CIF AUTOMATION SYSTEM

Jill Gosrani , Naivedh Shah, Harshit Shiroiya, Prof. Chetan Mahajan, Prof. Nida Jawre

Abstract——**Analysis of CO attainment level is performed by each university and therefore the result's directly analyzed w.r.t "Attainment analysis Criterion" provided by the University. After getting the attainment value of Course outcome if the attainment value of a particular CO attainment level or course level CO isn't higher than the threshold then the individual CO and its individual PI is known and a corrective action arrange is prepared. we have a tendency to shall propose a system that may contribute to judge the attainment of the Course outcomes (COs), Program outcomes (POs) and Program specific outcomes (PSOs). The weightage after all outcome w.r.t Performance Indicator (PIs), its mapping with Program outcomes and Program Specific outcomes are mentioned in Course Information Form (CIF) System.**

Keywords— -Course Outcomes, Program Outcome, Program Specific Outcome, Co Attainment, Performance Indicator (PI)

I. INTRODUCTION

Graduate specialist is found as a worldwide resident having vibrant skillful talentsaffordable for the worldwide scenario. Here we require a technique for measurement of their talents. Each basis has its personalconcept and assignmentthat is abided with the aid of using the charactertasksthru their imaginative and prescient and mission. The National Board of Accreditation (NBA) in India has proven an all-roundcategorized set of Program outcomes. These program consequencesmay bepreparedin the direction of the precise order to coordinate the framing of course outcomes with a concept called "OBE". [2]

Outcome-based education (OBE) - a performance-based method has appeared as a major reform model in the universal engineering education scenario [12]. The country that wants to be a participant member of a multinational agreement for the common acknowledgement of engineering degrees, i.e., the Washington Accord (WA) must implement OBE.

This will be ratification that the engineering education system has established a robust, extensive-term commitment to quality assurance in producing engineers ready for commerce practicein the international scene. Being participant to the Washington Accord, Indian accreditation agency 'National Board of Accreditation (NBA)' has made it compulsory for engineering institutions to adapt OBE framework for their program design, delivery andassessment.InOBEframework,theeducational outcomes of a program are clearly and definitely specified. These determine the curriculum satisfied and its association, the teaching methods and approaches and the assessment process. Though Indian Universities and Colleges have started adapting OBE framework for their engineering programs, the attention is inadequate to the curriculum design part, i.e., involving curriculum components to the program outcomes. Very petite attention is being given for connecting examination questions/assessment tools to the program outcomes. The absence of proper mapping between program outcomes and assessment tools lead to the inaccurate and unreliable measurement of attainment of outcomes by the students. This missing connect creates a big gap in the effective adaptation of OBE framework, making the whole exercisefutile.

The course outcomes are smaller proclamationsthat depict what understudies are required to know and have the option to do toward the finish of each course i.e., subject. Expected course outcome statements refer to specific knowledge, practical skills, areas of professional development, attitude, higher-order thinking skills, etc. that faculty members expect students to develop, learn, or master during a course. The course outcomes are mapped to Programme Outcomes which are subsequently mapped to Programme Specific Outcomes. For calculating the attainment of PEOs, attainment of POs is taken as one of the inputs. Similarly, for calculating the attainment of POs, attainment of COs is taken as one of the inputs. Thus, CO is the one of the important factors in the accreditation.[3]

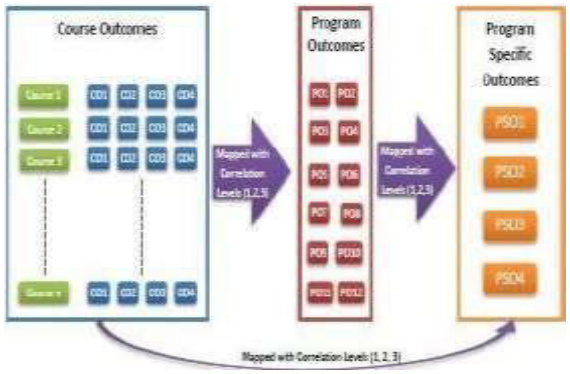


Figure:Relationship between CO, PO and PSO

II. RELATEDWORK

In one of the papers referred, Z. Yi, Q. Kun and L. Anling[1] have taken an example of a subject "The principles of imaging sensors" and showed us the calculation of curriculum-goals- completion evaluation. They defined curriculum goals according to the graduation requirements and designed the courses' content and teaching methods to make sure that the curriculum goals could be fulfilled. They claim that their curriculum-goals- completion approach was consistent with the 'Outcome Based Education' principle. Teaching methods, teaching content, assessment methods are designed closely around the curriculum goals, making the graduation requirement indicators could betracedandthenbeevaluated.Inthisway,foreach class,boththeteachersandthestudentswillbeclear thathowmuchtheirteachingorlearningcontributes to the future outcomes.[1]

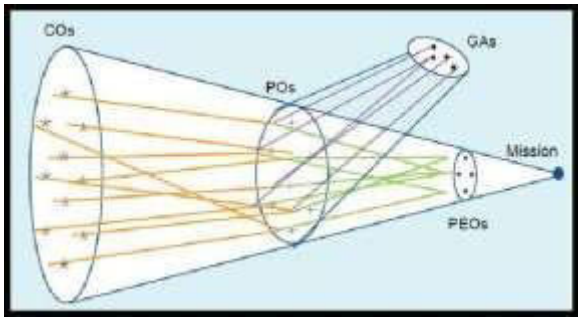


Fig: The relationship between curriculum goals completion evaluation and the graduation requirement[1]

A simple and effective method for calculation of course outcome attainment in University affiliated college is explained by M. Vanjale, S. Shelar andP.
B. Mane [3] in the below mentioned papers. Total marks obtained in the final exam are considered in the direct assessment, as the question wise marks obtained by the students are not available inthe University affiliated colleges. Indirect assessment was done with the help of 25-30 samples of course end survey. The analysis of result of CO attainment will help the staff members to improve the teaching learning process. This in turn will help the students in overall skill development, which is the prime expectation of OBE. The attainment of COs forms the key input for calculating the attainment of POs and PEOs. Thus, the formation, assessment and attainment of CO can be considered as seed of the successful accreditation, and the sincere efforts in the teaching learning process will lead to achievementofPO,PEOandVision,Missionofthe Program.[3]

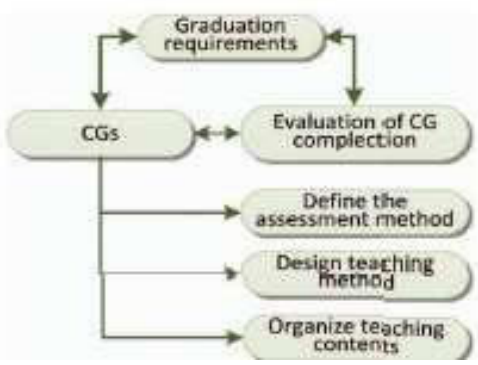


Fig: Correlation between PEOs, POs and Cos

After referring to many other papers, weunderstood the challenges that the colleges faced while carrying-out the attainment on MS-Excel.[2][3] We understood and realized that there is a need of an online automated system that helps college to attain courseandprogramoutcomes.Developinganonline system not only profits in time saving but also in preserving and tracking a large amount of historic data of past academic years. As we already know thattoretrievepast-datawehavetomanuallysearch all the Excel files whereas this is not the same inthe onlinesystem.

Havinganonlinesystemgivesefficiencyindefining subject teachers, mapping and attaining course outcomes. This also overcomes the wastage of time to always transmit excel files to colleagues. Compiling all the excel sheets of all the assessment methods for even a single subject is much more difficulttoperformifthereisnotaproposedsystem for it and hence we worked on 360 degree approach of having a collective mechanism of Course information form wherein the details of courses, teachers and course in-charge assigned to it and screens to enter marks of all the students of all the performanceindicatorsandanautomationsystemto

carryoutCO,POandPSOattainmentsystemcanbe done in the same Web basedApplication.

III. METHODS/IMPLEMENTATION

Performance Indicator: In general, assessment methodsareahugetopicbyitselfandcanbedivided into two major group's viz direct assessment, indirect assessment. It is frequently hard to put a specificevaluationtypeintoeitherdirectorindirect. Direct assessment is supposed to be essential forthe conveyance or instructional cycle, where it is utilized to assemble data and change the educating and learning continuously and the appraisal dependent on the imprints got in the assessments taken by the college. Indirect assessment is an approach, where the students assess themselves based on the questioner given by the course in- charge at the end of the course. The figure below depicts the assessmentmethods.

Assessment processes used for measuring the attainment of Course Outcomes following diagram depicts the process flow for measuring the attainment Course Outcomes. It also depicts the contribution of CO attainment levels for calculation of PO and PSO attainment levels.

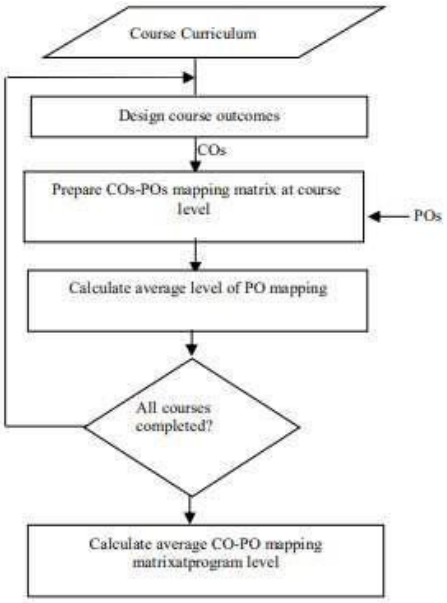


Figure: Flow Diagram for CO Attainment

There are certain steps to calculate the Course Outcome, they are as follow:

1. **InformationGathering:**

a. Identification / Defining Course Outcome: After a course is assigned to a faculty, if the course outcomes are not defined by the university to the course, the course outcome statements areidentified by the faculty and then the correctness and feasibility of the short listed outcomes is discussed inthedomainmeetingsandtheCOstatementsare finalized. If the statements are defined by the university then course In-charge analyze the scope and feasibility of those statements and if the In- charge feels that any or all the statement(s) are tobe changed then the scenario is discussed in domain meeting and the CO statements arefinalized.

b. DefiningtheweightagesofCOswithrespectto PIs: TheInternalAssessmentmethodsaretermedas PerformanceIndicator(PIs).FollowingPIsareused: Lab Experiment evaluation, Internal Assessment (Term Test), Assignments, Mini projects, Presentation, Quiz Case studies, Tutorial, Seminar. TheweightagesareassignedtoCOsaredocumented by course in-charge in the form named "Course Information Form (CIF)" which comprises following points and tables.

	CO1	CO2	CO3	CO4	CO5	CO6	Tota l
Weightage in %	15	40	20	10	10	05	100

Figure: Sample of Course Outcome Weightage Table

COs		AM1 Assignment		AM2 Term Test		AM3 (Quiz, Tutorial)		AM 4 (Seminar, Case Study)	
CO1	Number*	1	-	1	-	1	-	-	-
	Percentages**	100	-	100	-	100	-	-	-
CO2	Number*	1	-	1	2	1	-	-	-
	Percentages**	100	-	50	50	100	-	-	-
CO3	Number*	-	2	1	-	1	-	-	-
	Percentages**	-	100	100	-	100	-	-	-
CO4	Number*	-	2	-	-	1	-	-	-
	Percentages**	-	100	-	-	100	-	-	-
CO5	Number*	-	2	-	2	1	-	-	-
	Percentages**	-	100	-	100	100	-	-	-
CO6	Number*	1	-	-	2	-	-	-	-
	Percentages**	100	-	-	100	-	-	-	-

Figure: Course Outcome – Assessment Method Mappings

Calculation of Course Attainment: The weightages mentioned in the CIF are then entered into a MS Excel sheet prepared for the calculation of CO attainment. The same sheet will then be used by the course in-charge to enter the marks/grades obtained/awarded by/to the each student during continuousassessment.Forthecalculationofcourse outcome attainment of a course the method is divided into three mainparts:

- Direct Method (Internal Assessmentusing predefined PIs)
- Indirect Method (Course Exit and Lab Exit Surveys)
- University Assessment (Theory, Oral/Practical Examinations)

2. AttainmentEvaluationCriterion: Foracademic year the threshold for course level outcome attainmentlevelissetbytheuniversityorthecollege whichissupposedtobe60%ofmaximumvalue,for evaluating and continuous improvement the threshold levels are increased consequently for the following academic years. Also, for Internal Assessment and Assessment done by Universitythe

attainment evaluation criterion is revised for every academic year. The following table shows the example for revisions of evaluation criterions for last three academic year.

ademic Year	1	2	3
2015	62<=x<67	67<=x<72	72<=x
2016	63<=x<68	68<=x<73	73<=x
2017	65<=x<70	70<=x<75	75<=x

3. Evaluation Based on Course Exit Survey:
Every course in-charge frames the questions based on the course curriculum, every question is mapped to one or the other course outcome. At the end of every semester a survey based on the general question regarding the course and the lab are taken from the students using Google Form or Microsoft Form for each course where student analyzehimself or herself regarding what he has gained after completingthecourseandtowhatextent.Theresult of this survey is then analyzed and the analysis results are used in the calculation of each individual CO attainmentlevel.
After obtaining the outcome levels using all 3 methods for each individual CO using the weightages, the attainment levels of each CO are calculated. Based on the weightages given for an individual CO at the course level the Course Level CO attainment value is obtained.

4. AnalysisofCOattainmentlevelandCorrective / Improvement Actions:
After we calculate the attainment value of course outcome, if the calculated value of any individual CO attainment level or course level CO is belowthe threshold then the individual CO and its respective PIs are recognized and a corrective action plan is prepared. Also, if the value is above the threshold level but below the previous year attainment level then also the corrective action plan is prepared and if the current year value is improved as comparedto previous year of study then to improve it further the improvement action plan is prepared by the course in-charge. The action plan is then executed in the next academicyear.

5. Assessment processes used for measuring the attainment of Program Outcomes and Program SpecificOutcomes:
For calculation of PO & PSO Attainment level values, along with the values obtained for CO attainment four indirect methods are introduced and their Indirect Method Outcomes are also defined.
The Indirect methods are:
1. Co-curricular Activities
2. Extra-Curricular Activities
3. IndustrialVisit
4. LiteratureReview

Along with these indirect methods technical events organized by the chapters of professional bodies are also contributing for the attainment of POs and PSOs.

For choosing the theme for the specialized occasion, every occasion head recognizes the zones dependent on course content, lab tests, past educational program subjects and a hole distinguished from some course, improvement of a ranges of abilities or social-ecological factors and guides the occasion results to those regions. Hence, by getting sorted out different occasions the expert bodies and different cells of the establishment supports the climate for accomplishing the vision and mission through achievement of the program results and program explicit results. According to gives Correlation factors for each Course Outcome and Program Outcome and Program Specific Outcome.TheattainmentlevelforeachPOandPSO is calculated by using the followingformula.

Attainment of PO is calculated using following formula;
***POi = SUM-PRODUCT (COj ,POij) / n**
Where,
POi – PO attainment value for ith PO COj – CO attainment value for jth CO POij – POi correlation level for jth CO
n – no. of COs for which POi correlation level is non zero. * Similarly, for PSO.

6. Analysis of PO & POS attainment level and Corrective / ImprovementActions:
After obtaining the attainment values if the attainment level of any PO isn't over the limit then the course and its individual CO because of which the PO isn't achieved is recognized and a remedial activity plan is arranged additionally on the off chance that the estimation of over the edge level, at that point the fulfillment levels are contrasted and the amount of normal of accomplishment levels of each PO of last two academic years and 10% target. If the attainment levels are beneath this model then the restorative activity plan is readied and it is executed in next scholastic year.

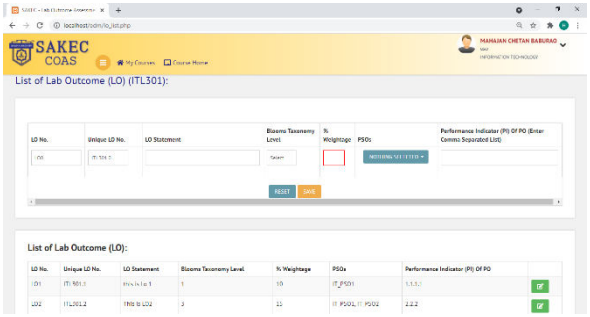


Figure: List of Course Outcome

Intheabovefigureitallowsthefacultyorthecourse in charge to define all the course outcomes for a particularsubjectandthefacultycanalsomapallthe listed course outcomes to the Program Outcomes and Program Specific Outcomes of a particular subject.

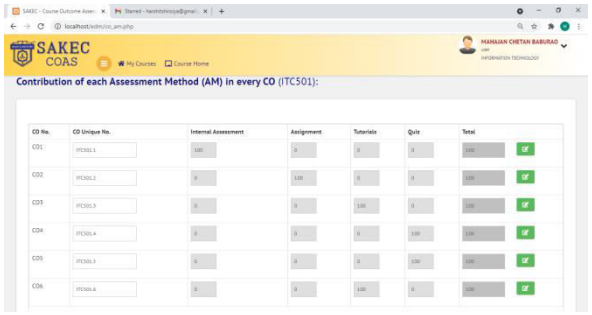


Figure: Weightage of Assessment Methods

This figure demonstrates the contribution of each Assessment method or the performance Indicator in each and every Course Outcome defined by the facultyortheCourseIncharge.Themethodscanbe selected and also the weightage of each method can be specified which will help to calculate the overall Courseattainment.

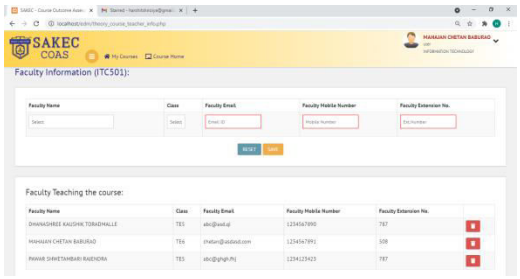
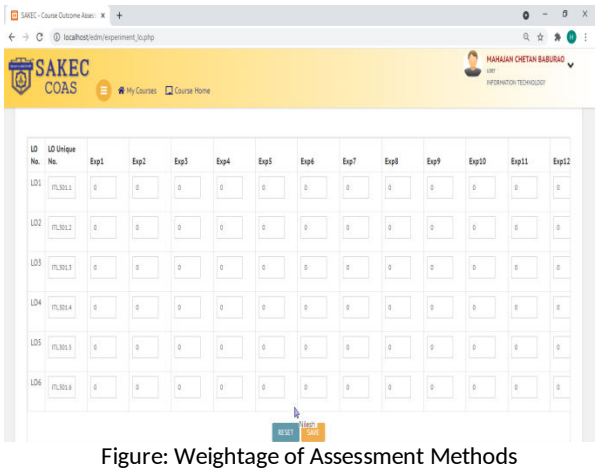


Figure: Assign Course In charge

The figure shows the module where the Head of the department or the admin can assign or appoint the course in charge for a defined course of a particular semester.

7. CO and LO Mapping and with Performance Indicators:



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Intheabovefigureitallowsthefacultyorthecourse in charge to define all the course outcomes for a particularsubjectandthefacultycanalsomapallWeightage of Assessment Methodsto the Program Outcomes and Program Specific Outcomes of a particular subject.

8.Division and batch wise marks input for Performance Indicator (PI):

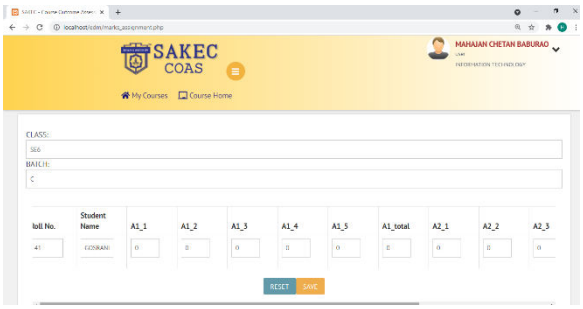
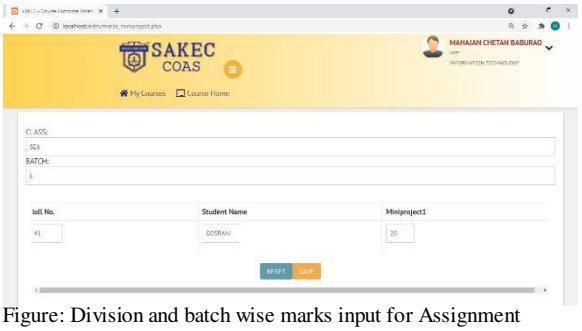


Figure:Division and batch wise marks input for Assignment

Intheabovefigureitallowsthefacultyorthecourse in charge to define all the course outcomes for a particularsubjectandthefacultycanalsoenter the marks question wise for each student according to theDivision and batch wise and it displays the students allocated to the particular faculty (batch) marks input for Performance Indicator Outcomes and Program Specific Outcomes of a particular subject.



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9. Automation Flow:

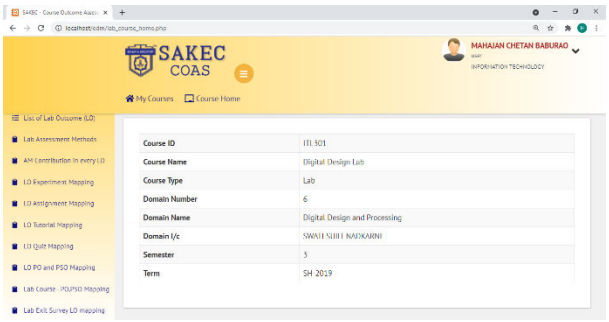

Figure: Automation for CIF System

Intheabovefigureitallowsthefacultyorthecourse in charge to define all the course outcomes for a particularsubjectandthefacultycanalsomapallthe listed course outcomes to the Program Outcomes and Program Specific Outcomes of a particular subject and it is

Automated for CIF System.

V. CONCLUSION AND FUTURESCOPE

Courses are the structure squares of a program. Teaching techniques, learning exercises, assessmentsandresourcesshouldallbeplannedand coordinated to assist understudies with accomplishing the learning results at the course level. In the assessment activities, students show their degree of accomplishment of the course learning outcomes. In a productively adjusted program, the courses are deliberately organized to guarantee consistent turn of events or platformfrom the prologue to dominance of the learning results, promptingaccomplishmentoftheexpectedPOs.For theadequacyoftheprogram,theaccomplishmentof POs is crucial which should be demonstrated through precise, reliable and solidappraisals.

This concept of OBE can be taken into a deeper approach by lining the attainment conclusions with data science i.e., a thorough analysis can be doneon student's performance throughout graduation a particular and relevant domain (Data structures, Computer Networks, Cloud Computing, etc.) canbe determined for that student in which he/she is good at. After calculating the final attainment of acourse, the staff member needs to analyze the results of direct and indirect assessment critically for the COs which are not attained. Accordingly, the changes in the course delivery and teaching learning methods should be done. If all the course outcomes are attained, then the higher goal can be set for the next semesterthisanalysismechanismcanbedoneeasily using an online system than in Exceldocuments.

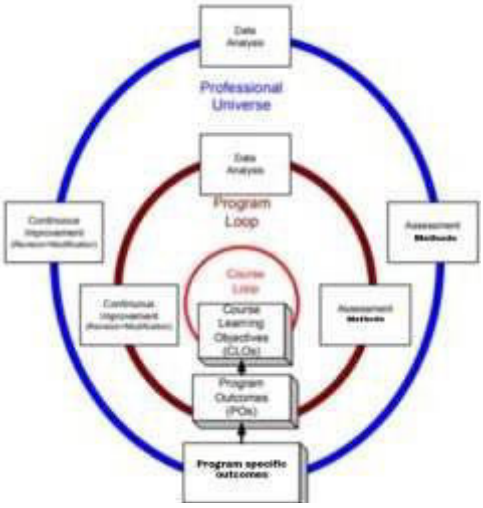

Fig: Proposed System

Hence by knowing the challenges faced by universities and colleges we can come to a conclusion that mapping and attainment of COs, POs and PSOs i.e., practicing an OBE (Outcome based evaluation) is much easier on a Web Based system because of above mentioned pros.

ACKNOWLEDGMENT

"Mentoring is a brain to pick, an ear to listen anda push into the rightdirection."

Theresultoftheprojectthatconsumeshugeamount of work, research and dedication is fruitful. Still, implementation would not have been possible if we did not have a support of our mentors: Prof Chetan Mahajan and Ms. Nida Jawre. Therefore, we would liketoextendoursinceregratitudetohim.

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