

A Data Project On Academic Performance

1. Project Overview and Objective

This project leverages **Excel** for Data Cleaning and Transformation and **Power BI** to analyze and visualize student performance data, providing actionable insights into academic outcomes and engagement patterns. The dashboard integrates multiple visuals to highlight key metrics, distributions, and relationships across the data.

2. Data Sources

- **Source Description and Timeline:** Mendely Data/Google Search [Student Dataset v1 - Mendeley Data](#) and 2025.
- **Domain:** Student Academic Performance

3. Problem Statement

- How can we consolidate scattered student data into a single, clean dataset for analysis?
- How do we track overall academic performance using clear KPIs (e.g., average grade, study hours)?
- How can we visualize the distribution of students across courses and part-time job status?
- How do we identify grade distribution patterns and compare them across different courses?
- How do we evaluate course ratings alongside student outcomes to measure course effectiveness?

4. Attribute (Column /Features) Details:

Attribute Name	Data Type	Description
Student Name	String (Text)	Name of the Student
Phone Number	Numeric (Integer)	Contact Number of the Student
Gender	String (Text)	Specify the Student Gender

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Study Hours	Numeric (Integer)	Study Hours of the Student
Part time job	String (Text)	Part time Job Status
Maths	Numeric (Integer)	Maths mark of the student
Physics	Numeric (Integer)	Physics mark of the student
Chemistry	Numeric (Integer)	Chemistry mark of the Student
Grade	String (Text)	Grade level of the Student
Comment	String (Text)	Comment based on their Performance
Course Recommendation	String (Text)	Recommended Course for the student
Course ID	Integer / String	Contains the course ID
List Of Courses	Integer / String	Contains the Course Collection
Rating of Courses	Numeric (Integer)	Having the courses rating

5. Tools & Technologies

- **Excel:** Data cleaning, transformation, and Pivot Tables.
- **Power BI:** Data modelling, DAX calculations, visualization, and interactive dashboard creation.

6. Data Pre-Processing (Excel / Power Query)

Tasks Performed:

- **Data Cleaning & Transformation:** Removed duplicates, handled missing values, standardized formats, and created calculated fields.

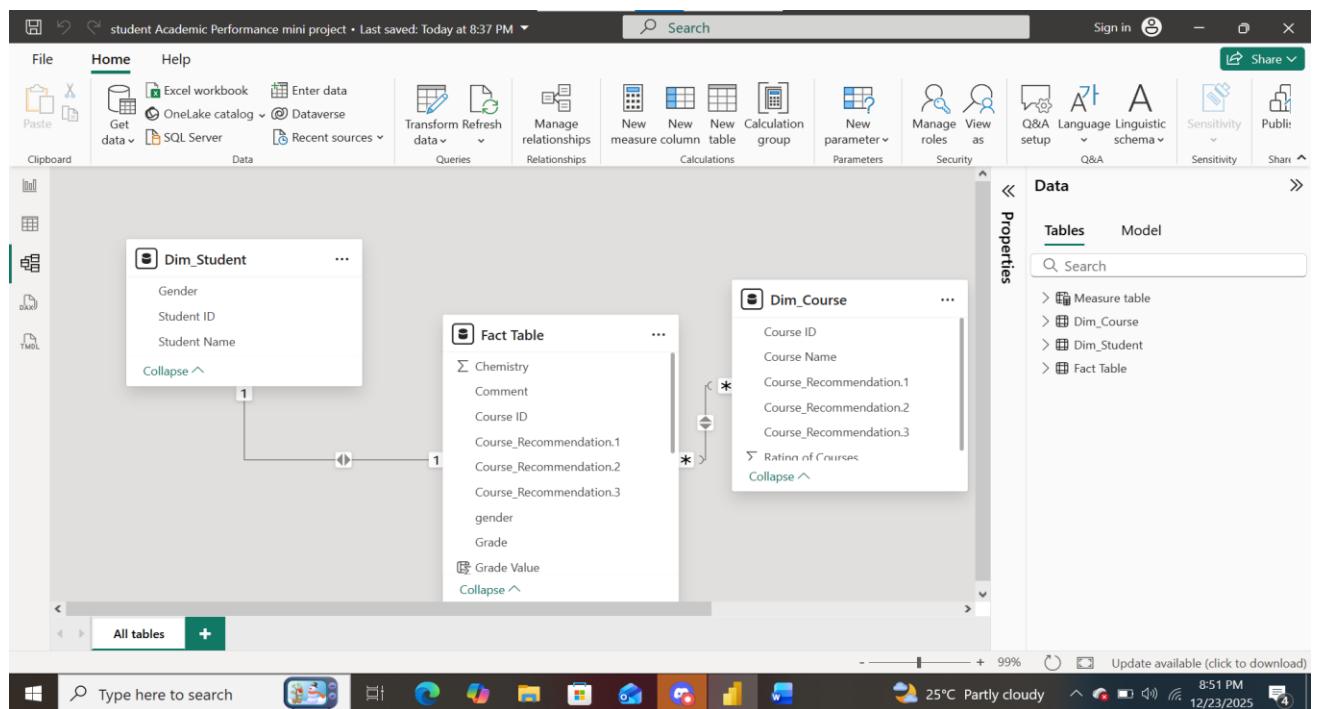
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- **Filtering & Sorting:** Organized data to focus on relevant records.
- **Random:** Random function is used to fill the NULL values in Rating column.
- **VLookup:** Vlookup is used to fill the NULL values in the List of Course column by using Course Recommendation.
- **Conditions:** If condition is used to fill the Null values in Course Id by fetching the data's from Course Recommendation.
- **Pivot Tables:** Generated Pivot Tables for data summarisation and initial insights. The created Pivot tables are Grade Vs Rating Vs Study Hours, Courses Vs Sum of Chemistry, Courses Vs Avg. value of Subjects, Student Name Vs Job Vs Study Hours, Comment Vs Rating, Course Code VS Rating.
- Convert the data into Fact and Dimension Table

7. Data Modelling and DAX (Power BI)

- **Data Model:** Established relationships between tables and defined the cardinality.

SCREENSHOT OF DATA MODELLING



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- Calculated Columns & DAX Measures:** Implemented DAX formulas for key metrics, such as

Column 1: Created the column Study Category based on Study hours

The screenshot shows the Microsoft Power BI desktop interface. A calculated column named 'Study category' is being created. The formula is defined as follows:

```
= if("Fact Table'[Study_Hours]>3, "Low", if("Fact Table'[Study_Hours]< 5 , "High"))
```

The table view shows rows of data with columns: Course_Recommendation.3, Course ID, List of Courses, Rating of Courses, Study category, Part time job status, and Grade Value.

Column 2:Part time Job status based on part time job Categorical Values

The screenshot shows the Microsoft Power BI desktop interface. A calculated column named 'Part time job status' is being created. The formula is defined as follows:

```
= if("Fact Table'[Part_Time_Job] = "yes" , "Has Job", if("Fact Table'[Part_Time_Job] = "No" , "No Job", "0"))
```

The table view shows rows of data with columns: Course_Recommendation.3, Course ID, List of Courses, Rating of Courses, Study category, Part time job status, and Grade Value.

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Column 3: Calculated the Grade Value for the relevant grade

The screenshot shows the Microsoft Power BI Data Editor interface. In the top ribbon, the 'Table tools' tab is selected. Below the ribbon, there's a formula bar with the DAX code:

```

1 Grade Value = SWITCH(
2     TRUE(),
3     'Fact Table'[Grade] = "A", 4,
4     'Fact Table'[Grade] = "B", 3,
5     'Fact Table'[Grade] = "C", 2,
6     'Fact Table'[Grade] = "D", 1,
7     'Fact Table'[Grade] = "F", 0, 'Fact Table'[Grade] = "A+", 5, 'Fact Table'[Grade] = "B+", 3.5,
8     BLANK()
9 )

```

The main area displays a table named 'Course_Recommendation.3' with columns: Course_ID, List of Courses, Rating of Courses, Study category, Part time job status, and Grade Value. The Grade Value column contains numerical values corresponding to the calculated grades. To the right, the 'Data' pane shows various measures and columns available in the model.

Calculated Measures:

Average Rating, Count of Students, Average Grade Value, Average Study Hours and Job Percent.

The screenshot shows the Microsoft Power BI Report view. The top ribbon has the 'Home' tab selected. The main area displays four KPI Visuals with the following data:

- Average Rating: 3.80
- Count of Students: 8641
- Average Grade value: 2
- Average Study_Hours: 5.50

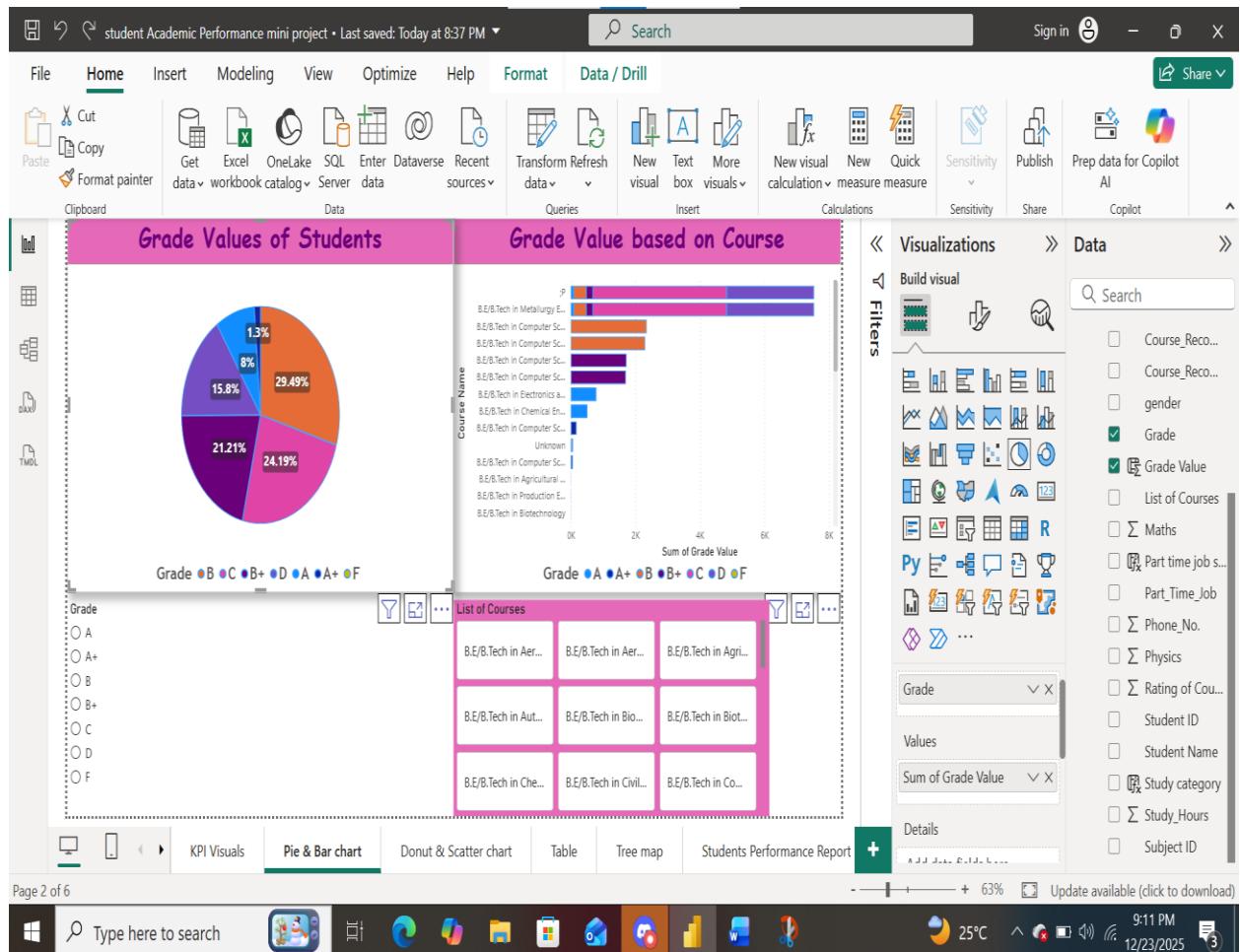
To the right, the 'Data' pane lists various calculated measures and columns used in the report, such as Course_Reco..., Course_Reco..., gender, Grade, Grade Value, List of Courses, Maths, Part_time_job_s..., Part_Time_Job, Phone_No., Physics, Rating of Cou..., Student ID, Student Name, Study category, Study_Hours, and Subject ID.

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8. Analysis and Visualizations (Power BI)

Dashboard Features:

- **Multiple Visualizations based on problem statement:** Bar charts, line charts, pie charts, cards, and tables to communicate insights.



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student Academic Performance mini project • Last saved: Today at 8:37 PM ▾

File Home Insert Modeling View Optimize Help

Cut Copy Format painter Get data workbook catalog Server data Recent sources Transform Refresh data New visual Text box More visuals Insert New visual calculation New measure Sensitivity Publish Prep data for Copilot AI Copilot

part time job status

Part time job status: Has Job (23768), No Job (23779)

Study hours vs Grade value based on Grade

Sum of Grade Value vs Sum of Study Hours

Visualizations

Data

Search

Course_Reco...
gender
Grade
Grade Value
List of Courses
 Σ Maths
Part time job s...
 Σ Part_Time_Job
 Σ Phone_No.
 Σ Physics
 Σ Rating of Cou...
Student ID
Student Name
Study category
 Σ Study_Hours
Subject ID

Add data fields here

Drill through Cross-report Keep all filters Add drill-through fields here

Update available (click to download)



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File Home Insert Modeling View Optimize Help

Cut Copy Format painter Get data workbook catalog Server data Recent sources Transform Refresh data New visual Text box More visuals Insert New visual calculation New measure Sensitivity Publish Prep data for Copilot AI Copilot

Course ID **Average Rating** **Average Study Hours** **Course Name**

Course ID	Average Rating	Average Study Hours	Course Name
01_CSE	3.94	5.26	B.E/B.Tech in Computer Science & Engineering
02_CSAI	3.85	5.55	B.E/B.Tech in Computer Science & Engineering (AI)
03_CSDS	4.00	6.92	B.E/B.Tech in Computer Science & Engineering (Data Science)
04_CSR	3.81	5.48	B.E/B.Tech in Computer Science & Engineering (Robotics)
05_CSCECS	3.80	5.41	B.E/B.Tech in Computer Science & Engineering (Cyber Security)
06_CSIOIT	4.00	2.00	B.E/B.Tech in Computer Science & Engineering (IOT)
07_CSBS	3.81	5.41	B.E/B.Tech in Computer Science and Business System (CSBS)
08_EEE	3.00	4.00	B.E/B.Tech in Electronic Engineering
09_ECE	3.80	5.59	B.E/B.Tech in Electronics and Communication Engineering
10_EE	4.00	9.00	B.E/B.Tech in Electrical Engineering
11_ME	3.00	10.00	B.E/B.Tech in Mechanical Engineering
12_AE	5.00	7.00	B.E/B.Tech in Aerospace Engineering
13_CE	4.00	4.00	B.E/B.Tech in Civil Engineering
14_AUAE	3.00	9.00	B.E/B.Tech in Automobile Engineering
15_CHE	3.77	5.54	B.E/B.Tech in Chemical Engineering
16_BIOE	4.00	8.00	B.E/B.Tech in Biomedical Engineering
17_PE	3.00	5.00	B.E/B.Tech in Petroleum Engineering
18_MIE	4.00	5.00	B.E/B.Tech in Mining Engineering
20_BT	5.00	7.00	B.E/B.Tech in Biotechnology
21_ENE	4.00	2.00	B.E/B.Tech in Environmental Engineering
22_EEE	5.00	2.00	B.E/B.Tech in Electrical Electronics Engineering
23_AEE	4.00	8.00	B.E/B.Tech in Aeronautical Engineering
24_PRD	3.00	6.00	B.E/B.Tech in Production Engineering
25_FPT	5.00	7.00	B.E/B.Tech in Food Processing and Technology
Total	3.80	5.50	

Visualizations

Data

Search

Course_Reco...
gender
Grade
Grade Value
List of Courses
 Σ Maths
Part time job s...
 Σ Part_Time_Job
 Σ Phone_No.
 Σ Physics
 Σ Rating of Cou...
Student ID
Student Name
Study category
 Σ Study_Hours
Subject ID

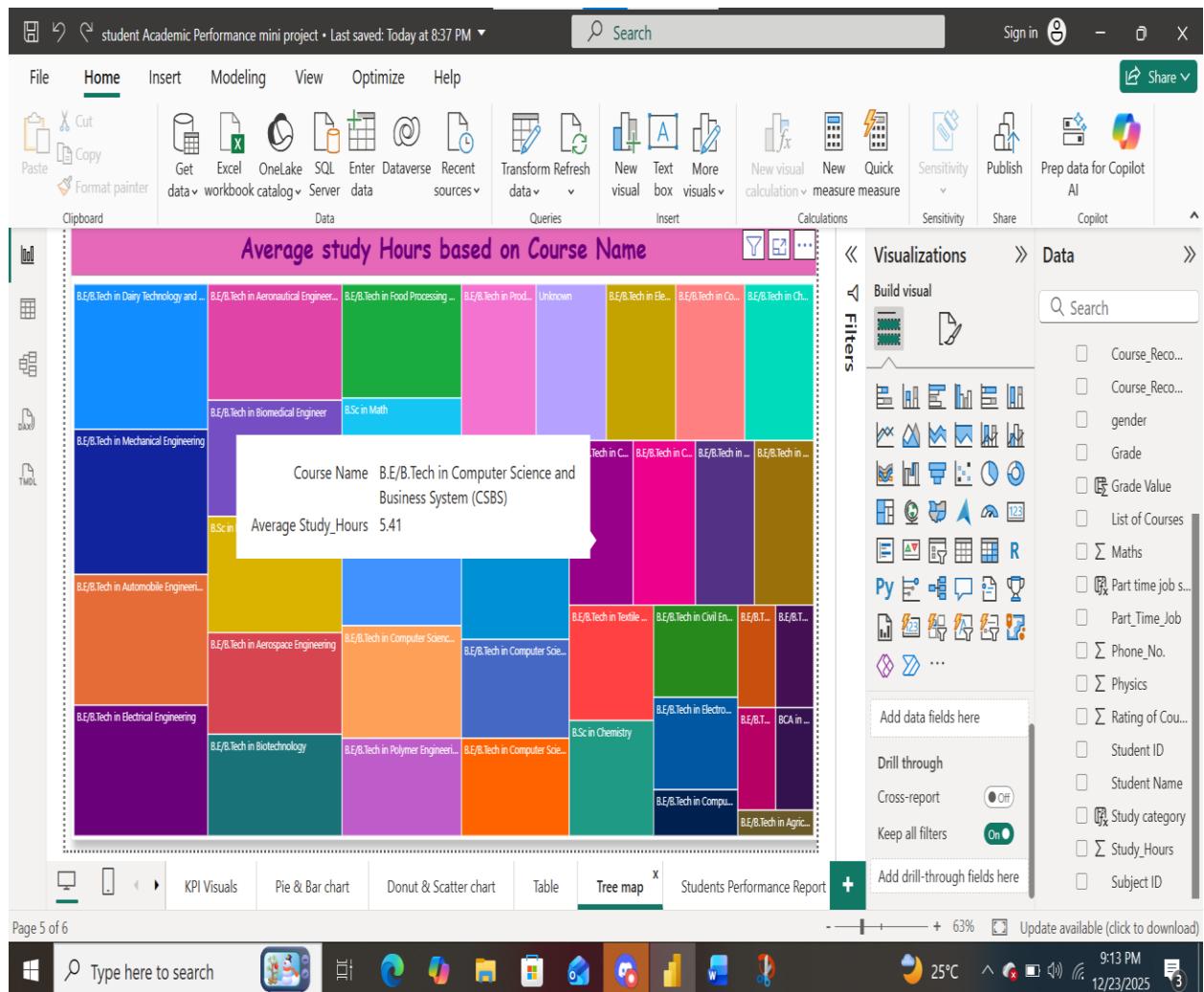
Add data fields here

Drill through Cross-report Keep all filters Add drill-through fields here

Update available (click to download)



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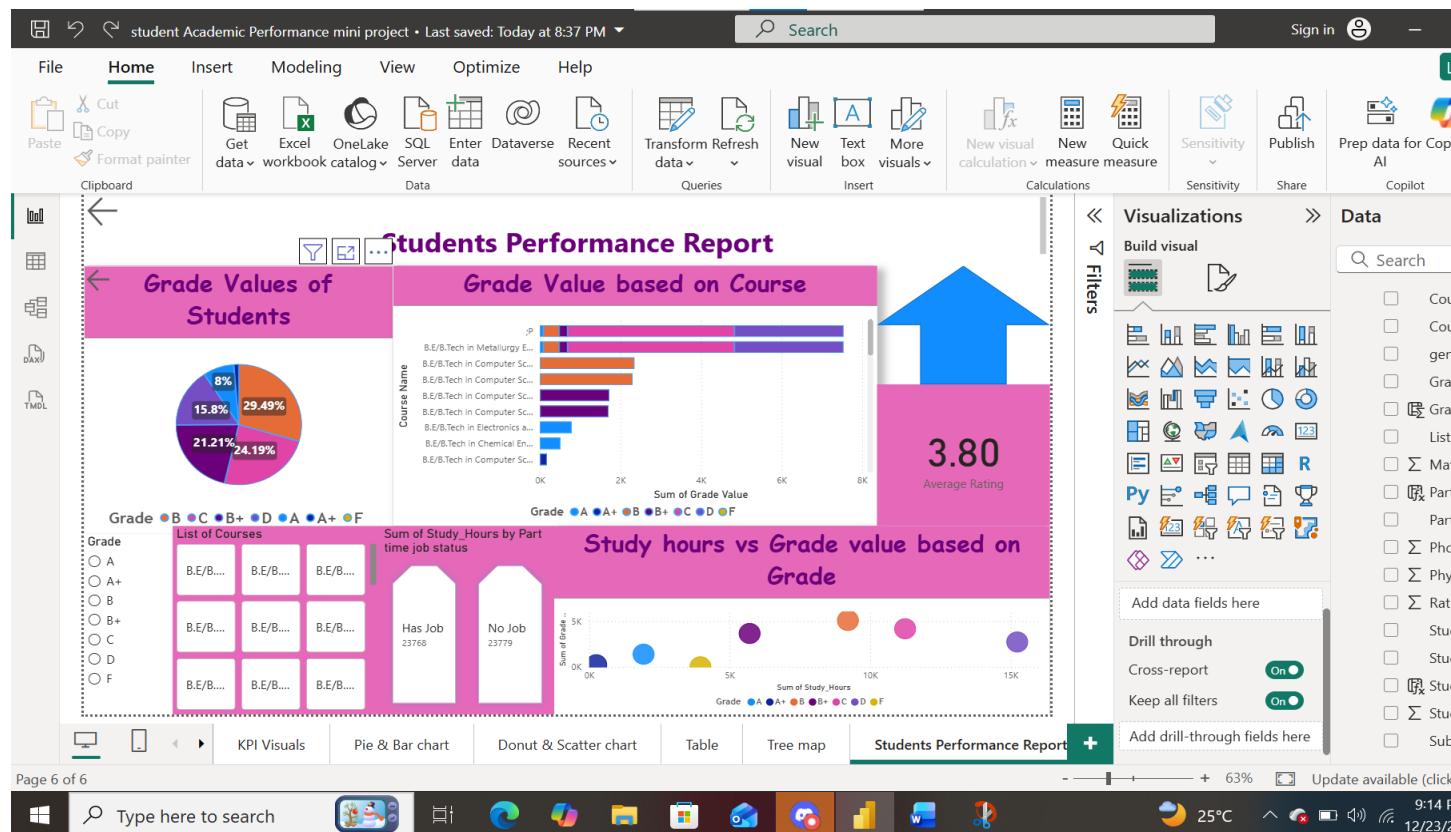


- Make your Report interactive Layout using **Filters and slicers, Drill Through**.
- **Bookmarks, Clear Titles for each visuals & Labels is must.**

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Created a consolidated Report /Dashboard

SCREENSHOT OF DASHBOARD /REPORT



9. Insights & Conclusions

- Key Findings:**

Summarize Performance, Average Rating based on courses identified in the data

- Provide the analysis insights:**

- Descriptive:**

What is the overall grade distribution among students?

- The majority of students received grades in the B+ (24.19%) and A (29.49%) range.
- Very few students achieved A+ (1.3%), and D/F grades are minimal.

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- This suggests a generally strong academic performance across the dataset.

- **Diagnosis:**
How does part-time job status affect study hours and grades?
 - Students with and without jobs have nearly identical total study hours (Has Job: 23,768 vs No Job: 23,779).
 - The scatter plot shows no major drop in grade value for students with jobs, indicating that part-time work may not significantly impact academic performance in this dataset.

- **Predictive:**
Which courses are likely to produce high-performing students based on current trends?
 - Courses like Aerospace Engineering, Biotechnology, and Electrical & Electronics Engineering show high average ratings (5.00) and strong study hour commitment.
 - These programs may continue to yield top-performing students if current patterns persist.

- **Prescriptive:**
Which courses may need academic support or intervention?
 - Courses like Agricultural Engineering and Automobile Engineering have low average ratings (3.00) and either very low or very high study hours.
 - These outliers suggest a need to review curriculum quality or student workload and possibly introduce tutoring or curriculum adjustments.

- **10. Conclusions**

The Power BI dashboard effectively consolidates student performance data, highlighting grade distributions, study habits, course ratings, and part-time job status. It delivers clear, interactive insights that help identify strengths, gaps, and trends, showcasing strong skills in data cleaning, visualization, and storytelling.

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