



**NATIONAL INSTITUTE OF TECHNICAL TEACHERS TRAINING & RESEARCH, CHANDIGARH
(MINISTRY OF EDUCATION, GOVERNMENT OF INDIA)**

NITTTR CHANDIGARH



CO-PO Attainment

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Outline

01 **Assessment Tools**

02 **Attainment Calculation**

03 **Exercise on Attainment Calculation**



01

What are the **various assessment tools** used to measure CO/PO Attainment?

02

How can we **use those tools** for measuring CO attainment?

Direct Assessment Methods

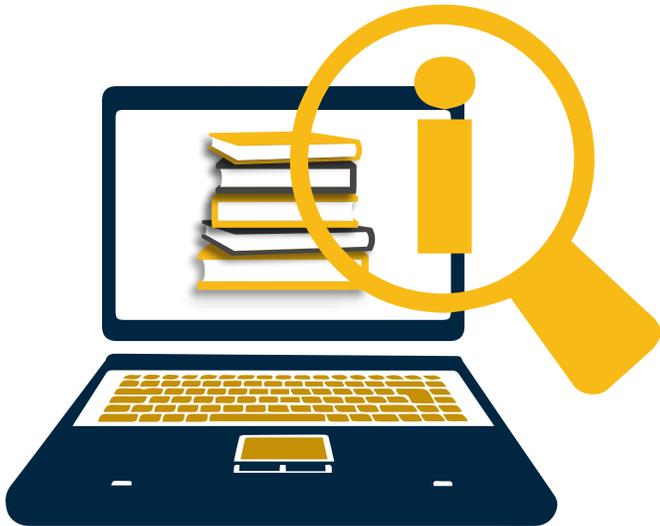
Capture student's actual performance which demonstrates that specific learning has occurred

Help to provide key insight and provide strong evidence

Provide more reliable results

Commonly used methods:

- *University Exam (Semester/Annual)*
- *Course – Embedded tests*
- *Assignments*
- *Projects/Thesis*
- *Grading with Rubrics*
- *Employee's / Supervisor's direct evaluation of the student's performance*



Indirect Assessment Methods

01 Capture student's attitude, perception or feelings about their learning

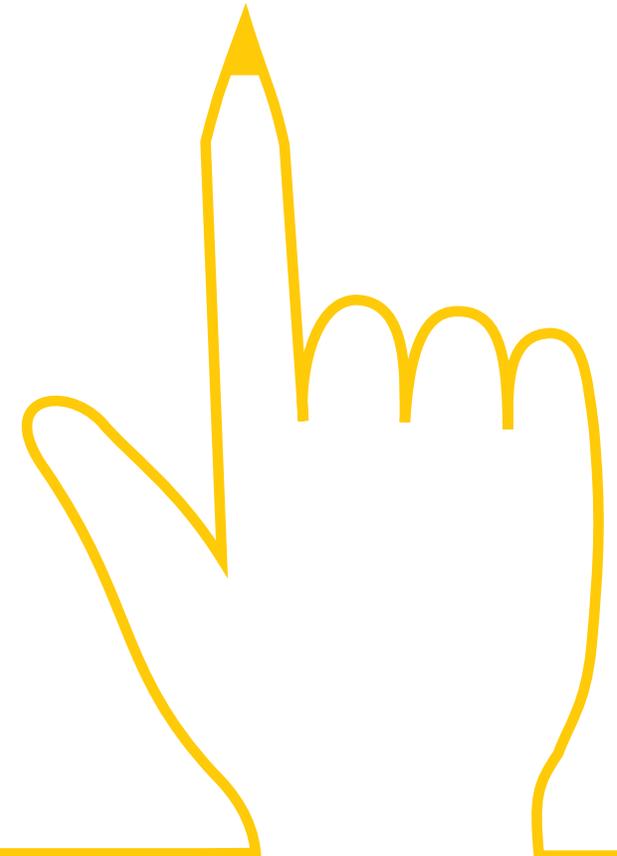
02 Less concrete evidence

03 Even be used in conjunction with direct methods

04 Data related to students

05 Can be useful in program improvement

06 **Commonly used Methods: Surveys**
Alumni/ Employer/ Student engagement surveys, Course Exit Survey, Graduate exit surveys, Departmental surveys



Attainment Calculation

Assessment of Attainment of Outcomes

- As POs are realized through curriculum implementation, we need to first look at the courses of the curriculum and the **Outcomes of each course** (COs).
- From the attainment of COs for all the courses of a Program, we can calculate the **attainment of POs**
- Thus, the attainment-of-outcome calculation is **bottom-up**
 - first COs and from that the POs

CO Attainment Calculation

- **3 levels of attainment 1-Low; 2-medium; 3- High**
- For Example, the three levels of attainment can be defined as
 - level 3 -> 70% of students scoring more than set target marks
 - level 2 -> 60% of students scoring more than set target marks
 - level 1 -> 50% of students scoring more than set target marks
 - level 0 -> Less than 50% of students scoring more than set target marks

target can be average, pass level, median etc.

CO Attainment Calculation

- **Tools (Example):**
 - Internal Test 1
 - Internal Test 2
 - Model/Assignment
 - Semester End Examination

CO attainment calculation – contd..

	T1/ CO1	T1/ CO2	T2/ CO3	T2/ CO4	T2/ CO5	M-A/ CO1	M-A/ CO2	M-A/ CO3	M-A/ CO4	M-A/ CO5	SEE/ CO1	SEE/ CO2	SEE/ CO3	SEE/ CO4	SEE/ CO5
S1	30	40	20	30	25	17	18	15	07	15	09	08	20	13	20
S2	25	37	25	25	25	18	14	08	11	05	08	09	15	14	19
S3	10	30	16	20	25	19	06	11	15	06	06	08	20	13	18
S4	14	20	10	17	24	20	06	17	14	15	05	04	11	05	15
MAX	50	50	30	30	40	20	20	20	20	20	15	15	20	20	30
CUT OFF	25	25	15	15	20	10	10	10	10	10	7.5	7.5	10	10	15
#above CUT- OFF	2	3	3	4	4	4	2	3	3	2	2	3	4	3	4
CO- VALUE	1	3	3	3	3	3	1	3	3	1	1	3	3	3	3

CO attainment calculation – contd..

	TEST1 (10%)	TEST2 (10%)	Model/ Assignment (30%)	Final (50%)	Attainment
CO1	1	-----	3	1	$(0.1+0.9+0.5)/0.9$ $1.5/0.9 = 1.67$
CO2	3	-----	1	3	$(0.3+0.3+1.5)/0.9$ $2.1/0.9 = 2.33$
CO3	-----	3	3	3	$(0.3+0.9+1.5)/0.9$ $2.7/0.9 = 3$
CO4	-----	3	3	3	$(0.3+0.9+1.5)/0.9$ $2.7/0.9 = 3$
CO5	-----	3	1	3	$(0.3+0.3+1.5)/0.9$ $2.1/0.9 = 2.33$

CO attainment calculation – Contd..

- If targets are ***achieved***, we may set higher targets subsequently as part of continuous improvement. Further, a scale of 3 levels may be reworked to a scale of 5 levels.
- 5 levels may be defined as follows:
 - 5-> 80% of students scoring more than the target marks**
 - 4-> 70% of students scoring more than the target marks**
 - 3-> 60% of students scoring more than the target marks**
 - 2-> 50% of students scoring more than the target marks**
 - 1-> 40% of students scoring more than the target marks**
 - 0-> Less than 40% of students scoring more target marks**
- If targets are ***not achieved*** then instead of lowering the target; the program should put in place an action plan to attain the target in subsequent years

CO-PO Mapping (connecting COs with POs)

- The mapping is a matrix with rows as COs and columns as POs
- Each element/cell of the matrix has a value in {--, 1, 2, 3}

The meaning associated with the values are as follows:

-- → this CO (row) has nil/very small/insignificant contribution to the PO (column)

1 → relevant and small significance

2 → medium or moderate and

3 → strong

CO-PO mapping (example)

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

blank: no correlation

						PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
SEM		SUB CODE	Course	COURSE OUTCOMES	COURSE OUTCOMES Statement												
III	C203	BEXX 201	Course name	C203.1	.	3	3	2	2	-	-	3	3	2	2	1	-
				C203.2		-	-	-	-	-	-	3	3	3	2	1	-
				C203.3		-	-	-	-	-	-	3	2	2	2	1	-
				C203.4		-	-	-	-	-	-	3	2	2	2	1	-
				C203.5		-	-	-	-	-	-	2	2	2	2	1	-
				C203.6		-	-	-	-	-	-	2	2	2	2	1	-

Program Outcome (PO) Attainment Calculation

- For the Calculation of Program Outcome, we can use **two methods**:
 - (i) Direct Method
 - (ii) Indirect Method
- **Direct Method:** In the direct method, we take CO attainment of all courses contributing to particular Program Outcomes and then calculate the attainment based on mapping (as per course articulation matrix)

Program Outcome (PO) Attainment Calculation - Direct Method

Course	Course Outcomes	Attainment Level Column A	PO1 column B	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C3 01	C301.1	1.5	1	1	3	2	2	1	-	1	1	-	-	-	2	2	1
	C301.2	2.1	1	1	3	2	3	1	-	-	1	-	-	-	2	2	1
	C301.3	2.4	1	1	3	3	3	-	-	-	1	2	-	-	3	3	1
	C301.4	2.5	1	1	3	3	3	2	-	-	1	-	-	-	3	3	1
	C301.5	2.4	1	2	3	3	3	-	-	1	1	-	-	1	3	3	1
	C301.6	2.7	1	2	3	3	3	2	-	-	1	2	-	1	3	3	1
C3 02	C302.1	1.8	-	-	-	-	-	-	1	-	2	1	3	-	-	-	-
	C302.2	1.9	-	-	-	-	-	-	1	-	2	-	3	-	-	-	-
	C302.3	1.7	-	-	-	-	-	-	1	-	2	-	3	-	-	-	-
	C302.4	2.7	-	-	-	-	-	-	1	-	2	-	3	-	-	-	-
	C302.5	2.1	-	-	-	-	-	-	1	-	2	-	3	-	-	-	-
	C302.6	1.4	-	-	-	-	-	-	1	-	2	-	3	-	-	-	-
		Program Outcome Attainment															
			2.27	2.34	2.27	2.33	2.31	2.33	1.93	1.95	2.04	2.40	1.93	2.55	2.33	2.33	2.27

- Here only 2 course are taken; for actual calculations all courses to be taken
- Calculation: $PO1 = \frac{\text{Sum}(\text{column A} * \text{Column B})}{\text{Sum}(\text{column B})}$

Program Outcome (PO) Attainment Calculation - Indirect Method

- **Indirect Method:** In the indirect method, surveys from current passing out students (program exit survey), surveys from employers (during placement), and surveys from industry persons (if students are working as interns for some industry) are to be taken.
- All this survey needs to be quantified [put questions like rate our students on the scale of 5 (5-excellent, 1-not satisfactory)]
- The indirect method too should be based on predefined levels
- Example; Level-3: *80% or above survey takers giving 4 or 5 marks*
Level-2: *70% or above survey takers giving 4 or 5 marks*
Level-1: *60% or above survey takers giving 4 or 5 marks*

Program Outcome (PO) Attainment Calculation - Indirect Method

Survey	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Program Exit Survey (30%)	3	3	3	3	3	3	3	3	3	3	2	2	-	-	-
Employer Survey (40%)	-	-	-	-	-	2	2	3	2	3	1	3	2	3	2
Alumni Survey (30%)	3	2	3	1	3	2	3	3	2	3	1	2	-	-	-
Program Outcome Attainment	$(0.9 + 0.9) / 0.6 = 3$	2.5	3	2	3	2.3	2.6	3	2.3	3	1.3	2.4	2	3	2

Program Outcome (PO) Attainment Calculation

Calculation: $PO1 = \{0.8 * \text{Direct Attainment}\} + \{0.2 * \text{Indirect Attainment}\}$

Attainment Type	Weightage	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Direct	80%	2.27	2.34	2.27	2.33	2.31	2.33	1.93	1.95	2.04	2.40	1.93	2.55	2.33	2.33	2.27
Indirect	20%	3	2.5	3	2	3	2.3	2.6	3	2.3	3	1.3	2.4	2	3	2
	PO Attainment	2.42	2.37	2.42	2.26	2.45	2.32	2.06	2.16	2.09	2.52	1.8	2.52	2.26	2.46	2.22

Using outcome assessment for improvement – an example

From an SAR of Civil Engineering program (accreditation completed)

PO1: Engineering knowledge: Apply knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems.

Target: 2.5 Calculated attainment: 2.3

The overall attainment of PO1 is near but below the target value;

The foundation course Mechanics of Materials (CVC202) has CO attainment below the target. Mathematical courses - Statistics and Integral Transforms (MAC209) and Numerical Methods and Partial Differential Equations (MAC213) have attainment below the target value. These are impacting the PO attainment.

Actions identified are – **on the next slide**

Outcome Assessment → improvement – example contd..

This diagnosis indicates insufficient connectivity between the theoretical concepts and their mathematical applications.

Action 1: Contextual learning pedagogy is used in Mechanics of Materials to associate classroom teaching with real-world experiences and improve the grasp of fundamental concepts.

Action 2: In the Mathematics courses in the third semester - Statistics and Integral Transforms and in the fourth semester - Numerical Methods and Partial Differential Equations simple problems of civil engineering were introduced

When targets are achieved then outcomes are attained; subsequently, We revise and set higher targets as a part of continuous improvement

Target setting and CI go together in OBE

Conclusion

- Understand assessment tools
- Develop effective and outcome based assessment tools
- Make stakeholders familiar with the assessment and attainment procedures
- Use technology for support



THANK YOU