity of presentation	4.57	5.0
I .6	Inclusion of recent developments with real life examples	4.50	5.0
I .7	Encouraging questions in class	4.57	5.0
I .8	Challenging tests	4.43	5.0
I .9	Quality of evaluation	4.43	5.0
I .10	Prompt and detailed feedback	4.36	5.0
I .11	Help in the course work available outside the class	4.57	5.0
I .12	Friendly and helpful towards students	4.50	5.0
I .13	Enthusiasm of the teacher towards the subject	4.57	5.0
I .14	Participation/academic interaction during class	4.50	5.0
I .15	Quality of assignments and tutorials	4.64	5.0
I .16	Number of assignments / tutorials (1=Too fast/too slow/uneven 5=Just right)	4.21	5.0
I .17	Pace / speed of teaching (1=Too fast/too slow/uneven 5=Just right)	3.93	4.0
II.1	Rating the course structure	4.57	5.0
II.2	Registered Students academic effort in studying the course	4.21	4.5
II.3	Overall rating of the teacher	4.57	5.0

But nowadays if I say that ok this kind of this general kind of feedback form if you see that this kind of general form is there in every institute, there is mean, median nobody know what is the inference. What do you mean by clarity of presentation somebody gets median is 4.5, median is 5, somebody mean is 4.57, how it contributes to the good teaching? Whether it is collected related to the student performance or whether it is related to the student achievement.

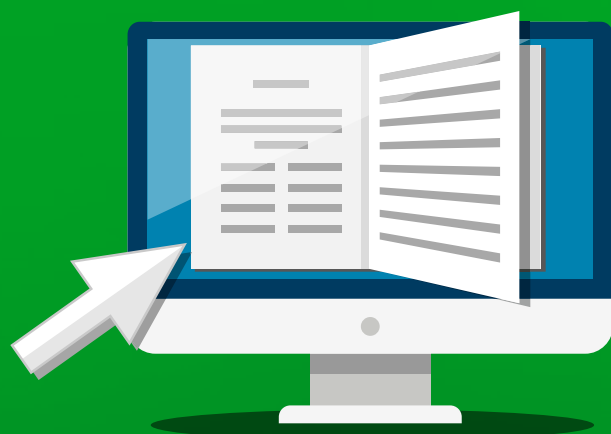
Means performance means how if suppose some teachers give a very easy grade many X then said this teacher is very good that study does not validate that teacher attributes. Even if same students will not marks high on the teachers if you take the feedback after one year very fine the student may mark him last. So it is not true that if I provide the grade to the student, student will marks me very high feedback so I will be since I have taken the feedback then and there after the exam that is why student thinking the grade is very important to him, that is why he giving you the good marks.

But in the long run if you take the same opinion from the students at the end of this study, you find you get the high marks of the teacher who are not that much of easy to give the grade they are quite you can say the balanced in the class quite balanced to provide the grade explain the motivate the students they will get the high marks.

So this is important. I say those are the main attributes are available, based on that attributes you can follow some attributes to increase your good teaching it increase your teaching. But yes you can define or you can design teaching evaluation system or teachers evaluation systems which was scientifically valid to provide the teachers grade. So it is not only take the feedback only in the end of the class, end of the course you have to take the feedback while they are passing out from the college, you have to take the feedback from the alumni also that which teacher is good teacher then find out which teacher is good teacher, ok.

So if any query you have then ask in the forum that this kind of query I have so I will explain in the forum, ok. Now I will just told you one thing that assignment for the 4 week 4 will be given in a video lectures. I will provide a half an hour video lecture what you have to do in the assignment and if you do that assignment after the end of the assignment I will again provide you a half an hour lecture which will explain what is wrong and what is right on that assignment.

So the assignment of the next this assignment 4 will be really on curriculum design. You have to design the curriculum, so once you design the curriculum I will go through the every design not whole curriculum, I will explain what has to be done in that video. Then you just do that part and I will I will go through every course, every part and I will give you feedback which is good, which is bad, which is not good, how it can be improved based on my knowledge I will give you the feedback, ok? Thank you, thank you very much.



**THIS BOOK IS NOT FOR
SALE NOR COMMERCIAL USE**

PH : (044) 2257 5905/08

| nptel.ac.in

| swayam.gov.in