

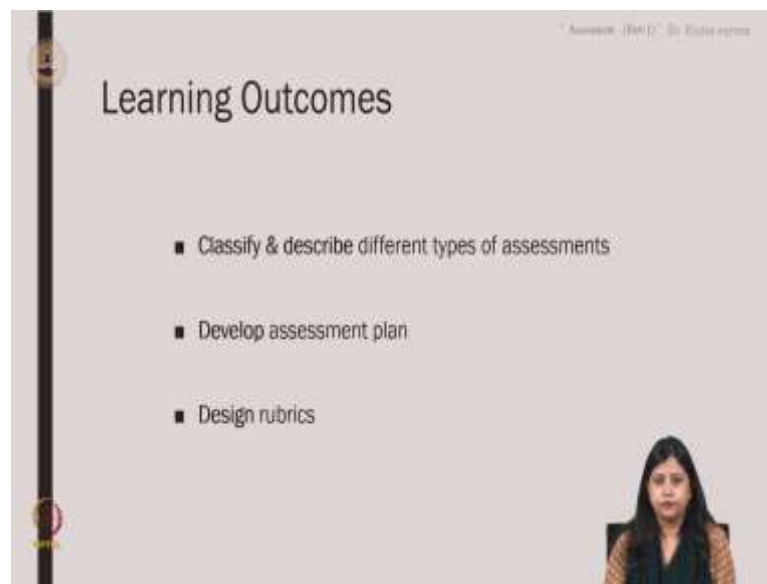
Effective Engineering “Teaching” in Practice
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Indian Institute of Technology, Madras

Lecture – 10a
Assessment - (Part - 1)

Welcome to this session on assessment my name is Richa Verma, I am a Vision Science Researcher. Currently I work at the as a senior project officer at the teaching learning center, IIT Madras. I also worked as an education consultant at L V Prasad Eye Institute in Hyderabad.

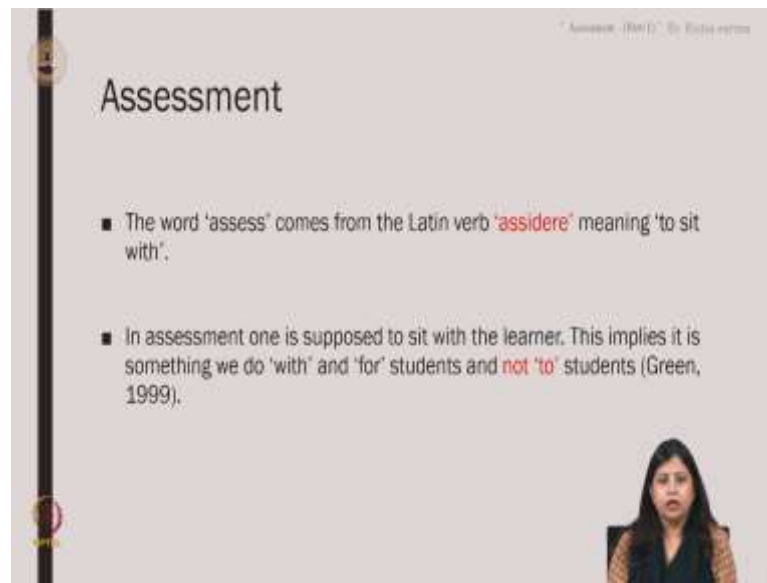
In last 3 or 4 years I have had formal training in teaching and learning within the higher education and in this particular session, I will go through the different types of assessment, as how to design an assessment plan and the role of rubrics within the assessment.

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So, hopefully at the end of this session, you should be able to classify and describe different types of assessment, develop assessment plan and design rubrics.

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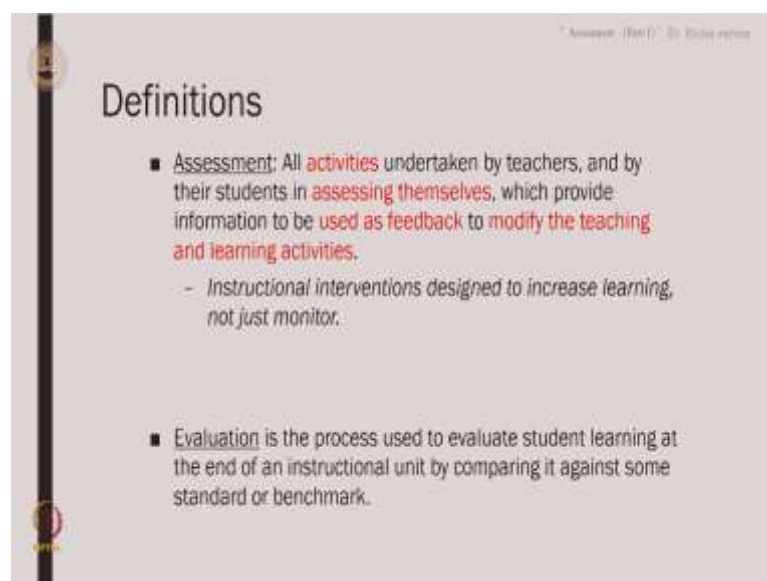
Assessment (Part 1) Dr. Rishi Verma

Assessment

- The word 'assess' comes from the Latin verb 'assidere' meaning 'to sit with'.
- In assessment one is supposed to sit with the learner. This implies it is something we do 'with' and 'for' students and **not 'to' students** (Green, 1999).

So, talking about assessment, the word assess comes from the Latin verb assidere which means to sit with. And Green in 1999 clearly described this as assessment is a process where the teacher is supposed to sit with the learner, which clearly means that assessment is a process where we do some work with the students and for the students rather than working or assessing to the students. I will clarify this bit more by defining what assessment is.

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Assessment (Part 1) Dr. Rishi Verma

Definitions

- Assessment: All **activities** undertaken by teachers, and by their students in **assessing themselves**, which provide information to be **used as feedback to modify the teaching and learning activities**.
 - *Instructional interventions designed to increase learning, not just monitor.*
- Evaluation is the process used to evaluate student learning at the end of an instructional unit by comparing it against some standard or benchmark.

So, if we look into the definition, assessment incorporates all activities which are undertaken by teachers, by students in assessing themselves. Hence, based on the data collected it provides information which can be used or rather is used for feedback, to modify the teaching and learning activities.

So, the data collected is not just used to enhance or improve student learning, but the data also provides feedback to the teacher as how they can intervene their teaching learning activity. So, assessment is not about just monitoring process, but it is designed to increase student's learning.

Another word which is often used along with assessment is evaluation and I would like to define evaluation as the process which is used to evaluate student's learning at the end of the instructional unit or a particular course and usually the process of evaluation in a course are compared against some standard or benchmark which could be either given by the institute or by the professional body.

It is when we go through different types of assessment, you would realize that the summative assessment is often referred as evaluation as well because summative assessment usually happens at the end of the course or a program and it always has some form of scores or grading.

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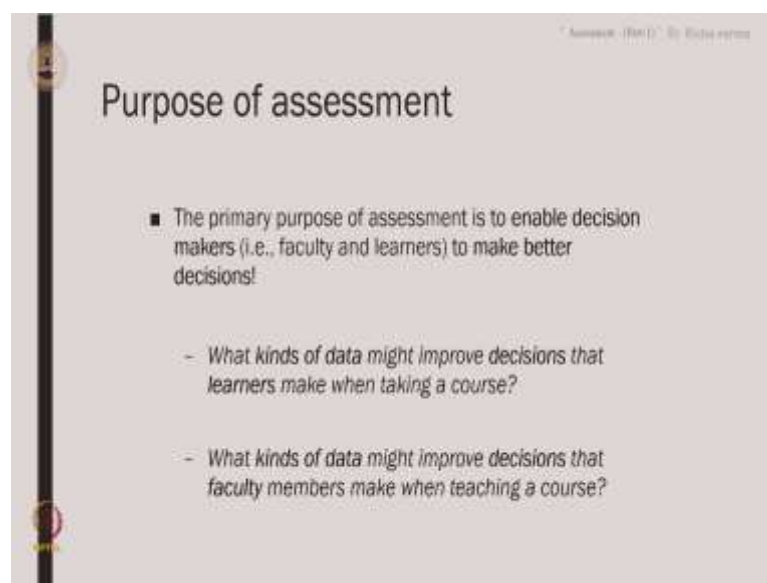


Going forward from here, the important thing to ask is why do we assess? Why do we need assessments within the teaching and learning practice. We assess to measure students learning. So, as a teacher we are providing concepts, we are conducting classes tutorials, it is important for us to understand whether the students are learning or not. It is also important that we assess to assign grades to the students as these grades are used by students for their higher education or for different jobs.

The assessment also provides that is opportunity to compare students within the same cohort as well as students from one cohort to the other. To meet requirements by the professional body or achieve required standards, assessment is very important. So, accreditation body also requires us to assess our students and based on their performance or their assessments scores, the accreditation body decides what needs to be changed or how things can be taken forward. Other important aspect of why we assess is actually to improve the quality of teaching. Based on the data or results of assessment, it provides feedback to the teacher about how students have been learning, how what else needs to be changed within the teaching learning practice so that we could improve our teaching quality.

At the end apart from all of this which I have mentioned so far, assessment is also important to address public expectations and social accountability. What that means, is when a student is enrolled in a particular course or a program there is a particular expectation from the public that an engineering graduate within a mechanical engineering course should have certain competency skills and assessment has a very important role within the teaching and learning.

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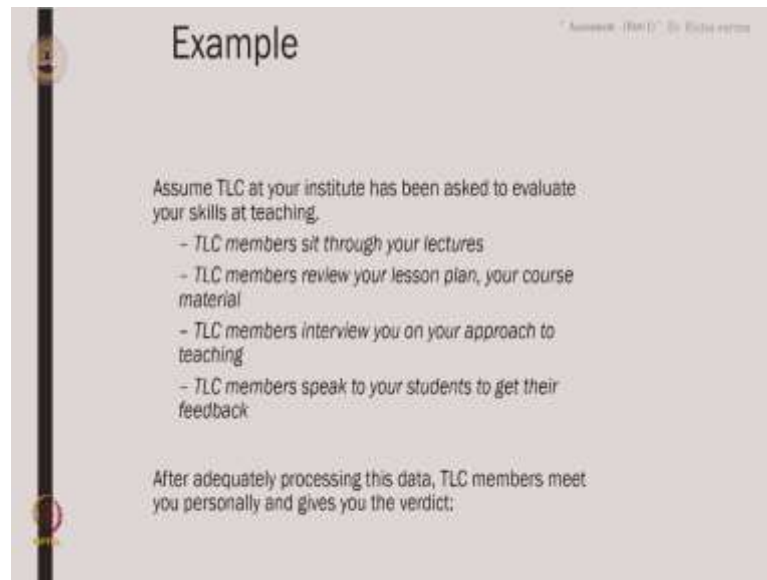
So, going to the purpose of assessment, even though we have spoken about why do we really assess, we have gone through 8 or 9 different reason and gone through different reasons of why we should be assessing our students. The primary purpose of assessment is that it enables decision makers and I would like to highlight here the decision makers here are both the faculty as well as the learners and it allows both of these decision makers to make better decision. Which means it provides data, so when we conduct any type of assessment we get data which informs the students or the learners as how they have performed in a particular assessment and what could they do next to change or improve their learning.

The same data is also used by the other decision maker which is the faculty member here to make improvement within the teaching style. Based on the data if a particular concept or assessment designed on a particular learning outcome, average class has not performed well, a teacher or a faculty member needs to reflect what can be changed within the teaching learning activity or the type of assessment where we could improve the student learning.

Before we get into different types of assessment and assessment plan, I would like to discuss one example to give a better understanding of what type of assessment we should be conducting within our higher education.

Just as an example, let us assume a hypothetical situation where a TLC member at your institute, which is the teaching learning center at the institute has been asked to evaluate your skills at teaching, that is a very good thing to do.

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The slide is titled "Example" in a large, bold, black font. Below the title, there is a paragraph: "Assume TLC at your institute has been asked to evaluate your skills at teaching." This is followed by a bulleted list of four items: "- TLC members sit through your lectures", "- TLC members review your lesson plan, your course material", "- TLC members interview you on your approach to teaching", and "- TLC members speak to your students to get their feedback". At the bottom of the slide, another paragraph states: "After adequately processing this data, TLC members meet you personally and gives you the verdict:". The slide has a light beige background and a dark vertical bar on the left side.

Example

Assume TLC at your institute has been asked to evaluate your skills at teaching.

- TLC members sit through your lectures
- TLC members review your lesson plan, your course material
- TLC members interview you on your approach to teaching
- TLC members speak to your students to get their feedback

After adequately processing this data, TLC members meet you personally and gives you the verdict:

During this process, the TLC member sits through your lectures, the TLC members review your lesson plan, your course material. So, important thing to highlight here is even though the TLC member from your institute has been asked to evaluate your lecturing in a particular session, they do not just show up all of a sudden in your classroom and start evaluating you. But before they go and sit in the classroom they sit through your lectures, have a discussion about what your lesson plan is, what your course material looks like and the TLC members interviews on your approach to teaching where there is an active discussion about how are you going to conduct your class, is it going to be a tutorial style, is it going to be a didactic lecture and then because the TLC member is going to sit in your classroom the students are also going to be participants within this particular process.

So, the TLC member speaks to your students to get their feedback as this is quite important because depending on what the teacher does in the class, the key thing is that the student should learn and be engaged during that class. So, after adequately processing this data where the TLC members having a discussion with you as a lecturer and

discussing the students to get their feedback, sits in your classroom goes through your lecture and gives you a final verdict.

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The verdict is 76. So, you might be wondering as a lecturer, few of you might think that the score 76 is above average. So, looks like I did reasonably well in my lecture. However, few of you might wonder that my lecture went really well, I delivered it well in that one hour class, not sure why did I get 76 and where did I lose the marks. So, let us look into what are the positive aspects of this type of assessment.

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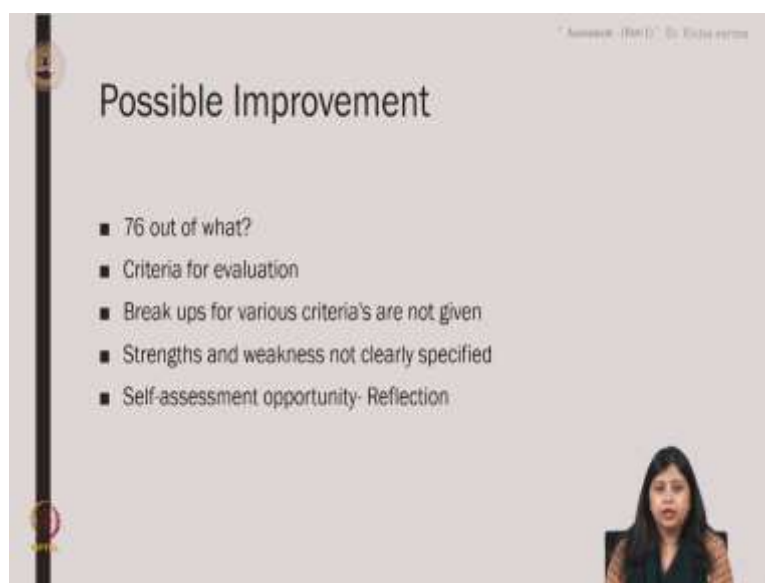


If we look at the positive aspects, the good thing about the TLC member giving you a score 76 at the end of this process, it is a quantitative process. Even though you might just think based on your own preference whether you performed above average or you did not perform as what you thought, at least there is a number there which tells you where do you sit in terms of your performance. The good thing about this process was the members the TLC member who evaluated you discussed with all the stakeholders and the two stakeholders where you the faculty person as well as the students and before going and sitting in your lecture, the TLC member made sure that they had a prior discussion with both the stakeholders.

And once again it was a continuous process which means that the TLC member did not come to your class all of a sudden, but went through discussion before you actually conducted the class and had discussion with students as well. Doing all of this discussion, what it also helps is the teacher comes much more well prepared, the teacher knows that I am going to be evaluated on my teaching for this particular hour, they come well prepared in terms of how they are going to conduct the class, what approaches are they going to use to deliver a particular concept.

The other positive aspect of this process was cross verification. So, the 76 score was not just by the TLC person, but they also included students' feedback depending on what the students thought about that lecture. Having looked at the different positive aspects, it is also important to see where could this process be improved.

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So, yes the score or the verdict was 76, but it was not specified it was 76 out of what. Most of us do assume it must be out of 100 which is correct, but at the same time when it comes to assessment and evaluation, there is no room for ambiguity and hence it is important to clarify that 76 was out of 100.

The key thing which needs to be incorporated in this process is the criteria for evaluation. So, the TLC member did have a discussion with the faculty person regarding the process, but there was no clarity given to the teacher on what all criteria his or her lecture is going to be evaluated, there was no break ups for various criteria given, the strength and weakness were not clearly the specified which again comes back that the criteria for evaluation were not given.

Which means that as a teacher even though you know that you got 76, you scored above average, there was no clarity on that the marks which you scored was based on the content of your delivery or was it on your communication style, or was it on how engaging your class was, there was no criteria specified in this process.

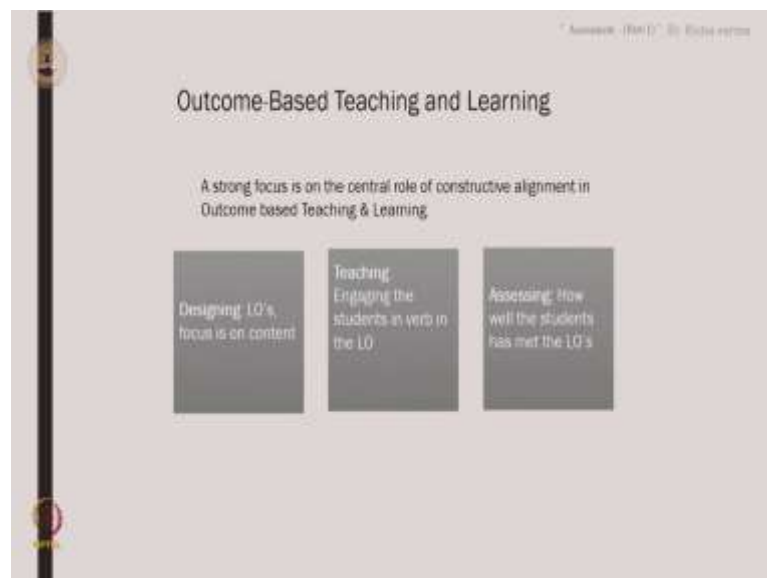
The strength and the weakness were not clearly specified and also the self assessment opportunity which is reflection was not incorporated in this process because you as an examiner might have thought that actually I did a better job then what I was scored and in your reflection was incorporated in this process, you might have reflected on the your strengths and weakness and what could be changed for future. The reason I gave this as

an example is for us to put this in perspective when it comes to student going through the assessment. When student goes through assessment we as a teacher have clear criteria on how we are going to evaluate our students.

We do have this clear criteria depending on the type of the assessment which we are going to ask students to undergo, but when students do not know what these criteria are they are at loss, they do not know on what criteria they will be evaluated, they do not know how to work towards a particular assessment. So, taking it forward from here, we go into types of assessment. The important thing I want to highlight here that within higher education there is a strong focus towards outcome based teaching and learning. What this really means is, based on what a particular graduate needs to be competent in, it is a top down model, the curriculum these days are designed based on what the outcome should be.

So, a strong focus is on the central role of constructive alignment in outcome based teaching and learning which means based on what your competency as a graduate needs to be, all the learning outcomes of the course or the lecture or particular content is designed based on those outcomes.

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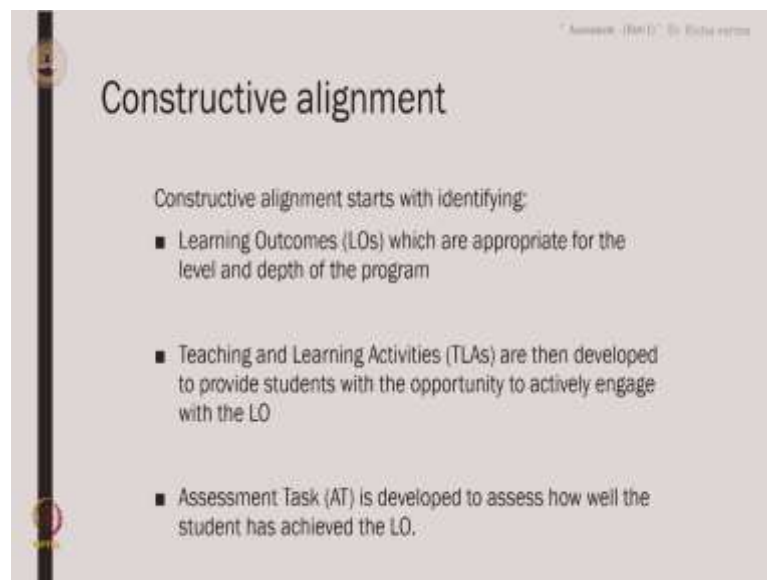


Based on these learning outcomes teacher, needs to decide what type of teaching learning activity do I need to conduct to address the active verb within that learning outcome. The next thing is the teacher also needs to decide how am I going to do the

assessment for that particular learning outcome so we have a clear understanding if the students have achieved that learning outcome or not. All these three things need to be in alignment and that is what is called as constructive alignment.

I also want to highlight here that when we say these three things needs to be in alignment, it does not mean that if we need to first decide on learning outcome, then the teaching learning activity and then the assessment, it could go the other way around. So, the order does not matter, what important thing is here, the learning outcome is the key. The teaching learning activity should be based on the active verb of, which is used in the learning outcome.

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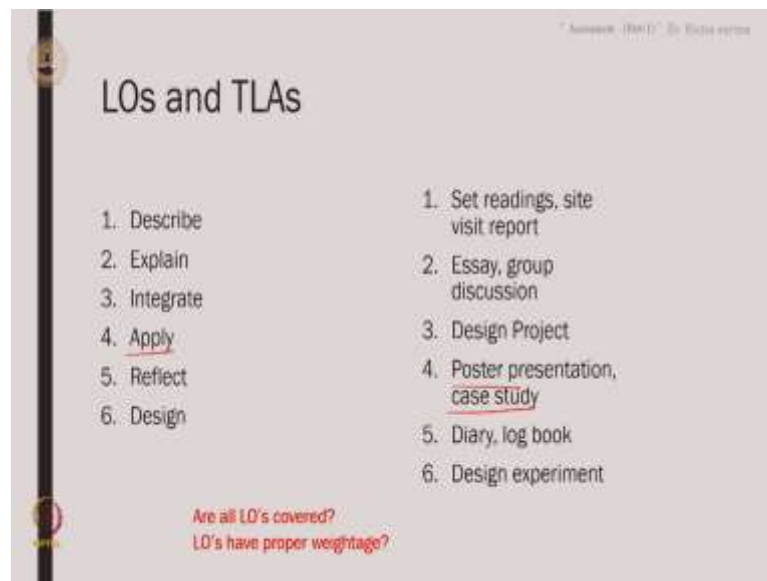


And your assessment needs to be in alignment with the teaching learning activity and the learning outcome. What this really means is that when you choose the learning outcome you need to choose an appropriate verb based on the level and depth of the program which means that if you are designing a particular course for a first year level would vary from what you would require it in a third year or a fourth year level and also based on the depth of the program. If it is an elective course, the learning outcomes will be different compared to the learning outcomes of a core courses.

Now, based on what your learning outcomes are, you would decide on the teaching learning activity which will tell you how are you going to conduct the class, is it going to be a didactic class? Is it going to be a hands-on experience? How are you going to

engage student to achieve that learning outcome? Once you decide your teaching learning activity, the next thing is to decide; now how am I going to assist the student to ensure that the student has achieved that learning outcome? Hence the principle of constructive alignment requires us to keep the learning outcome, the teaching learning activity and the assessment task all in alignment.

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LOs and TLAs	
1. Describe	1. Set readings, site visit report
2. Explain	2. Essay, group discussion
3. Integrate	3. Design Project
4. <u>Apply</u>	4. Poster presentation, <u>case study</u>
5. Reflect	5. Diary, log book
6. Design	6. Design experiment

Are all LO's covered?
LO's have proper weightage?

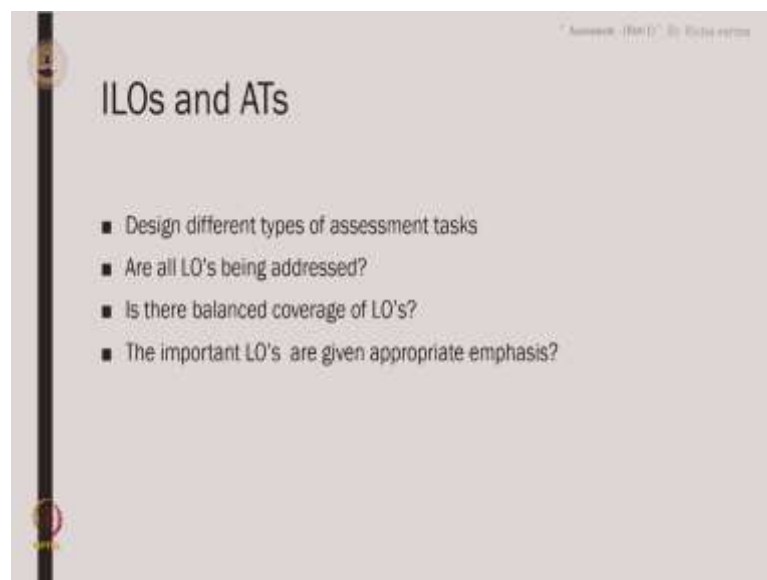
So, just as an example what I would like to highlight what you see here on the left hand side are the different action verbs which we use to write our learning outcomes which is describe, explain, integrate, applied, reflect and design. What you see on the right hand side are the different teaching learning activities which are appropriate based on the action verb used in your learning outcome.

Just as an example, look at number four where it says apply. If I have written in my learning outcome as apply a particular concept to design a particular model, then the type of teaching learning activity should not be a typical didactic lecture, but something where I have asked students to do a poster presentation or a case study. In that case, that gives us opportunity where students are going to apply their knowledge to come up with a poster presentation or a case study. In this particular scenario, if I ask them to do class reading or what is given in the first point, then my learning outcome the action verb used in my learning outcome and the type of teaching learning activity or the assessment is not in alignment.

Hence it is important to ensure the action verb which we use in our learning outcome is in alignment with the teaching learning activity as well as the type of assessment. It is also important to consider, are all the LOs or the learning outcomes within that course has been covered appropriately or not and all these LOs have a proper weightage or not which means that if there are two or three learning outcomes within the course, which has got more significance then we need to give more weight age to those learning outcomes when it comes to assessment compared to the ones which could be of lesser weightage.

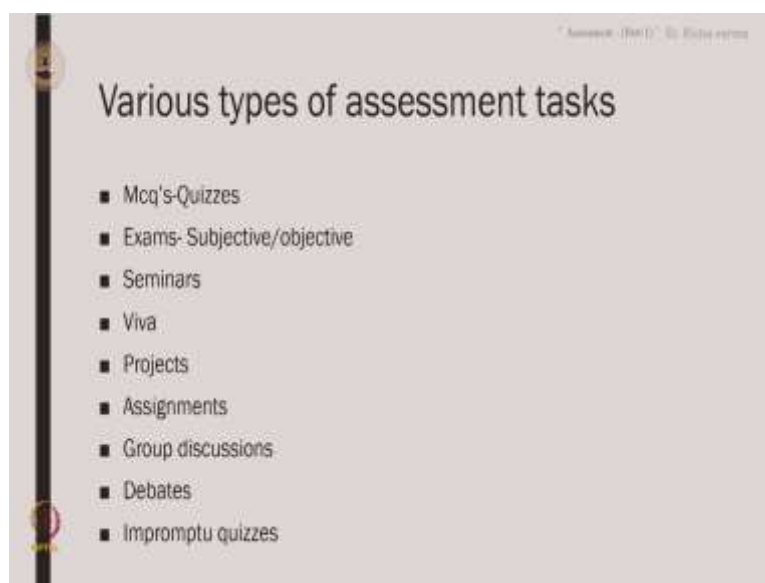
So, the important thing here to keep in mind is LOs which is also referred as intended learning outcomes and your assessment tasks should be in alignment.

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Along with that, for the entire course as a teacher we should incorporate different types of assessment task, which means the assessment task need not always be either MCQ or short questions, but the assessment tasks should cover different types including or it could be either a case study, research project, oral presentation, so that various learning outcomes are covered using different assessment task. It is also important to consider as I said earlier that are all these learning outcomes being addressed or not. Is there a balanced coverage of these learning outcomes? And has the important learning outcome got its appropriate emphasis or not? Taking it forward from here.

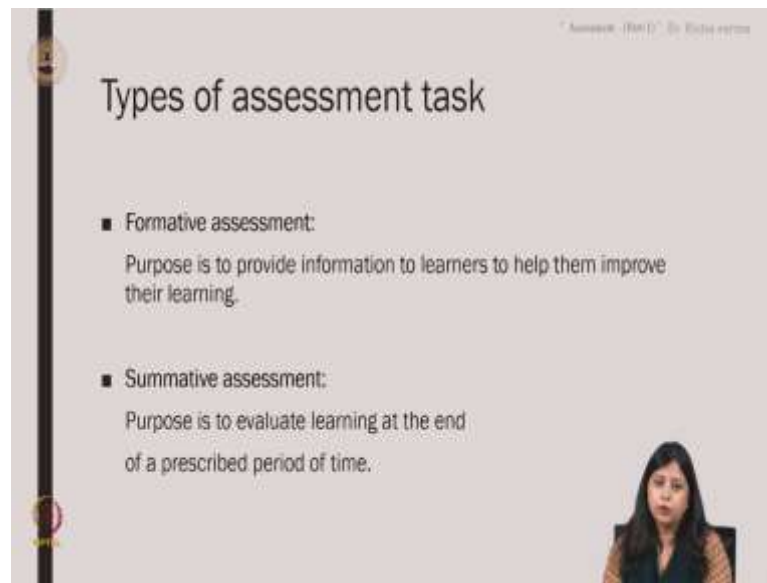
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These are few examples which you would normally use for your course. So, if we look into the various types of assessment task, the assessment tasks could either be a multiple choice question, quiz, it could be an exam which could be again either mcq type or it could be short answers, seminars viva, projects which could be a research, project or a case report assignments, group discussion, debates and impromptu quizzes. These are about a few examples which covers the wide range of various types of assessment task you can choose for your course. An important thing here to keep in mind is we need to incorporate different types of assessment task within course rather than keeping it just one single format.

Now, from here based on your understanding of what are the different assessment task, how each of these assessment tasks need to be aligned with the appropriate learning outcome and how a teaching learning activity also need to be in alignment with the assessment task and the learning outcome, now I am going to give you different types of assessment task. So, typically we can put that all the examples which I covered in my previous slide under two different categories: one is a formative assessment and the second, one is called as a summative assessment.

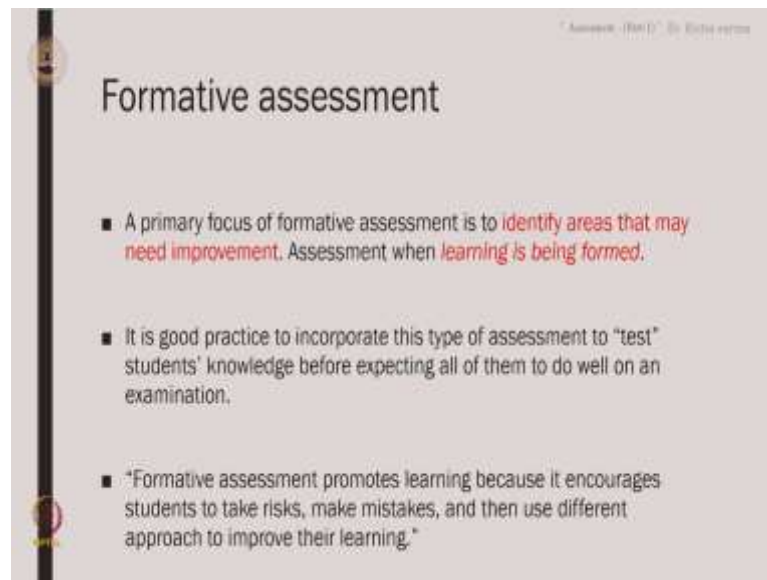
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Formative assessment: the purpose is to provide information to learners to help them improve their learning which means formative assessment is always conducted to improve the learning of the student. Hence it is always conducted at regular intervals during the course compared to summative assessment which is usually or rather always conducted at the end of the course. And the purpose of the summative assessment is to evaluate learning at the end of a prescribed period of time which could be end of the semester, end of the program or at the end of the specified duration of the entire course.

So, as I said broadly we can classify assessment task, all of these assessment tasks either formative assessment task or the summative assessment tasks. As I mentioned that formative assessment task is designed to help improve their learning, hence it needs to have a strong feedback mechanism incorporated within that assessment plan. When it comes to summative assessment, summative assessment since it happens at the end of the course or program, its feedback is usually more in terms of grades or the scores.

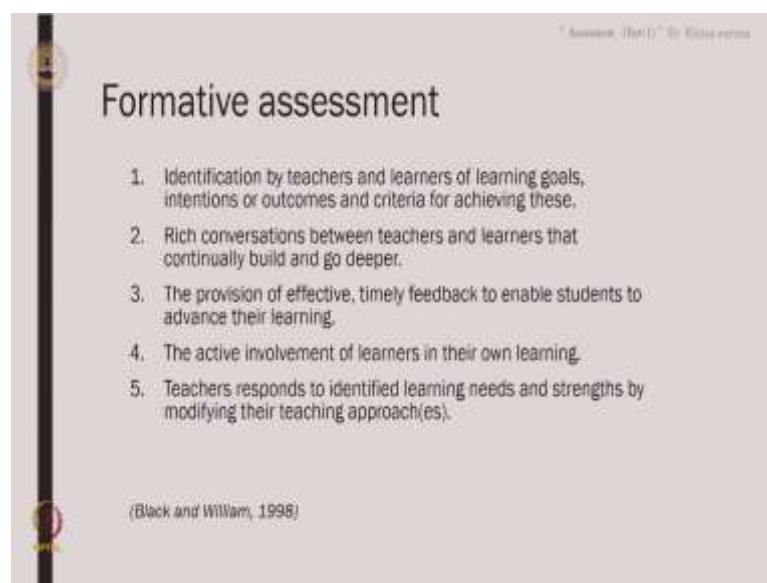
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Let us look into formative assessment into bit more detail. So, the primary focus of the formative assessment is to identify areas that may need improvement. And as I mentioned earlier, assessment is not just about the student, but it is also for teachers to identify the areas where they would improve their quality of teaching. So, assessment or the formative assessment it happens when the learning is being formed hence it is important to conduct formative assessment at regular interval during the course rather than just having one final assessment at the end of the course.

What it does is - it allows students to improve their learning because going through various internal assessment which is formative it helps them understand where they have made mistake and how they can improve or use different approach to improve their learning. It is a good practice to incorporate this type of assessment to test student's knowledge at regular interval and how they have been performing before they undergo the final examination.

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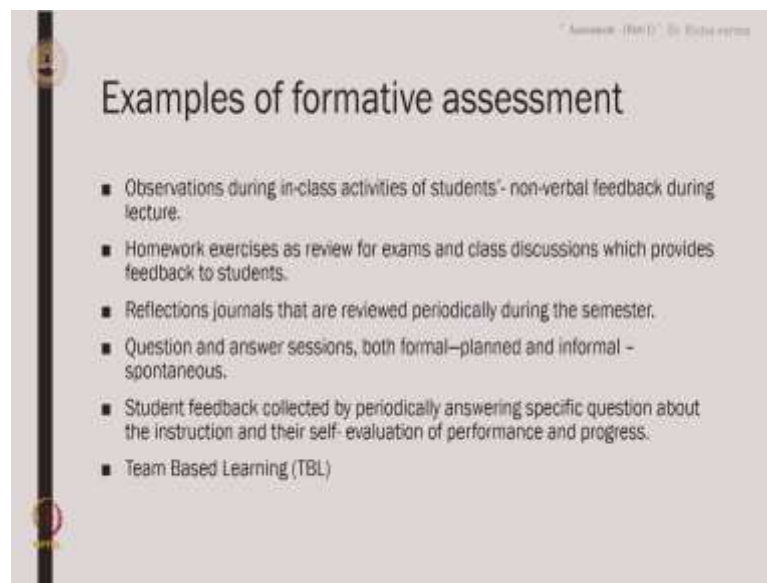
Black and William in 1998 summarized formative assessment as a process which allows teachers and learners to identify their learning goals, their intentions or outcomes and criteria for achieving these, which brings us back to what I mentioned earlier, depending on how you want your learning outcomes to be conducted, you need to decide your assessment task which is in alignment with the teaching learning activity as well as the action verb used in the learning outcome. Because formative assessment is a process where students and teachers get feedback it provides opportunity to have rich conversations between teachers and learners that continuously builds and go deeper and deeper.

The provision here is to provide feedback and feedback should be provided in a timely manner, say in a week or a two weeks time. Because if the students do not get this feedback at regular interval and in a timely manner, then the purpose of formative assessment is defied because then the students would not know how could they improve their learning or how could they change their approach towards this learning. So, the active involvement of learners in their own learning it provides opportunity for students to work on those feedback and then perform better when the next assessment is conducted.

Even though this sounds like it is all about students improving their learning, but based on these results and student performance, teachers respond to identify learning needs and

strengths by modifying their teaching approaches. So, based on the results teacher can look at a particular assessment and see that if average class has performed below expectation, then one need to think whether the teaching learning activity was appropriate for this particular learning outcome or maybe the assessment task designed was not appropriate or not in alignment with the learning outcome. Hence it provides feedback to the teachers in a way of how they can change their teaching practices.

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Let us look into few of the example of formative assessment. Formative assessment could be either an observation which you make when you give an in class activity to students and these observations gives you a nonverbal feedback during a lecture as well looking at how students are engaging within the class, or how they are responding to questions, these are all part of formative assessment. When you give a homework exercise to student and then student submits the homework and you provide feedback to students either in form of a written, feedback or an oral feedback, then this becomes a formative assessment.

Reflective journals are very good formative assessment task where students are asked to maintain reflective journal based on what needs to change or improve in their learning, what are the concepts in which they are struggling and if you as a teacher review this periodically and give them feedback, students would know how to improve their

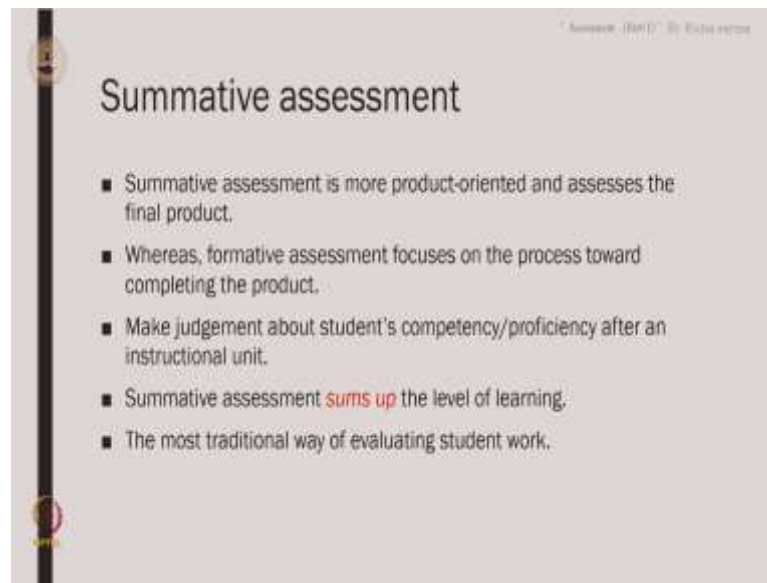
learning. Question answer sessions both, formal, planned, informal or even impromptu quizzes, all this if you provide feedback then it becomes a part of formative assessment.

Student feedback is very important in collecting information of how students have been performing as well as about the teacher and their instructional style and that forms a key feedback mechanism for the teacher. The other thing which I have mentioned here and that is becoming quite popular within higher education teaching and learning is team based learning, team based learning is the type of formative assessment and I would take two minutes just to explain what team based learning is.

So, lot of teachers do conduct multiple choice question as an type of assessment. So, if you conduct a multiple choice question as an objective way of conducting an assessment, you give a score to the students based on whether they got 5 on 10 or 8 on 10, they get a feedback on how well they have performed. What the team based learning does is, here first the students are expected to individually undergo this multiple choice questions. Once they have done these multiple choice questions on their own, without knowing the answers, they then sit in a group and discuss all the questions with the group members, be it 8 or 10 members. They look for the correct answer for each of those questions and then there is part three of the team based learning where the instructor or the facilitator or the faculty person who is an expert in that particular topic gives them a feedback on each of these question as why that particular option was correct or incorrect.

The benefit of this sort of format is that students not only undergo assessment of their individual learning, but when sit in a group and discuss each of the questions option by option, what they do is there is a lot of peer learning happening, they are discussing each concepts, they are learning from each other. And at the end when the teacher provides feedback, they are able to come to a common conclusion of why a particular option was incorrect or correct. Hence team based learning which is again an MCQ type of question, but it can it be made as a formative assessment by providing a detailed feedback. And the good thing is, the students not only just get a score, but they get the feedback in terms of why a particular option is correct or incorrect immediately after the test is conducted.

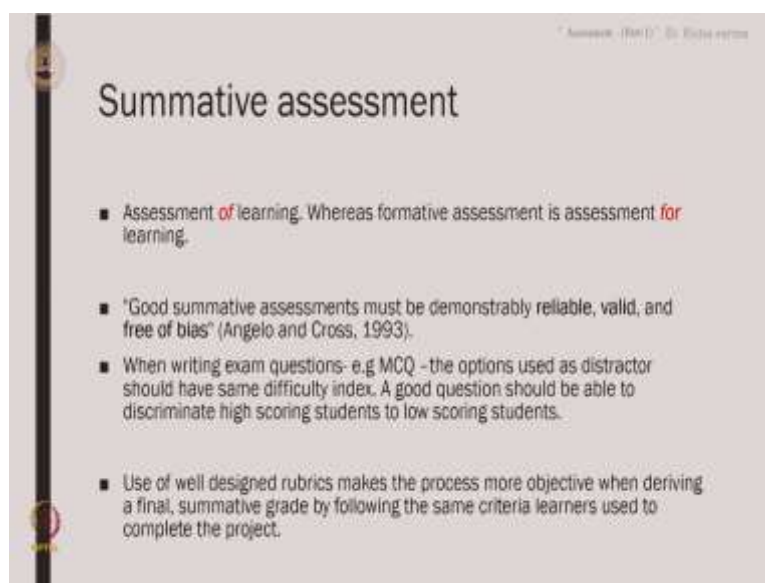
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Moving forward to the other type of assessment is summative assessment. Summative assessment is more of a product oriented or it assesses the student's final learning because it happens at the end of the course or the end of the program. Formative assessment is all about the process towards completing the product whereas, its summative assessment it is about the end product.

Here we make judgment about student's competency, proficiency after an instructional unit which could be a course or at the end of the program. Hence summative assessment sums up the level of learning for the entire course. It is the most traditional way of evaluating student work and I would like to highlight the summative assessment many times is also just referred as evaluation. The important thing to remember here and I will talk about it bit later, that be it a formative assessment or summative assessment, evaluation can be or the scores can be added even to formative assessment.

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So, summative assessment is assessment of learning whereas, formative assessment is assessment for learning because it helps you to improve the learning. And when we are designing summative assessment, as I mentioned it happens at the end of the course, summative assessments are usually of high stakes which means it has higher weightage. Compared to formative assessment, the usual split would be a formative assessment altogether would be around 20 or 30 percent for the entire semester, the summative assessment we are looking around 70 percent weightage.

Now because it is such a high stake exam or a test we need to ensure as highlighted by Angelo and Cross in 1993, that the questions which we have designed for the summative assessment is reliable, valid and free of bias. So, when you are writing exam questions, suppose it is an multiple choice question, one should ensure that the 4 options which you have given, all these options which are used as a distracter apart from the correct answer should have same difficulty index, which means that if all your three distracters are totally out of context, it is very easy for students to do guesswork and come to the right answer and that is not a very well reliable question. A reliable question especially with MCQ, all the option should have same difficulty index which allows students to think more before they come to a conclusion on one option.

Also when you write a question it is important to keep in mind that a good question should be able to if it is a question which requires lot of knowledge assimilation and not

just its designed on knowledge recall, it should be able to discriminate high scoring students to low scoring students clearly and we call those as high discriminating index.

The reason I am talking about the good quality questions here because specially when it comes to summative assessment, the weightage to assessment of assessment is very high, hence we have to make sure the whole process is reliable, valid and free of bias. Free of bias refers to the exam being an objective exam and the way we do it is by designing different rubrics, which makes the whole process more objective when deriving final marks or grades and because the students get here a clear criteria of what is expected for them to come prepared for this particular exam or test.

At the end of this session the last 15 minutes we are going to go through the different types of rubrics, for now I would just like you to understand that rubrics are designed to make a summative assessment or even a formative assessment a more objective process.