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CO-PO-PSO Mapping in OBE

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Abstract: *The CO-PO-PSO Mapping is a vital component in the framework of Outcome-Based Education (OBE), which focuses on achieving specific learning outcomes for students rather than merely completing course content. This mapping process aligns Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs) to ensure that each course contributes meaningfully to the overall goals of the educational program. By systematically linking the learning objectives of individual courses to broader program goals, CO-PO-PSO Mapping facilitates a clear, measurable approach to student learning and assessment. It aids in tracking student progress, identifying gaps in learning, and continuously improving curriculum design and teaching strategies. This alignment also ensures that students acquire both the technical expertise and essential soft skills needed to meet industry standards and societal expectations. The CO-PO-PSO Mapping thus plays a critical role in enhancing the effectiveness, accountability, and transparency of OBE, ensuring that graduates are well-prepared for future challenges.*

Keywords: Course Outcomes (COs), Program Outcomes (POs),Program Specific Outcomes (PSOs).

I. INTRODUCTION

CO-PO-PSO Mapping is important because it helps ensure that the education students receive is aligned with the skills and knowledge they need to succeed in their careers. CO (Course Outcomes) define what students should learn in a specific course, while PO (Program Outcomes) focus on the general skills and attributes students should develop by the end of their program, such as problem-solving, teamwork, or ethics. PSO (Program Specific Outcomes) are more focused on the technical skills and expertise specific to the program. This mapping ensures that every course contributes to the overall goals of the program, avoids gaps in learning, and tracks student progress effectively. It also helps teachers improve their methods, supports accreditation processes, and ensures quality education. Overall, CO-PO-PSO Mapping plays a key role in providing students with a well-rounded education and preparing them for the future.

II. IMPORTANCE IN OBE

Outcome-Based Education (OBE), **CO-PO-PSO Mapping** is crucial as it ensures that the learning outcomes of individual courses (COs) align with broader program outcomes (POs) and specific program skills (PSOs). This mapping process provides a structured approach to designing and assessing curricula, ensuring that each course contributes effectively to the overall educational goals of the program. By tracking student performance against predefined outcomes, it helps in monitoring progress and identifying areas for improvement. This alignment fosters transparency, accountability, and continuous improvement in teaching methods. Additionally, it plays a key role in maintaining industry relevance and ensuring that students develop the necessary skills to succeed in their careers. Ultimately, CO-PO-PSO Mapping in OBE guarantees that students acquire both technical and soft skills, ensuring they are well-prepared for real-world challenges.

III. CO-PO-PSO MAPPING PROCESS

The new mapping process has been updated to introduce a quantitative approach for assessing the strength of correlation between COs, POs, and PSOs. The process is as follows:

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Step 1: Finalization of PO and PSO Keywords

The first step is to finalize the keywords for POs and PSOs in collaboration with the Academic Coordinator. This ensures that all Program Outcomes (POs) and Program Specific Outcomes (PSOs) are clearly defined with specific measurable terms that align with the course objectives.

Step 2: Finalization of CO Keywords

Once the POs and PSOs are finalized, the next step is to finalize the CO keywords for each course in coordination with the Academic Coordinator. CO keywords should specifically reflect the intended learning outcomes of the course that contribute to the achievement of POs and PSOs.

CO,PO and PSO Keywords			
POs/ PSOs	**Keywords**	**COs**	**Keywords**
PO1	111-Apply knowledge of basic mathematics, science and Engineering fundamentals	CO1	11-Create interactive web page
	112-Engineering specialization to solve the engineering problems		12-Use program flow control structure
PO2	121-Identify well defined Engineering problem	CO2	21-Implement Array in javascript
	122-Analyze well defined Engineering problems using codified standard methods		22-Implement functions in Javacsript
PO3	131-Design solutions for well-defined technical problems	CO3	31-Create event based web forms using javascript
	132-Assist with the design of system component		
	133-Assist with processes to meet specified needs		
PO4	141-Apply modern engineering tools to conduct standard test and measurements	CO4	41-Use javascript for handling cookies
	142-Apply appropriate techniques to conduct standard test and measurements		
PO5	151-Apply appropriate technology in context of society	CO5	51-Create interactive web pages
	152-Apply appropriate technology in context of sustainability		52- Use regular expressions for validations
	153-Apply appropriate technology in context of environmental		
	154-Apply appropriate technology in context of ethical practices		
PO6	161-Use management principles individually to manage projects	CO6	61-Create menus in web pages
	162-Use management principles as a team member to manage projects		62-Create nevigations in web pages
	163-Use management principles as a team leader to manage projects		
	164-Use management principles individually effectively communicate about well-defined engineering activities.		

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CO Keywords

Step 3: Probability Calculation for CO-PO-PSO Correlation

In this step, the correlation between each CO, PO, and PSO is calculated using a probability score between 0 and 1. This score is based on the degree of alignment between the CO and the respective PO/PSO, using the following ranges:

Correlation Levels:

If the probability is between 0.25 and 0.49, the correlation is categorized as Level 1 (Weak Correlation).
If the probability is between 0.50 and 0.74, the correlation is categorized as Level 2 (Moderate Correlation).
If the probability is between 0.75 and 1.00, the correlation is categorized as Level 3 (Strong Correlation).
If the probability is less than 0.25, it indicates No Correlation between the CO and the PO/PSO.

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DEPARTMENT OF COMPUTER ENGINEERING

CO-PO Mapping Calculation

PO	CO-1		CO-2		CO-3		CO-4		CO-5		CO-6	
	11	12	21	22	31		41		51	52	61	62
111	1	1	1	1	1		1		0	0	0	0
112	1	1	1	1	1		1		1	1	1	1
	1.00		1.00		1.00		1.00		0.50		0.50	
121	0	1	0	0	1		1		0	1	1	1
122	1	1	1	1	1		1		1	1	1	1
	0.75		0.50		1.00		1.00		0.75		1.00	
131	1	1	1	1	1		1		1	1	1	1
132	1	1	1	1	1		1		1	1	1	1
133	1	1	1	1	1		1		1	1	1	1
	1.00		1.00		1.00		1.00		1.00		1.00	
141	1	1	1	1	1		1		1	1	1	1
142	0	0	0	0	0		0		0	0	0	0
	0.50		0.50		0.50		0.50		0.50		0.50	
151	0	0	0	0	0		0		0	0	0	0
152	0	0	0	0	0		0		0	0	0	0
153	0	0	0	0	0		0		0	0	0	0
154	1	1	1	1	1		1		1	1	1	1
	0.25		0.25		0.25		0.25		0.25		0.25	

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Course Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	3	3	2	1	3	3	3	2
CO2	3	2	3	2	1	3	2	3	2
CO3	3	3	3	2	1	3	3	3	2
CO4	3	3	3	2	1	3	3	3	2
CO5	2	3	3	2	1	3	3	3	2
CO6	2	3	3	2	1	3	3	3	2
SUM	16	17	18	12	6	18	17	18	12
AVERAGE	2.7	2.8	3.0	2.0	1.0	3.0	2.8	3.0	2.0

Rubrics	Probability of CO's to PO's	Correlation Levels
	<0.25	--
	>=0.25 and <0.50	1
	>= 0.50 and <0.75	2
	>=0.75	3

Probability Calculation 1

COs	POs/PSOs									Th (Hrs)	PR (Hrs)	Total Hours
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2			
CO 1	Y	Y	Y	Y	Y	Y	Y	Y	Y	10	4	
CO 2	Y	Y	Y	Y	Y	Y	Y	Y	Y	10	6	
CO 3	Y	Y	Y	Y	Y	Y	Y	Y	Y	6	8	
CO 4	Y	Y	Y	Y	Y	Y	Y	Y	Y	6	4	
CO 5	Y	Y	Y	Y	Y	Y	Y	Y	Y	8	2	
CO 6	Y	Y	Y	Y	Y	Y	Y	Y	Y	8	8	
Total Hours of instruction										48	32	80.00

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Hours devoted to POs:	80	80	80	80	80	80	80	80	80
% hours devoted to POs:	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
CO-PO Addressing Level	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00

Rubrics	%	Level	Probability of CO's to PO's	Correlation Levels
weightage of CO score More than criterion level.	50	1	<0.25	No Correlation
	75	2	>=0.25 and <0.50	1
	80	3	>= 0.50 and <0.75	2
			>=0.75	3

1 - Slight (Low) 2 - Moderate (Medium) 3 - Substantial (High)

Probability Calculation 2

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Step 4: Mapping CO-PO-PSO with Time Span Efficiency

This step refines the **CO-PO-PSO mapping** by incorporating the percentage of instructional time devoted to each **Program Outcome (PO)** and **Program Specific Outcome (PSO)** during the course. By factoring in the time spent on each outcome, the mapping becomes more precise and reflects the actual focus of the course content delivery. This ensures that the mapping is not only based on intended learning objectives but also on the realistic weightage given during teaching.

Process of Time-Span Based Mapping

The next step involves factoring in the **percentage of hours devoted to each PO and PSO** during the course delivery. This allows for a more refined mapping by considering how much instructional time is allocated to the relevant outcomes.

Final Mapping Formula:

The **probability score** for each CO-PO-PSO mapping is averaged with the percentage of time allocated to that outcome.

The resulting **average correlation value** is used to determine the final mapping for each course.

COs, POs and PSOs Time Span Efficacy

Course Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
CO2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
CO3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
CO4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
CO5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
CO6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

COs, POs and PSOs Average

Course Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	1.00	0.88	1.00	0.75	0.63	0.94	0.88	1.00	0.75
CO2	1.00	0.75	1.00	0.75	0.63	0.88	0.75	1.00	0.75
CO3	1.00	1.00	1.00	0.75	0.63	1.00	1.00	1.00	0.75
CO4	1.00	1.00	1.00	0.75	0.63	0.88	1.00	1.00	0.75
CO5	0.75	0.88	1.00	0.75	0.63	1.00	1.00	1.00	0.75
CO6	0.75	1.00	1.00	0.75	0.63	1.00	1.00	1.00	0.75

CO-POs-PSOs Mapping

Course Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	3	3	3	2	3	3	3	3
CO2	3	3	3	3	2	3	3	3	3
CO3	3	3	3	3	2	3	3	3	3
CO4	3	3	3	3	2	3	3	3	3
CO5	3	3	3	3	2	3	3	3	3
CO6	3	3	3	3	2	3	3	3	3
SUM	**18**	**18**	**18**	**18**	**12**	**18**	**18**	**18**	**18**
AVERAGE	**3.00**	**3.00**	**3.00**	**3.00**	**2.00**	**3.00**	**3.00**	**3.00**	**3.00**

Time-Span Based Mapping

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IV. CONCLUSION

The CO-PO-PSO Mapping is a critical process that ensures alignment between the Course Outcomes (COs), Program Outcomes (POs), and Program Specific Outcomes (PSOs) in an academic program. By mapping these outcomes, institutions can track how well the course content and teaching methods contribute to achieving broader program objectives and specific program skills. This alignment helps ensure that students acquire the necessary competencies to meet both generic engineering standards and specialized knowledge required in their field.

Through the mapping, educators can identify strengths and areas for improvement in the curriculum. It also provides framework for continuous improvement in teaching methods,

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