

# Program Educational Objectives Attainment: The Process

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**Abstract:** *The Program Educational Objectives (PEOs) of an engineering degree program are the statements that describe what the graduates are expected to perform and achieve during the first few years after graduation. They are a reflection of the measure of professional development in the field of application or research. PEOs are aligned with the vision and mission of the Institution. The PEOs are framed on the needs of the stakeholders. As PEOs are a measure of the accomplishment of the graduate, they are the key indicators of the attainment of the Educational Objectives of the Program. The Program Educational Objectives attainment, which include the direct Program Outcome attainment and the indirect attainment from stakeholders reflects the progressive accomplishment of the program as well. This review paper is an attempt to calculate the PEO attainment of two batches of Civil Engineering students, to check the consistency of the attainment levels.*

**Keywords:** Educational Objectives, attainment, stakeholders

## 1. Introduction

The Program Educational Objectives (PEOs) support and are in consonance with the Mission of the Institution and the department. The definition of the PEOs is broad based, general statements that describe the career and professional accomplishments that the program is preparing the graduates to achieve. In short it describes long term program targets or directions of development. To establish PEOs of the department, first step is to get feedback and suggestions from the stakeholders. The Institution Management is the key stakeholder. Industries, private consultants, government departments to whom professional consultancy services are being offered are the prime stakeholders. Involving parents of students for opinion regarding their expectations is also an important factor in collecting the stakeholders opinion and needs. After receiving the feedback and suggestions, meetings were held with students, faculty members, Department Advisory Group, Board of Studies, Alumni, Employers etc to frame the PEOs.

Stakeholders	Rationale for consulting the stakeholders
Management	Management is key provider of the resources, financial and other supports . They are the policy makers and decision takers - hence are involved in the future growth and development
Faculty and Staff	They are the planners and implementers of the department vision and mission and PEOs.
Students	They are the future ambassadors of the institution and their career growth and aspirations are involved in their future career.
Alumni	Alumni are very important for the department. They can provide fruitful feedback and help department improve continuously as the technology evolves.
Industry and Employers	They are the job providers and also can provide important information about needs and expectation in terms of competencies required from the graduates.
Regulatory Bodies	During the process of defining vision, mission and PEOs of the department the norms and standards are considered to ensure quality and conformity with the binding rules.
Funding	They provide financial assistance to the Institution

Agencies	and interact with the principal investigators/ faculty of the Department.
Other Institutions	They are important because they are the competitors.

## 2. Process of Defining PEOs

- 1) A department level committee studied and developed the first draft of PEOs in consonance with the mission of the Department. The committee consisting of 10 nos of faculty, 20 students and Training and Placement Officer of the Institution participated in the initial brainstorming sessions. The committee brainstormed among themselves, conducted environmental scans, studied various institutions offering similar programs and the industrial needs based on the previous placement records.
- 2) The requirements of Professional Bodies were also studied.
- 3) The information thus collected was summarized and presented and discussed through brainstorming sessions among all the faculty and select stakeholders to ascertain the extent to which we could address the issues and expectations that were listed through such extensive efforts.
- 4) The results were discussed and key critical elements on which we need to focus for next four to five years were identified and listed and used while developing PEOs.
- 5) The first draft was presented to all stakeholders of the program and comments/suggestions were sought on PEOs.
- 6) After the required modification, the second draft was shared with the employers and alumni representatives for their final comment and suggestions. About 10 employers and 40 alumni and about 60 current students along with all faculty participated in focus group discussion.
- 7) Once the PEOs were finalized, the curriculum was scrutinized to ensure all the PEOs were adequately represented.
- 8) The final version was presented to the academic council of the Institution and PEOs were approved by the

academic council.

- 9) The analysis of available resources and additional requirements to fulfill achievements of PEOs was presented to the Board of Governors for seeking approvals.
- 10) Since the essence of objective and outcome based education system is continuous improvement, appropriate mechanism has been developed for the same.

### 3. Program Educational Objective Statements

**PEO1:** The graduate will be successful professionally and contribute to core civil engineering construction projects, infrastructure projects, alternative construction technology projects, green buildings towards environmental sustainability for academic domain as well as for research and pursue higher studies.

**PEO2:** The graduate will be professionally sound in broad area of knowledge of various dimensions of civil engineering and allied fields.

**PEO3:** The graduate will be a team leader/effective team member with ethical values, versatile, quick learner will

adapt to given professional context with lifelong learning capability.

### 4. Methodology

Two batches have been considered, batch of (2014-2018) and (2015-2019). The PO Attainments have been used here for the calculation of the PEOs. For the proper attainment calculation of PEOs, a detailed working out of each of the Course Outcomes for every course is required. The program Articulation Matrix has then to be mapped for calculating the Program Outcomes. Accuracy should be maintained throughout the process without which errors will creep in resulting in incorrect attainment of PEOs.

- 1) Program Outcome Attainment for two batches (2014-2018) and (2015-2019)
- 2) PSO Attainment for two batches (2014-2018) and (2015-2019)
- 3) PEO Evaluation Criteria
- 4) PO-PEO Mapping for the two batches
- 5) Methodology for feedback from Stakeholders
- 6) Percentage attainment for the two batches
- 7) Conclusions

#### 1. Program Outcome Attainment for two batches (2014-2018) and (2015-2019)

Overall PO attainment = 80% of direct attainment +20% of indirect attainment (BATCH 2014-18)													
PO Direct Attainment (80%)		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
	PO Attainment	2.06	2.04	1.9	1.88	1.79	1.84	2	1.6	1.92	2.16	0.96	1.52
PO Indirect Attainment (20%) Average Of	Alumni Survey	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Exit Survey	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Parents Survey	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Overall PO Attainment	Overall PO A	3.86	3.84	3.7	3.68	3.59	3.64	3.8	3.4	3.72	3.96	2.76	3.32
	Percentage	88.6	88	83.3	82.6	79.6	81.3	86.6	73.3	84	92	52	70.6

Overall PO attainment = 80% of direct attainment +20% of indirect attainment (BATCH 2015-19)													
PO Direct Attainment (80%)		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
	PO Attainment	2.05	2.04	1.94	1.85	1.79	1.68	1.94	1.73	1.88	2.2	1.44	1.66
PO Indirect Attainment (20%) Average Of	Alumni Survey	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Exit Survey	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Parents Survey	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Overall PO Attainment	Overall PO A	2.65	2.64	3.14	3.65	3.59	3.48	3.74	3.53	3.68	4	2.08	3.46
	Percentage	88.3	88	84.6	81.6	79.6	76	84.6	77.6	82.6	93.3	68	75.3

#### 2. PSO Attainment for two batches (2014-2018) and (2015-2019)

	(BATCH 2014-18)	PSO1	PSO2
PSO Direct Attainment (80%)	PSO Attainment	1.8	1.6
PSO Indirect Attainment (20%) Average Of	Alumni Survey	0.6	0.6
	Student Exit Survey	0.6	0.6
	Parents Survey	0.6	0.6
Overall PSO Attainment	Overall PSO Attainment	3.6	3.4
	PERCENTAGE	80	73
	(BATCH 2015-19)	PSO1	PSO2
PSO Direct Attainment (80%)	PSO Attainment	1.88	1.8
PSO Indirect Attainment (20%) Average of	Alumni Survey	0.6	0.6
	Student Exit Survey	0.6	0.6
	Parents Survey	0.6	0.6
Overall PSO Attainment	Overall PSO Attainment	2.48	2.4
	Percentage	82.6	80

#### 3. Program Educational Objectives Evaluation Criteria

PO-PEO MAP	60%
Placements	10%
Higher Studies	10%
Student Exit Survey	10%
Alumni Survey	10%

#### 4. PO-PE Mapping for the two batches

PO-PEO MAPPING (BATCH 2014-18)							
	PEO1	PEO2	PEO3		PEO1	PEO2	PEO3
PO1		X		PO1		88.6	
PO2	X	X		PO2	88	88	
PO3	X			PO3	83.3		
PO4	X	X		PO4	82.6	82.6	
PO5	X			PO5	79.6		
PO6			X	PO6			81.3
PO7	X			PO7	86.6		
PO8			X	PO8			73.3
PO9			X	PO9			84
PO10			X	PO10			92
PO11	X	X		PO11	52	52	

PO12	X		X	PO12	70.6		70.6
				AVG	77.53	77.8	80.24
				AVG PEO%=78.52			
<b>PO-PEO MAPPING (BATCH 2015-19)</b>							
	PEO1	PEO2	PEO3		PEO1	PEO2	PEO3
PO1		X		PO1		88.3	
PO2	X	X		PO2	88	88	
PO3	X			PO3	84.6		
PO4	X	X		PO4	81.6	81.6	
PO5	X			PO5	79.6		
PO6			X	PO6			76
PO7	X			PO7	84.6		
PO8			X	PO8			77.6
PO9			X	PO9			82.6

PO10			X	PO10			93.3
PO11	X	X		PO11	49.3	49.3	
PO12	X		X	PO12	75.3		75.3
78.52				AVG	77.57	76.8	80.96
				AVG PEO%=78.4			

**5. Methodology for feedback from stakeholders**

Google forms with questionnaire framed as per the program Outcomes were sent to Alumni, parents and to the students. Each of the questions were to be rated on a scale of 5. Data collected was analyzed. 60% target was aimed at. Only those stakeholders who have given score of more than 3 (60%) out of 5 in each question were considered for analysis.

**Parents, Alumni and Student exit survey for 2017-2018**

nos of Parents surveyed =17	PARENTS SURVEY 2017-18												CIVIL ENGINEERING DEPARTMENT	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
nos given scores more than 60%	17	17	17	16	17	17	16	16	17	17	17	17	17	17
% given scores more than 60%	100	100	100	100	100	100	94	94	100	100	100	100	100	100
co-relation	3	3	3	3	3	3	3	3	3	3	3	3	3	3
nos of Alumni =22	ALUMNI SURVEY 2017-18												CIVIL ENGINEERING DEPARTMENT	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
nos given scores more than 60%	22	22	22	22	22	22	22	22	21	21	21	22	22	22
% given scores more than 60%	100	100	100	100	100	100	100	100	95	95	95	100	100	100
co-relation	3	3	3	3	3	3	3	3	3	3	3	3	3	3
nos of students =20	STUDENT EXIT SURVEY 2017-18												CIVIL ENGINEERING DEPARTMENT	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
nos given scores more than 60	22	22	22	22	22	22	22	22	21	21	21	22	22	22
% given scores more than 60%	100	100	100	100	100	100	100	100	95	95	95	100	100	100
co-relation	3	3	3	3	3	3	3	3	3	3	3	3	3	3

**Parents, Alumni and Student exit survey for 2018-2019**

nos of Parents surveyed =30	PARENTS SURVEY 2018-19												CIVIL ENGINEERING DEPARTMENT	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
nos given scores more than 60%	25	29	28	29	29	26	30	29	30	29	28	30	30	30
% given scores more than 60%	83	96	93	96	96	86	100	96	100	96	93	100	100	100
co-relation	3	3	3	3	3	3	3	3	3	3	3	3	3	3
nos of Alumni =36	ALUMNI SURVEY 2018-19												CIVIL ENGINEERING DEPARTMENT	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
nos given scores more than 60%	30	30	30	28	28	29	29	29	29	30	31	31	27	28
% given scores more than 60%	93	93	93	87	87	90	90	90	90	93	96	96	84	87
co-relation	3	3	3	3	3	3	3	3	3	3	3	3	3	3
nos of students =20	STUDENT EXIT SURVEY 2017-18												CIVIL ENGINEERING DEPARTMENT	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
nos given scores more than 60	27	29	27	26	25	27	28	27	29	27	28	28	29	26
% given scores more than 60%	90	96	90	86	83	90	93	90	96	90	93	93	96	86
co-relation	3	3	3	3	3	3	3	3	3	3	3	3	3	3

If 60%of the stakeholders gave scores between 60-70% then co-relation factor was taken as 1
If 60%of the stakeholders gave scores more than70- 80% then co-relation factor was taken as 2
If 60%of the stakeholders gave scores more than 80% then co-relation factor was taken as 3

**6. Percentage Attainment for the two batches**

Program Educational Objectives Evaluation Criteria	batch 2018	batch 2019
PO-PEO MAP	60%	1.41
Placements	10%	0.15
Higher Studies	10%	0.07
Student Exit Survey	10%	0.3
Alumni Survey	10%	0.3
PEO	2.23	74%

Program Educational Objectives Evaluation Criteria	batch 2019
PO-PEO MAP	60%
Placements	10%
Higher Studies	10%
Student Exit Survey	10%
Alumni Survey	10%
PEO	2.38
	79.33%

Placements Target Level - 100% (2018)		
<b>Placements</b> Target Level - 100% (2018)		
NOS of Students	71	36/71x3 X0.1= 0.15
Core Placement	36	
<b>Higher Studies</b> Target Level - 40% (2014)		
NOS of Students	71	17/71x3X 0.1=0.07
Higher Studies	17	
<b>Placements</b> Target Level - 100% (2019)		
NOS of Students	73	41/73x3= 1.68
Core Placement	41	
<b>Higher Studies</b> target Level - 40% (2015)		
NOS of Students	73	21/30 x3= 2.1
Higher Studies	21	
PEO Attainment For 2014-2018 Batch = 2.23 (74%)		
PEO Attainment For 2014-2018 Batch = 2.38 (79.33%)		

## 5. Conclusion

PEO is a very effective measure to conclude on the progress of the Department in terms of attainments of the Goals set. It gives a comprehensive picture of the developments as it encompasses the direct as well as the indirect attainments. It not only focuses on the attainment in terms of Program Outcomes but goes beyond that to show the progress of the Department towards the Institutional Vision and mission. In the present case, It is possible to point out that the development of the Department is in orientation with the vision of the Institution to a good extent of more than 70%. It is possible to say so, as the PEOs have been framed in alignment with the Vision of the Institution, by meticulously following the process of framing the PEOs. In the calculation that has been carried out, there is consistency in the attainment of PEO over the two batches, which is reflective of the consistent progress of the Department across the two batches. There is increase in the PEO attainment level in the successive year by 5.33% which is a positive indication of achievement.

## 6. Limitations

The number of students denoted in the tables in terms of students placed in core area (civil engg) / perusing higher studies was as per data available only, and not indicative of the true picture. Unavailability of Alumni Data, regarding placement and Higher studies would have distorted the attainment level slightly. There could have been inclusion of more stakeholders like employers etc., which could not be carried out due to time constraints.

## References

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