

Development of OBE Module for Technical Program

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Abstract- Accreditation is said to be an important part for assuring quality of institutions regarding education in colleges and university, particularly in engineering education. In present work an effort is made to develop computer-based system to facilitate the faculty members of the specific technical program to add, edit, update, and generate report of various accreditation outcomes. The OBE module basically consists of CO, PO, PEO, PSO emphasizes target and attainment on the report which would help in making decisions for continuous improvements. As sample targets and attainments of CO, PO, PSO has been discussed to validate the present module. The sample module is developed using Excel to calculate direct and indirect CO assessment. An average attainment is set and the individual attainment levels (low, medium, and high) are calculated to investigate the performance for the course.

Keywords- OBE, CO, PO, PSO, PEO, Attainment and Mapping.

I. INTRODUCTION

Outcome-Based Education (OBE) is a student-centric teaching and learning methodology in which the course delivery, assessment is planned to achieve stated objectives and outcomes. It focuses on measuring student performance i.e., outcomes at different levels. OBE is outcome-based learning in which the engineering graduates are trained to have better knowledge, skill sets and attitudes. In OBE certain targets are set and teaching learning activities are properly planned and organized to achieve the targets. The success of any program depends on the attainment of course outcomes and program outcomes. The CO-PO mapping and its attainment calculations are an integral part of OBE and it helps in continuous quality improvement, which serves as feedback for OBE loop. The program must evaluate the attainment of student outcomes, these evaluations must be used as inputs for continuous quality improvement. The attainment levels of each POs and PSOs of the program are compared with target levels and the observations are recorded.

II. LITERATURE SURVEY

[1] **S. Sangeetha Et al., “Android Application for College Website,” 2016.** In the previous system, all the information has to view in a hard file, or in website. At the same time while searching any information it is too difficult to access and takes a lot of time to search a particular website. Hence, in order to overcome this problem a smart phone Android application for college provides one attractive environment where you can manipulate information about college easily. In this, students and other authorities get all the information in their hand. It is software which is helpful for students as well as the college authorities. The main principle behind the need of Android app for college is easy supervision of Institute. This software can help us to explore all the activities happening inside the college. It can handle the details of courses, maps, events, news, etc.

[2] **Hossein Rahemi Et al., “Student Learning Assessment and Curriculum Continuous Improvement Process,” 2008.** The aim is to implement an assessment process that will measure student-learning outcomes and develop a model for a continuous improvement process that will ensure student success in engineering, engineering technology and management programs. This process will include a methodology that adapts to changes in technology. It will adopt new tools and skills to improve student performance through the course and program. Implementation of this process will provide instructors with a continuous assessment tool that can be used to check course contents, thereby indicating any new technology and teaching skills needed to enhance student performance through the course and program.

[3] **Abhishek Kumar Et al., “NBA Web Portal,” 2017.** A web portal we designed for college management system. This paper develops and describes a web model which covers different aspects of web designing. Visual Studio is used for designing purpose and c# is used for the purpose of coding and database management. The aim of this project is to create a software for Computer Engineering Department; purpose of this is to evaluate the “Self-Assessment Report”. This software gives permission to the staff to evaluate, their proctor details, result details and allotted subject. The project is more user-friendly so that anyone have minimum computer knowledge can access and handle the software without having any complexity.

[4] **D.R. Kalbande Et al., ‘Software development for CO and PO attainment’**
In today’s competitive world, every institute needs to keep their academic standard as high as possible. It becomes mandatory for all most all the institutes to maintain the quality in technical education as well as to produce the skilled graduates. In order to produce the skill graduates, the Institute always rely on different programs which is responsible for producing the high calibre graduate. As of now, there is no such application available which will automate at least the process of reducing the clerical work required for preparing the course file to evaluate the Course Outcome with Program Outcome. NBA has laid down the guidelines for each program through the means of rubrics to undergo this evaluation process which implies the accreditation grade to be given from

NBA committee. This application allows the faculty to enter the details about their courses in terms of mapping with PO, PSO and Bloom's Taxonomy. The application calculates the PO attainment which helps the faculty about the existing gap which further can be improved in the next semester. Hence such type of application will assist the faculty to reduce their workload regarding the individual course.

[5] Dawson Et al., "To examine the impact of outcome-based education on student learning," 2013.

Increased accountability has been a catalyst for the reformation of curriculum and assessment practices in postsecondary schools throughout North America, including veterinary schools. There is a call for a shift in assessment practices in clinical rotations, from a focus on content to a focus on assessing student performance. Learning is subsequently articulated in terms of observable outcomes and indicators that describe what the learner can do after engaging in a learning experience. The purpose of this study was to examine the ways in which a competency-based program in an early phase of implementation impacted student learning and faculty instructional practices. Findings revealed that negative student perceptions of the assessment instrument's reliability had a detrimental effect on the face validity of the instrument and, subsequently, on students' engagement with competency-based assessment and promotion of student-centered learning. While the examination of faculty practices echoed findings from other studies that cited the need for faculty development to improve rater reliability and for a better data management system, our study found that faculty members' instructional practices improved through the alignment of instruction and curriculum.

[6] Sunil Kumar Bangi Et al. "Development of an Institutional App by adopting Android Play," 2017.

The whole information of any organization or an institution must view in a hard file, or in website in the current circumstances. At the same time while searching any information it is very hard to access and takes a lot of time to search the website. Because of this, in order to overcome this problem a smart phone-based application using Android can be used to make this process easier, secure and less error prone. The Android application is portable and can be easily installed and used on any mobile phones supporting Android OS. It also provides an interface which is easy to understand by the users and greatly helps in adapting to the use of this application. Android is an open-source Linux based system developed by Google, and mostly aimed at mobile handsets and other portable devices. One of the most interesting features of our application is "The Digital Attendance Management System". The digital attendance management system provides flexibility to the faculty to take attendance of the students directly in the application.

[7] Sunil P Rajput Et al. "Automatic report generation for NBA," 2018.

The idea to make something useful for academic environment has led us to "Automatic Report Generation for NBA Criteria 1 to 5" web application with user data. The application mainly focuses on reducing the manual work that takes place while collecting the data as well as calculating the NBA criteria. It also provides additional functionality communication between staff and students. The application helps in maintaining yearlong records in a systematic way and can be retrieved whenever one feels the need to. The main goal of our proposed system is to automate the report generation of NBA criteria once all the necessary data is uploaded to the portal.

[8] R. Jeyanthi, "A Study on Sample Measuring the Attainment of CO-PO and Empowering the Students Through OBE Among Pedagogy of English Course in B.Ed. Program," 2019.

The important element of outcome-based education (OBE) is attainment of course outcome (CO) and program outcome (PO). Modified version of self-assessment report (SAR) by national board of accreditation (NBA) is the guidelines of this paper. NBA specified the OBE system in criterion. Specifically, Criterion emphasis the attainment of CO and PO. The sample measuring procedure done with all semester English pedagogical scores. Steps and procedure of attainment level and finding weak POs are addressed in this paper. In this assessment helps to find the weak POs and well-established POs mapping with course objectives. Based on the revised Blooms Taxonomy of educational objectives all the course outcome and program outcomes framed with its knowledge level. Education is the process of transferring knowledge, skill, and content of subject oriented information.

[9] V. S. Kumbhar "Impact of Outcome-Based Education in Indian Universities" 2020.

This study examines the understanding of Outcome-Based Education among Indian university's higher education institutions' faculty members. The outcome-based curriculum is one of the most significant advances in recent years of Indian Education worldwide. For some time, the result-based curricula are changing or are in the proposal stage of preparation. The outcomes, process of change, and implementation of the result-based approach are outlined. The traditional education system is losing its importance in the age of globalization. It becomes essential to work with rapidly developing technologies that expect supplementary skills and efforts. The institute aims to produce students with the ability to cope with recent trends and technologies. It becomes mandatory to adapt and become familiar with conventional Education to Outcome-Based Education (OBE) to fulfill its needs. Outcome-Based Education is a paradigm of Learning which focuses on outcomes or goals rather than performance.

[10] B. Rajagopal Reddy Et al., "A Case Study on the Assessment of Program Quality through CO-PO Mapping and its Attainment," 2021.

In recent years, accreditation of National Board of Accreditation has become mandatory for all the Autonomous colleges and Universities. NBA stresses on Outcome Based Education to improve the quality of education. It has formulated twelve graduate attributes to measure the quality of the program that a graduate has to acquire from any college/university during his four years of under graduation. The success of any program depends on the attainment of course outcomes and program outcomes. But there is a lack of understanding among the Engineering faculties in CO-PO attainment calculations. This study explores the significance of

proper CO-PO mapping and its attainment calculation. CO-PO mapping and its attainment calculations are an integral part of OBE and it helps in continuous quality improvement, which serves as feedback for OBE loop.

III. OBJECTIVES

- To develop the criteria-based CO attainments.
- To develop a module to set the target for CO attainments.
- To generate CO-PO attainment based on set attainment level.

IV. METHODOLOGY

The following steps are to be followed with regards to the OBE module. The panels are created in the visual studio using C#, HTML, CSS, MSSQL Server and are discussed in the following paragraphs.

Step 1: Login panel

The login panel is carried out for both admin and faculty. The user must have login credentials to access the site.

Step 2: Admin panel

The page is for the admin. They could control the courses by adding and deleting it. This panel is also used to add the faculties and to view the total course and faculties added.

Step 3: Faculty panel

This is page for the faculty. In this panel course details are added.

Step 4: Syllabus copy generation

Syllabus copy format is created according to department format.

Step 5: Mapping of CO-PO matrix

The interface is created for the mapping of Co with Po for given attainment.

Step 6: Calculation of CO attainments

The calculation is carried out using excel sheet for both CIE and SEE.

Software used

1. HTML
2. CSS
3. JavaScript
4. C#

4.1 Algorithm

Step 1: Start

Step 2: Login

i.If the user is admin, go to step 3

ii.If the user is faculty, go to step 4

Step 3: If admin login

i.Register Faculty

ii.Edit/delete Faculty

iii.Go to Step 6

Step 4: If Faculty login

i.Enter Name

ii.Enter Subject and subject code

iii.Enter the course outcome

iv.Enter CO description

v.Enter the marks details

vi.Enter attainment level

vii.Enter attainment target

viii.Enter the linked Bloom's Taxonomy

Step 5: Mapping of CO-PO, go to step 6

Step 6: Stop

4.2 Use case diagram

The Figure 4.2 shows the Use case diagram for user interface.

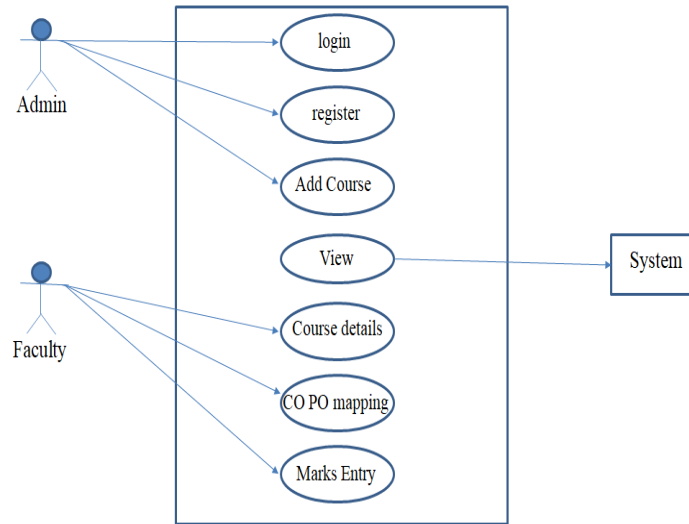


Figure 4.2 Use case diagram

4.3 Software requirement specification: The software requirements for the implementation is shown in Table 4.1

Table 4.1 Software Requirement

Software	Version
Operating system	Windows 8/10
Front End	HTML, JavaScript, CSS
Back End	Visual studio
Web Browser	Google chrome, Mozilla Firefox, Edge
Data base	My SQL

4.4 Hardware requirement specification: The Hardware requirements for the implementation of the projects is shown in Table 4.2.

Table 4.2 Hardware Requirements

Requirements	Specifications
Processor	Intel High generation laptop 2GHz and above
RAM	2GB and above
HDD/SSD	200GB/256GB above

V. IMPLEMENTATION

5.1 Admin and Faculty module

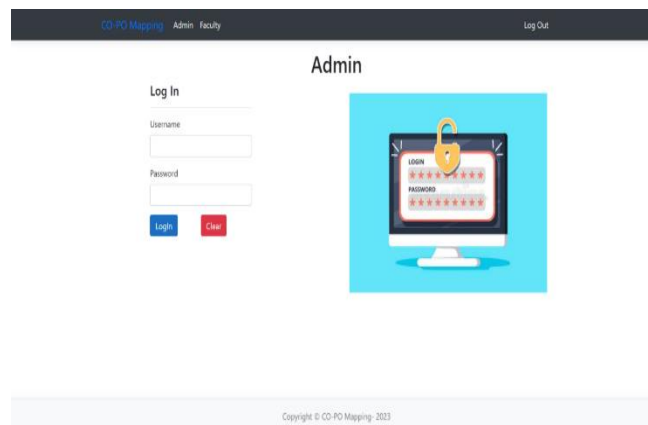


Figure 5.1.1 Admin module

The Figure 5.1.1 shows the Admin module. This page is for the admin login. After login in the admin will be taken to the admin Dashboard page.

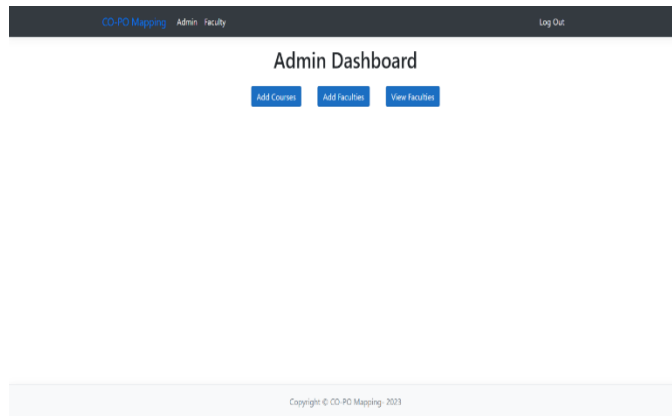


Figure 5.1.2 Admin Dashboard

The Figure 5.1.2 shows the Admin Dashboard. In this admin can add the course, faculties and their information. Admin should add the faculty details like name, email id, contact number, date of birth and designation.

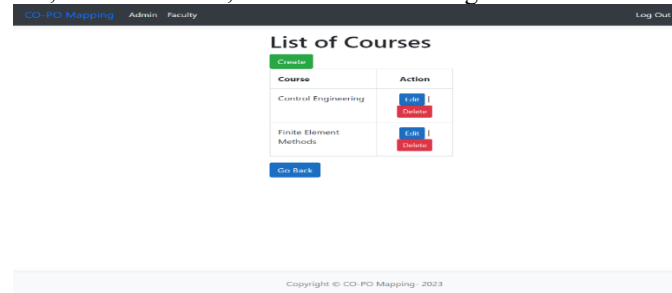


Figure 5.1.3 List of course

Figure 5.1.3 shows the List of course. After registering the course, this page is to view and edit the registered course.

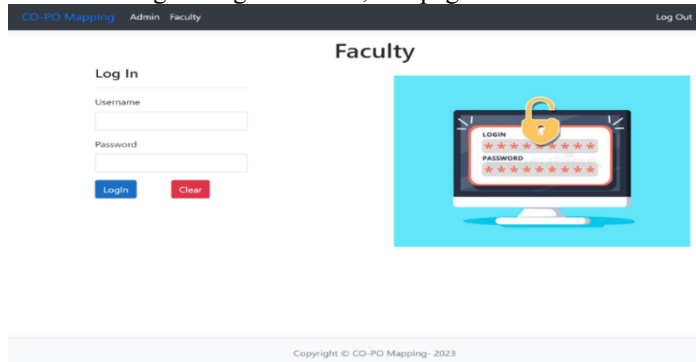


Figure 5.1.4 Faculty module

The Figure 5.1.4 shows the Faculty module. This page is for the faculty login. After login the faculty will be taken to the faculty dashboard page.

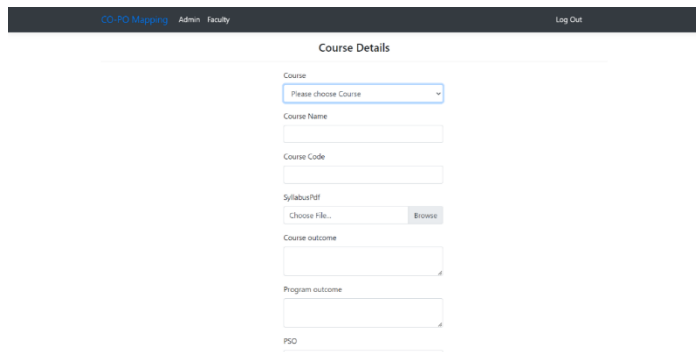


Figure 5.1.5 Course details

The Figure 5.1.5 shows Course details. This is the page about adding the course details which is registered by the admin. It contains the details like course code, course outcome, program outcome, syllabus copy attainment level, target level and the linked blooms taxonomy.

5.2 Syllabus copy

BASAVESHWAR ENGINEERING COLLEGE (AUTONOMOUS), BAGALKOTE- 587 102

MECHANICAL ENGINEERING

UNIT -1 <small>Table Row 2, Column 1 (Herged)</small>	Table Row 1, Column 2
UNIT -2 <small>Table Row 2, Column 1 (Herged)</small>	Table Row 1, Column 2
Course Outcomes <small>Table Row 2, Column 1 (Herged)</small>	
Question Paper Pattern for SEE: <small>Table Row 2, Column 1 (Herged)</small>	

Download PDF
CO-PO Status Attainment

Figure 5.2 Syllabus copy

The Figure 5.2 shows Syllabus copy. This is the page containing the syllabus copy in which faculties can enter the details like course name, course code, total hours, credits, CIE marks, SEE marks, reference books and question pattern.

5.3 CO-PO matrix

Course Outcomes(CO)	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	3	----	----	----	----	----	----	----	----	----	----	----
2	----	----	1	----	----	----	----	----	----	----	----	----
3	----	----	----	----	----	----	----	----	----	----	----	2
4	----	----	----	6	----	----	----	----	----	----	5	----

Figure 5.3 CO-PO matrix

The Figure 5.3 shows CO-PO matrix. This page contains the mapping of course outcome to the program outcome and converts to pdf format.

VI. RESULTS AND DISCUSSION

6.1 CO attainment calculations

6.1.1 CO attainment calculation for CIE:

PO Direct assessment Tools = CO assessment Tools

Direct CO assessment – 20

Indirect CO assessment – 80

Illustration of CIE Attainment:

Table 6.1 gives the illustration of CIE Attainment

Table 6.1 Illustration of CIE Attainment

Course	Advanced manufacturing Technology
Maximum marks	50
No. of students appeared	70
Passing level (Threshold based target)	50%

- **Threshold based target:** It is the total passed percentage of all the students of previous 3 years in the subject. CO1 is calculated as given below,

$$CO1 = \frac{\text{Marks obtained by an individual for Q1 and Q2}}{\text{Maximum marks for Q1 and Q2}}$$

$$\text{For Example: } CO1 = \frac{8+6+6+8+1}{9+6+6+9+1} = 0.935 = 93.55\%$$

- % of students scoring more than 50% in CO1 = $\frac{\text{No. of students scoring more than 50\%}}{\text{Total No. of students}}$
- Average attainment = $\frac{\text{No. of \% of students scoring more than 50\% in all COs}}{\text{Total number of COs}}$

For Example

No. of Students getting more than 50% in CO1 = 7

% of students scoring more than 50% in CO1 = 100

Average Attainment = $\{(100+100+100+100)/6\} * 100 = 66.67$

% of students scoring more = 85.71
than 50% in CO1

Average Attainment = (85.71+85.71+85.71+71.43)/6 = 54.76

The Figure 6.2 shows SEE marks in Excel sheet

Basaveshwar Engineering College (Autonomous), Bagalkot																																		
Department of Mechanical Engineering																																		
Evaluation of course outcomes from Semester End Examination (SEE)																																		
Year	2022-23																																	
Course Name	ADVANCED MANUFACTURING TECHNOLOGY																																	
Course Code	UME716E																																	
Semester	7 SEM																																	
L:T:P	03:00:00																																	
Credits	3																																	
Faculty Name	Dr. Vinay V Kuppast																																	
		Attainment Levels																																
		<60% 0																																
		>=60% and <=70% 1																																
		>70% <=80% 2																																
		>80% 3																																
		Total Marks																																
		Q1			Q2			Q3			Q4			Q5			Q6			Q7			Q8											
		a	b	c	a	b	c	a	b	c	a	b	c	a	b	c	a	b	c	a	b	c	a	b	c	a	b	c						
		8	6	6	12	8		8	6	6	10	10		10	10		10	10		5	10	5	8	6	6									
		Mark allotted																		20	32	48	20	15	25									
		COs																		CO1	CO2	CO3	CO4	CO5	CO6									
S.No.	Student Name	USN	1	1	1	2	3		2	2	2	3	3		3	3		4	4		6	5	5	6	6	6								
1	Bhardwai K Mohare	2BA19ME027	7	5	0				7	5	0	4	10		10	8								7	5	0	60.00	60.00	80.00	NA	NA	60.00		
2	Javadev C Tippannavar	2BA19ME040	8	5	3				8	5	0	10	10		10	8								7	6	5	80.00	65.00	95.00	NA	NA	90.00		
3	Maheshwar S K	2BA19ME046	5	5	0	12	7		8	6	0				10	8								3	4	2	50.00	81.25	89.29	NA	NA	45.00		
4	Srivatsa P Kulkarni	2BA19ME102	2	3	5				2	5	0	10	4		8	6								8	0	0	50.00	35.00	70.00	NA	NA	40.00		
5	Sagar S Shirol	2BA19ME076	4	4					8	6	6	2	5		8	6								8	5	5	57.14	100.00	52.50	NA	NA	90.00		
6	Vikram Babanaagar	2BA19ME111							0	4	6				0	5								0	5	6	NA	50.00	25.00	NA	NA	55.00		
7	Vinay Palled	2BA19ME110	5	3					3	4	5	8	3		10	8								8	6	6	57.14	60.00	72.50	NA	NA	100.00		
		No of students scoring more than 50%																		6.00	6.00	6.00	0.00	0.00	5.00									
		% of students scoring more than 50%																		85.71	85.71	85.71	0.00	0.00	71.43									
		Avg. Attainment																		54.76														
		Attainment Levels																		3	3	3	0	0	2									

Figure 6.2 SEE marks in Excel Sheet

VII. CONCLUSION

The following conclusions have been made to assist technical program faculties:

- Computer module with user interface to facilitate admin and faculty login.
- CO-PO mapping is done based on Bloom's Taxonomy levels.
- The course syllabus is generated for each course of the program.
- A module to calculate CO attainments (CIE and SEE) is developed using Excel.
- CO Attainment levels have been calculated for the set attainment values which provides a ready reckoner to measure the performance for the course.

Scope for future work

The application of this software can be upgraded to a multiplatform application by C#. As C# is used as the programming language to design the software, upgrading to cloud-based software will not be much of the problem. The automatic mapping of CO-PO matrix can be done.

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