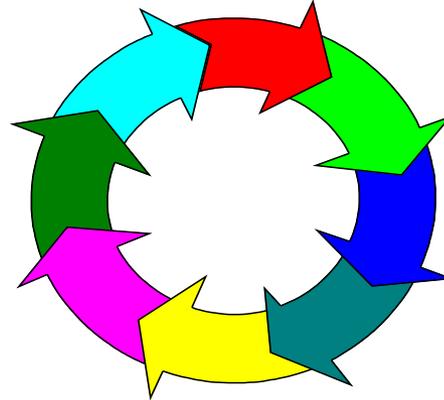# Attainment of course outcomes to program outcomes

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Aim of the project

•Predict the student performance at the time of admission based on data mining techniques or alternative methods if possible.

•Attainment of course outcomes to program outcomes

What are you trying to achieve?

- To make professional engineer

- To increase pass percentage

- To develop readymade graduates

- To asses the teaching learning based on feedback

- To make a student towards skills, health and family.

- To attract quality and global students

Objectives

- To collect data , data preparation and processing
- To predict the new student who gains admission into the university i.e., falls under which group, low-risk(strong) students, medium-risk(or moderate) students or high-risk (or slight) students.
- Outcomes are the abilities the students acquire at the end of the program/course
- To create an academic healthy environment in institutions selected under the programme
- To achieve their own set targets for excellence and sustain the same with autonomy and accountability.
- To improve efficiency and effectiveness of the technical education in the state and institutions selected under the programme.

Summarize what you did

- Program quality improvement and ultimately improving outcomes for Graduates with limited resources are looking to invest in activities.

- Input from experts in engineering quality improvement.

- linked to positive outcomes for teacher practices and/or program developmental outcomes

- Identification weak and bright students.

- Setting a priority to target program quality improvements that will ultimately increase support for graduates optimal development.

- **Finally concluded with attainment of course outcomes and recommended few things.**

Summarize how you did it

•Myself what I learned from last two decades, I extracted very clear data and extracted hidden information.

•As per my previous research experience in data mining OR STATISTICS those mining techniques applied for finding of weak and bright students.

•And those are the things I shared with the groups. By that sharing collected useful information for making the graduates as professional engineer.

Summarize how you did it

• Listed program outcomes and course outcomes by gathering information from different stakeholders.

• Setting a priority of target levels.

• Applied statistics and assessment methods for attainment of course outcomes to program outcomes .

Research and investigation

• Algorithm for Overall pass prediction.

• Prediction overall pass course wise.

• To predict the new student who gains admission into the university falls under which group, low-risk students, medium-risk students or high-risk students

Conti...

- The result of CO attainment will also be used to evaluate the attainment of Programme Outcomes (PO).

- Identify the Course outcomes

- The outcome of analysis will be used to improve the teaching and learning experience in the particular course.

Conti...

- These COs are produced based on the requirement of the programme outcomes (PO).

- Each CO will be mapped to PO (CO-PO) matrix.

- The PO will be then mapped to PEO. (i.e. relationship between CO, PO and PEO).

Conti…

- Assessment methods need to be designed in such a way to achieve the PO's.

- The Teaching-Learning is important to ensure the student able to acquire the knowledge or skill required.

- Assessment is also important to assess whether the student or learner has attained what is expected out of them.

- All these will be used to continuous quality improvement (CQI).

CO- Attainment method

- This method is evaluating the attainment of CO by using student's marks, where the student marks consists of

    (1) Final exam

    (2) Tests

    (3) Quizzes

    (4) Assignments

    (5) Project   and etc.

    (6) Special.

Conti…

- Assessment-CO matrix is produced for each individual course based on these N assessment methods or more.

- General form of assessment-CO matrix. The weightage in the matrix shows the amount, in term of percentage.

Strength of PO/PSO

- Strength of mapping is defined at three levels: Slight or Low (level 1), Moderate or Medium (level 2) and Substantial or high (level 3)

- A simple method -number of hours devoted to the COs which address the given PO.

- If $\geq$ 40% then PO is Level 3

- If 25 to 40% then PO is Level 2

- If 5 to 25% then PO is Level 1

- If < 5% then PO is considered not-addressed

Sample Course Outcomes

	Course Outcome	POs	CL	Class Sessions	Lab Sessions (Hrs)
CO1		PO1, PO10, PSO1	U	4	
C02		PO2, PO10, PSO1	U	9	4
C03		PO1, PSO1	U	4	4
C04		PO3,PO4, PO5, PSO1	Ap	08	4
C05		PO3,PO4, PO5, PSO1	Ap	10	6
C06		PO3, PO4, PO5, PSO1	Ap	8	8
Total Hours of instruction				40	28

Course – PO matrix
12 of 68 (18%) sessions are devoted to PO1   Course Level 1

Conti...

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C502	1	1	3	0	3	0	0	0	0	1	0	0	3	0

Setting targets for Course Outcomes

Targets are set for each CO of a course individually(set the targets on the basis predicting present student performance or previous experience by committee or any method if possible) .

CO	Target (Class Average)
CO1	70%
CO2	80%
CO3	75%
CO4	65%
CO5	70%
CO6	80%

Attainment of COs of the Course

- Computation of indirect attainment of COs may turn out to be complex the percentage weightage to indirect attainment : 10%.

- Each student in individual COs is not available, the Institution/Department has to take that attainment (percentage marks) for all COs of the course is the same.

Conti…

- The proportional weightages of Internal Exam (IE): External Exam(EE)may be 20:80, 25:75 or 30:70.

- The number of assessment instruments used for IE is decided by EXPERTS GROUPS

Assessment Pattern

All assessment items :
Cognitive Level (CL)
Course Outcome (CO)
Marks

CL	A1 5	T1 10	T2 10
Remember	0	20%	20%
Understand	0	60%	40%
Apply	60%	20%	40%
Analyze	20%	0	0
Evaluate	10%	0	0
Create	10%	0	0

Class Average in Internal Exam

CO	A1 5 Cl. Ave	T1 10 Cl. Ave	T2 10 Cl. Ave	IE Class Average
CO1	0	2.3/4	0.6/1	2.9/5= 58%
CO2	1.5/2	2.1/3	0.8/1	4.4/6 = 76%
CO3	0.7/1	2.3/3	2.3/3	5.3/7= 76%
CO4	1.7/2	0	1.2/2	2.9/4= 72%
CO5	0	0	1.1/2	1.1/2= 55%
CO6	0	0	0.7/1	0.7/1= 70%

Computation of CO Direct Attainment in the course Cxxx

- Attainment of COX in a course Cxxx =

  Weightage of IE x Attainment of COX as % in IE

  + Weightage of EE x Class Avg. Marks % in EE

CO	IE 30 Cl. Ave	EE 70 Cl. Ave	Direct CO Attainment 0.3 IE Cl. Ave +0.7 EE Cl. Ave
CO1	2.9/5= 58%	63%	60.5
CO2	4.4/6 = 76%	63%	65.9
CO3	5.3/7= 76%	63%	65.9
CO4	2.9/4= 72%	63%	64.7
CO5	1.1/2= 55%	63%	59.6
CO6	0.7/1= 70%	63%	64.1

CO Attainment and Attainment Gap

- Computation of Attainment of COs in Cxxx = 0.9 Direct CO Attainment **+** 0.1 Indirect CO Attainment

CO	Direct CO Attainment 0.3 IE Cl. Ave +0.7 EE Cl. Ave	Indirect CO Attainment (Exit Survey)	CO Attainment	CO Target	CO Attainment Gap %ge
CO1	60.5	78	62.3	60	-2.3%
CO2	65.9	85	67.8	75%	7.3%
CO3	65.9	76	66.9	70%	3.1%
CO4	64.7	89	67.1	70%	2.9%
CO5	59.6	78	61.4	80%	18.6%
CO6	64.1	85	66.2	70%	3.8%

Closure of the Quality Loop

	Target	CO Attainment gap	Action proposed to bridge the gap	Modification of target where achieved
co1	60	-2.3%		
co2	75%	7.3%		
co3	70%	3.1%		
co4	70%	2.9%		
co5	80%	18.6%		
co6	70%	3.8%		

CO Attainment and POs/PSOs

- POs and PSOs are addressed through core courses, projects etc.

- A course/project etc. meets a subset of POs and PSOs to different level (1, 2 or 3)

- Sample Course addresses a subset of POs and PSOs to varying levels

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C502	1	1	3	0	3	0	0	0	0	1	0	0	3	0

Setting CO Attainment Targets

- Not every COi of the course will address every PO or PSO addressed by the course

CO	POs	CO Attainment %ge
CO1	PO1, PO10, PSO1	62.3
CO2	PO2, PO10, PSO1	67.8
CO3	PO1, PSO1	66.9
CO4	PO3,PO4, PO5, PSO1	67.1
CO5	PO3,PO4, PO5, PSO1	61.4
CO6	PO3, PO4, PO5, PSO1	66.2

PO and PSO Attainment

- PO and PSO attainments are normalized to 1, that is, if a PO is to be addressed at the level of 3 and attainments of CO is associated with that PO is 100%, then attainment of that PO is 1

- Attainment of PO1in Cxxx = (1/3)x Ave (0.623+0.669) = 0.265

- Attainment of PO2 in Cxxx = (1/3) x Ave (0.678) = 0.226

- Attainment of PO3 in Cxxx = (3/3) x Ave (0.671+0.614+0.662) = 0.648 and similarly other POs

Attainment of POs and PSOs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C302	1	1	3	0	3	0	0	0	0	1	0	0	3	0
Attainment	0.265	0.226	0.648	0.648	0.648	0	0	0	0	0.271	0	0	0.653	0

Setting CO Attainment Targets

Example 1

- Same target is identified for all the COs of a course. For example

- The target can be "the class average marks $\geq$ 60 marks"

Example 2

- Targets are the same for all COs and are set in terms of performance levels of different groups of students.

Conti…

Targets			
(% of students getting < 50)	(% of students getting >50 and < 65)	(% of students getting >65 and < 80)	(% of students getting $\geq$ 80)
10	40	30	10

- While this method classifies students into different categories it does not provide any clues to plans for improvement of quality of learning

Example 3

- Targets are set for each CO of a course and for different groups of students separately.

CO	Targets			
	(% of students getting < 50)	(% of students getting $\geq$50 and < 65)	(% of students getting $\geq$65 and < 80)	(% of students getting $\geq$ 80)
CO1	10	30	50	10
CO2	20	30	35	15
CO3	20	30	40	10
CO4	10	45	35	10
CO5	20	20	50	10
CO6	20	20	50	10

- Provides considerable details on the performance of students with regard to specific COs, which can lead to specific plans for improvement.

Conclusions

- The institute moving from traditional education to outcome based education.

- By this process Few students might be felt very happy with the new teaching learning and evaluation process.

- Finally attained the course outcomes to program outcomes and improved the performance of student based on the identification of weak and bright students.

Recommendations

• Improve the student performance under the innovative teaching learning process of institution.

• To take longer amount of time for assessment and evaluation , this can assess and estimate between three to five years period.

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