

## Dashboard for Learning Outcome based Attainment Measurement

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**Abstract**— AICTE (All India Council of Technical Education) specifically requires colleges under it to adhere to certain guidelines regarding the courses taught. Each course has certain Course Outcomes (CO) which tell what the students are supposed to learn and also indicate to what degree they have learnt the subject. Similarly, Program Outcomes (PO) indicate the same about the programs taught in the college. Professors currently maintain all this data manually which means a lot of work is put in Excel documents and huge files are maintained. This system helps in achieving the error free attainment calculations as it eliminates the manual calculation using spreadsheets. It helps to increase the productivity of the faculties as the manual work is eliminated and data is stored and retrieved in a safe and secure manner.

**Keywords**-Course Outcomes, Program Outcomes, Excel, Attainment, Outcome Based Education

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### I. INTRODUCTION

Most undergraduate colleges require the professors to maintain files about courses they teach. These files typically contain years' information of the course taught, the students' performance in the course and how they fared in relation to each other.

AICTE (All India Council of Technical Education) specifically requires colleges under it to adhere to certain guidelines regarding the courses taught. Each course has certain Course Outcomes (CO) which tell what the students are supposed to learn and also indicate to what degree they have learnt the subject. Similarly, Program Outcomes (PO) indicate the same about the programs taught in the college. Professors currently maintain all this data manually which means a lot of work is put in Excel documents and huge files are maintained.

The aim of this system extends to the efficient and proper arrangement of facilities for the faculty. In the previous system, which consisted of pen and paper method, the faculty were obliged to write down every detail. In this proposed new system, an automated and organized system is being developed for the better use of the time of the faculty. In

addition to this, machine learning is being implemented for suggestion analysis which after the assessment of the data, a suggestion list is generated for every faculty.

This system helps in achieving the error free attainment calculations as it eliminates the manual calculation using spreadsheets. It helps to increase the productivity of the faculties as the manual work is eliminated and data is stored and retrieved in a safe and secure manner. Faculties can focus effectively on their other responsibilities. It generates various reports such as CO-PO, PO-PEO mappings, program articulation matrix, student analysis, various attainment reports, survey reports in a click of button. This saves a lot of time for HOD and faculties. Hence, it eliminates the manual work. Along with this, the students are also benefitted as they get suggestions relating to their subjects.

### II. RELATEDWORK

Here the authors Mousami Vanjal and Sachin Shelar [1] provide a simple and effective method for calculation of course outcome attainment in University affiliated college is explained in this paper. 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 in the

University affiliated colleges. Indirect assessment is done with the help of 25-30 samples of course, end survey. The analysis of result of CO attainment helps the staff members to improve the teaching learning process. This in turn helps 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 achievement of PO, PEO and Vision, Mission of the Program.

Here the authors Izham Zainal Abidin, Adzly Anuar and Norshah Hafeez Shuai [2] provide a method to calculate Course Outcomes using the Microsoft Excel software. In this method we see a proper method of calculating the course outcomes. For any course we use tools like test marks, project marks and assignment marks among other tools. It is also possible to create action plans for improvement in performance the next semester..

### III. PROPOSED METHODOLOGY

#### A. Administrator

##### 1. Add Teachers and Add Courses

Admin can add teachers to the system by creating accounts for them. He enters their email ID, the password for the account, their name and the Department they belong to. Admin adds the courses by entering the Course ID, Course name and the department which the course is a part of.

##### 2. Assigning Courses to Teachers

Admin can assign courses to teachers using the dropdowns. If he wishes to change an allocation, he simply has to choose the said course and choose a new teacher for it.

##### 3. View the assigned courses

This is for the admin to view all the courses assigned to teachers. Any change made in the assignment will be reflected here.

#### B. Teacher

Based on the courses that are assigned to every teacher by the admin, the teacher gets to view only those courses thus making their work happen more efficiently. Once the teacher selects anyone of the course, they will be able to view: CO Attainment, PO Attainment, Report Generation, Time Table, Syllabus-text books, Course Objectives, Lecture Plan, Lab assignments, Curriculum Gap, List of Experiments, Lab Manual, Rubrics, Unit test question papers, etc.

#### C. Course Outcome Attainment

To calculate Course Outcome, we need information about the Course, its Course Outcomes and the tools belonging to each Course Outcome.

Tools include: Unit Test marks, End Semester Theory/Practical marks, Lab Assignment marks, Course Exit Survey results, Guest Lecture attainment, Seminar attainment and many others.

We make the use of Excel sheets to calculate the Attainment Level for each tool. We provide a Download button on the dashboard which will download a template of the Excel file to be used.

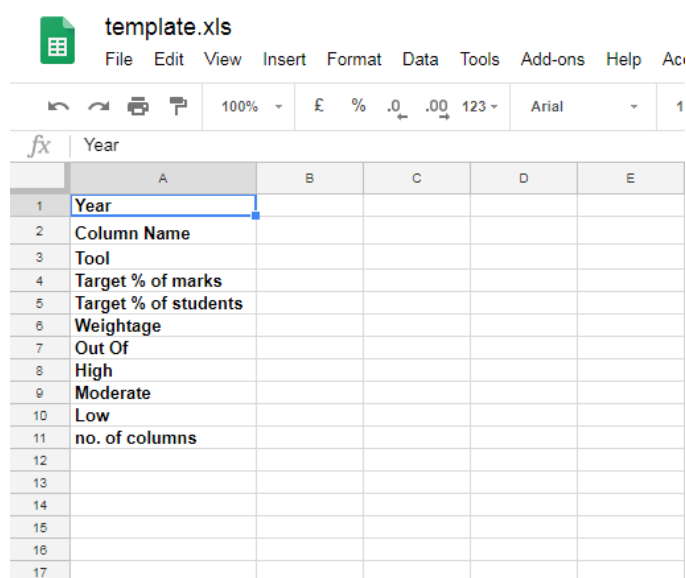


Figure 1. Excel Template

After downloading the Excel sheet template, the teacher fills in the details regarding the tool and uploads it back to the web app, where the CO attainment is calculated and stored to the database. This template contains details regarding the tools which have to be filled by the teacher for the CO attainment to be calculated.

If the column name written is “Test1(20)”, then the Excel tool will search the excel sheet for the cell having this exact name. Once it reaches this cell, it will start traversing the column and start checking whether the values in that cell are greater than or equal to the target % of marks.

The total number of students calculated are the successful students who have marks more than the target. We then divide number of successful students by the total number of students and multiply by 100, giving us the attainment percentage. Then to know the attainment level, we check which category the attainment percentage lies in High, Moderate or Low and accordingly categorize it.

#### D. CO-PO Mapping

Every Course Leads to Some Outcomes. All the courses together must cover all the POs.

For a course we map the COs to POs through the CO-PO matrix. The values can be any

number 1, 2 or 3, this indicates the attainment level of that CO to the corresponding PO.

Object Oriented Programming Methodology CSC302 -C202												
Understand Object oriented concepts like data abstraction, encapsulation, inheritance, polymorphism, exceptions, packages etc.	3		3							3	3	1.9
Solve computational problems using basic constructs like if-else, control structures, arrays, strings.	3	3	3	2						3	3	1.9
Model real world scenario using classes (IS-A and HAS-A relationship)	3	3	3	2						3	3	2.1
Demonstrate programs on exceptions, multithreading and applets.	3	3	2	2						3	3	2.2
TOTAL	12	9	11	6						12	12	
CO-PO MATRIX	3	3	2.75	2						3	3	
PO ATTAINMENT	2.025	2.0666	2.06	2.0666						2.025	2.025	

Figure 3. CO-PO Mapping

Here, for every course outcome we need to enter which year and course name it belongs to. Now the horizontal table format is given for 12 POs as defined by NBA in which the teacher will have to enter the attainment level value for that particular course outcome and the program outcome.

TOTAL it is the sum of the attainment level values done for all the POs.CO-PO Matrix value is calculated by (TOTAL/number of COs to which it is mapped).

#### E. PO Attainment

- Establish Attainment levels for all the COs applicable for that course by Inspection of the evidence available for the purpose.
- Then, as per the CO – PO matrix, created for the purpose, map these results into PO attainment levels.
- For every PO, PO attainment is calculated by

$(3 \times \text{Average (CO Attainment values of COs having value 3 mapped to it)} + 2 \times \text{Average (CO Attainment values of COs having value 2 mapped to it)} + 1 \times \text{Average (CO Attainment values of COs having value 1 mapped to it)}) / (3+2+1)$ .

#### F. Graphs

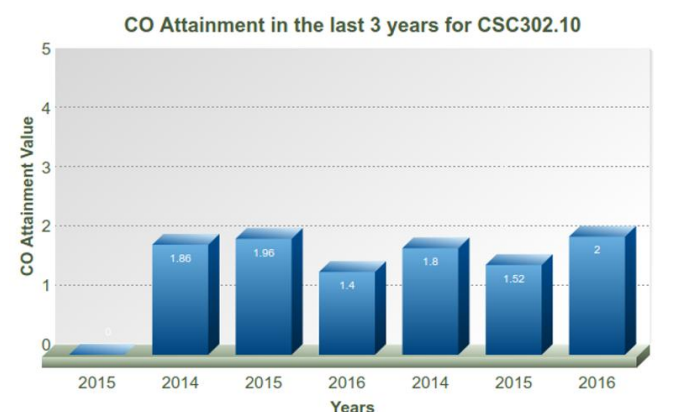


Figure 4. CO Attainment graph for the subject Object-Oriented Programming Methodology (OOPM)

To visualize the CO attainments, we make use of graphs provided by FusionCharts. FusionCharts XT - It offers all the general-purpose charts like column, bar, line, area, pie, combination and stacked charts to advanced charts like the combination, scroll, zoom line, XY Plot, Marimekko and Pareto charts. In particular, we are using FusionCharts XT which is powered by technologies including JavaScript, SVG, VML, Adobe Flash (ActionScript 3.0), XML and JSON. We created a REST API endpoint which serves us with the Course Outcome data in the JSON format.

Then using AJAX, we call this API every time the page is loaded, and this JSON data is fed to the FusionCharts function and along with that we pass various parameters regarding what is to be shown on the X-axis, Y-axis or any other tags we might want to see on the chart.

#### IV. CONCLUSION

In this project we have proposed to create a system that can help the teacher manage all the courses under him thereby almost eliminating the need for manual paper work. There is also an administrator who has the ability to add, modify and delete teachers and courses and also assigns courses to teachers. Teachers can view all the information of courses under them and their job of calculating the CO and PO attainment is handled by the system through the use of Excel templates. There is an option to generate the Course Outcome Report which provides detailed information of all the courses outcome attainments. The teacher can also view charts for easy understanding of the CO data generated over the years.

#### V. REFERENCES

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