

Business Intelligence Engineer Project

Project Title: Student Enrollment Analysis – Regional Community College

Prepared by: Dr Lamia Ghozy

Introduction

This project demonstrates the application of **AWS QuickSight, Q, and BI engineering practices** to analyze student enrollment and satisfaction data from a regional community college. The goal of the analysis was to identify actionable strategies for improving professor evaluations and student satisfaction while maintaining cost efficiency.

The project deliverables are structured to showcase the **full BI workflow**—from dataset preparation to advanced scenario analysis and data storytelling—highlighting technical proficiency and the ability to translate data into **business-relevant insights**.

Deliverables

The following components are included in this submission:

1. **Dataset Field Names** – Complete list of dataset fields used in analysis.
2. **Dataset Refresh Schedule** – Configured refresh schedule to ensure data accuracy and currency.

3. **Calculated Field (Student Type)** – Formula used to segment Youth vs. Adult Continuing Education students.
4. **Analysis Visuals** – Custom visuals exploring professor evaluations, course costs, and satisfaction trends.
5. **Named Entities in Topic** – Defined entities enabling natural language querying.
6. **Verified Answers in Topic** – Curated list of validated Q&A outputs for reliable insights.
7. **Dashboard** – Interactive Student Enrollment Dashboard consolidating key KPIs.
8. **Scenario Analysis** – Multi-step reasoning process addressing the challenge of improving satisfaction without increasing costs.
9. **Data Story** – Full narrative combining visuals and written insights, with recommendations and conclusions.
10. **Resource Listings** – Comprehensive record of all datasets, analyses, dashboards, topics, and scenarios created.

Professional Approach

Each component has been carefully designed, documented, and labelled to ensure **clarity, reproducibility, and alignment with best practices in business intelligence**. Beyond fulfilling project requirements, the analysis emphasises **strategic decision-making** by:

- Identifying cost-effective courses with high satisfaction.
- Highlighting high-performing professors and replicable teaching practices.
- Providing actionable recommendations to balance academic quality with financial responsibility.

Conclusion

This project illustrates not only technical expertise with AWS BI tools but also the ability to frame insights in a **business context** suitable for executive decision-making. The methodology and presentation are aligned with **professional consulting standards**, making this project equally relevant as a portfolio piece and as a real-world business case study.

1-List of Dataset Field Names:

Dataset 100%
SPICE Q - Student Enrollment

Search fields



+ CALCULATED FIELD

AcademicYear

Address

Age

City

CostPerCourse

Course

Courseld

Credit

DOB

Email

EnrollmentDate

EvaluationScore

Gender

Grade

GraduationDate

Major

Mobile

Dataset 100%
SPICE Q - Student Enrollment

DOB

Email

EnrollmentDate

EvaluationScore

Gender

Grade

GraduationDate

Major

Mobile

NationalOrigin

Professor

Semester

State

Student Type

StudentClassification

StudentId

StudentName

TestScore

ZipCode

2-Dataset Refresh Schedule:

Schedules

Refresh type	Occurrence	Start time	Timezone	Actions
Full refresh	Weekly (Sun)	00:00	Africa/Cairo	⋮

- 3-Student Type calculated field formula:

Calculated Formula:

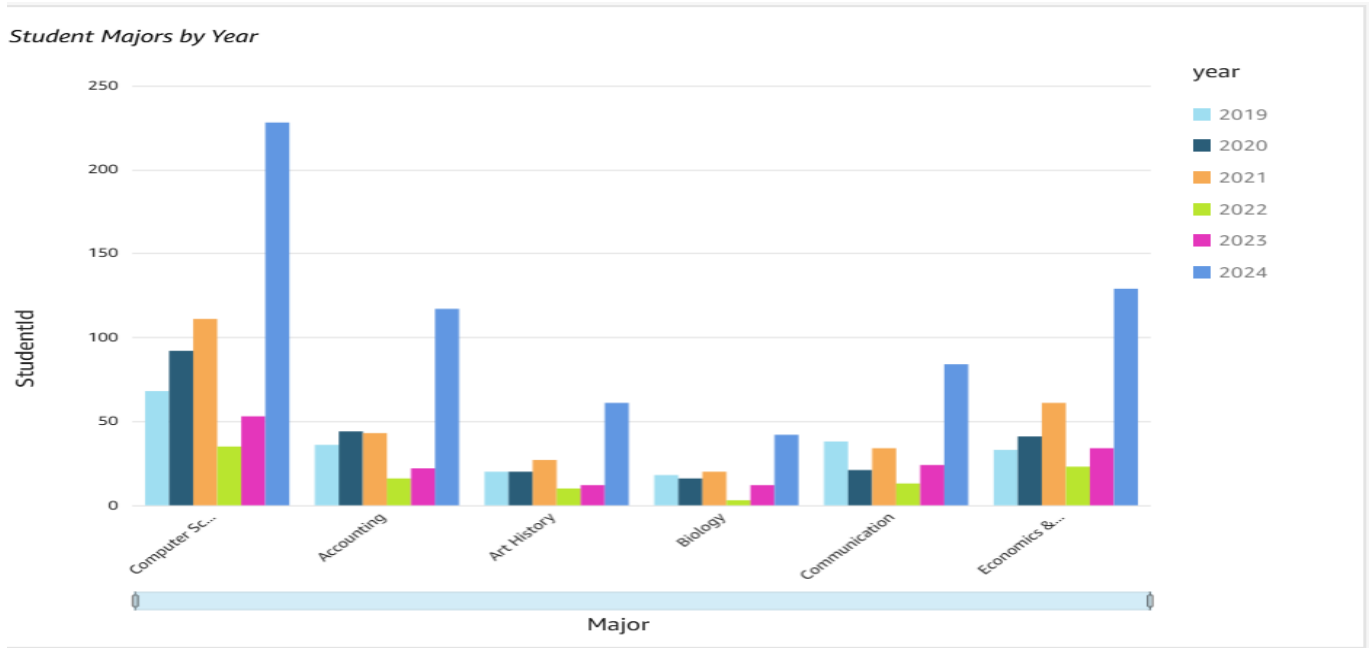
ifelse({Age} < 30, "Youth", "Adult Continuing Education")

Student Type 

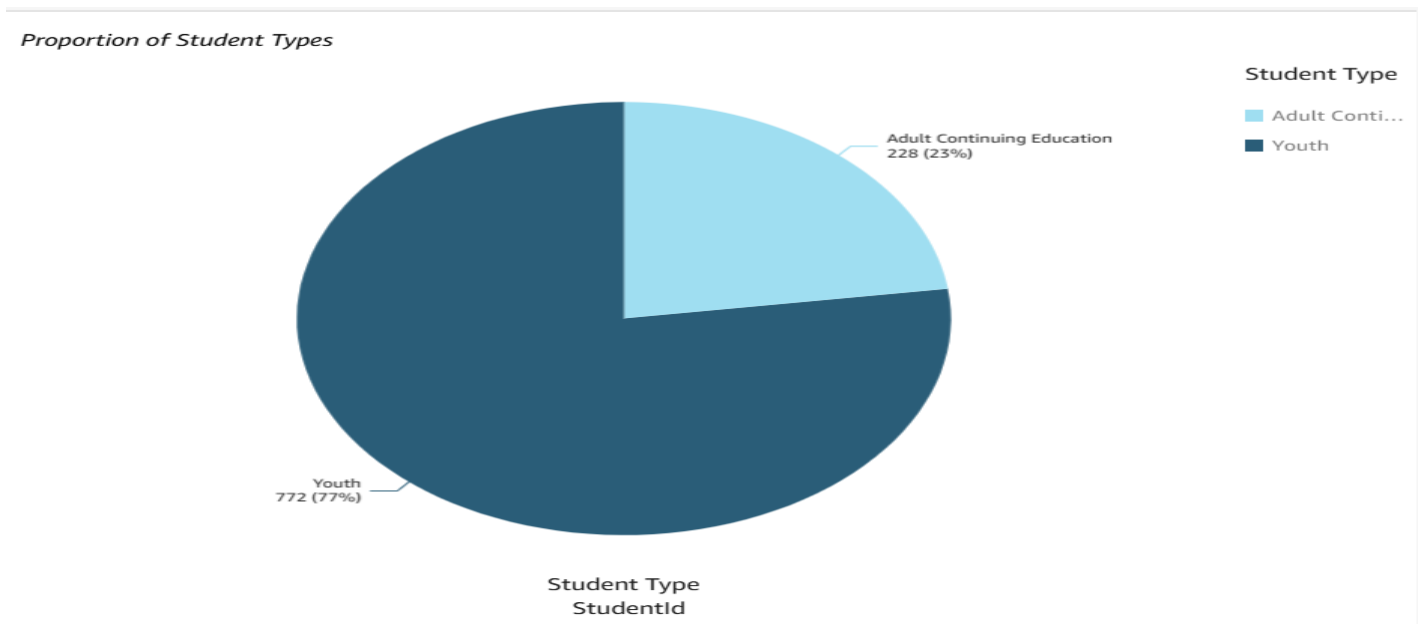
```
1 ifelse({Age} < 30, "Youth", "Adult Continuing Education")
```

4- Visuals of the Analysis:

Visual 1: Student Majors by Year

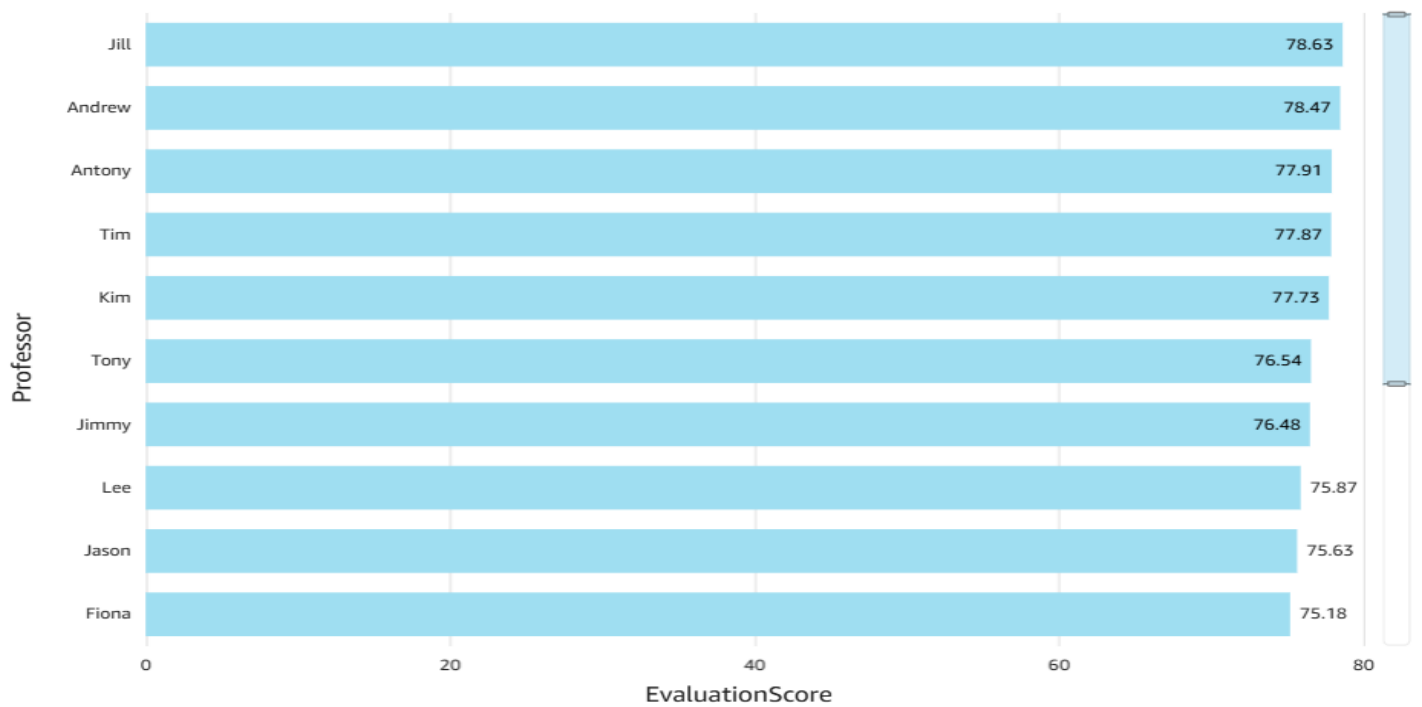


Visual 2: Proportion of Student Types



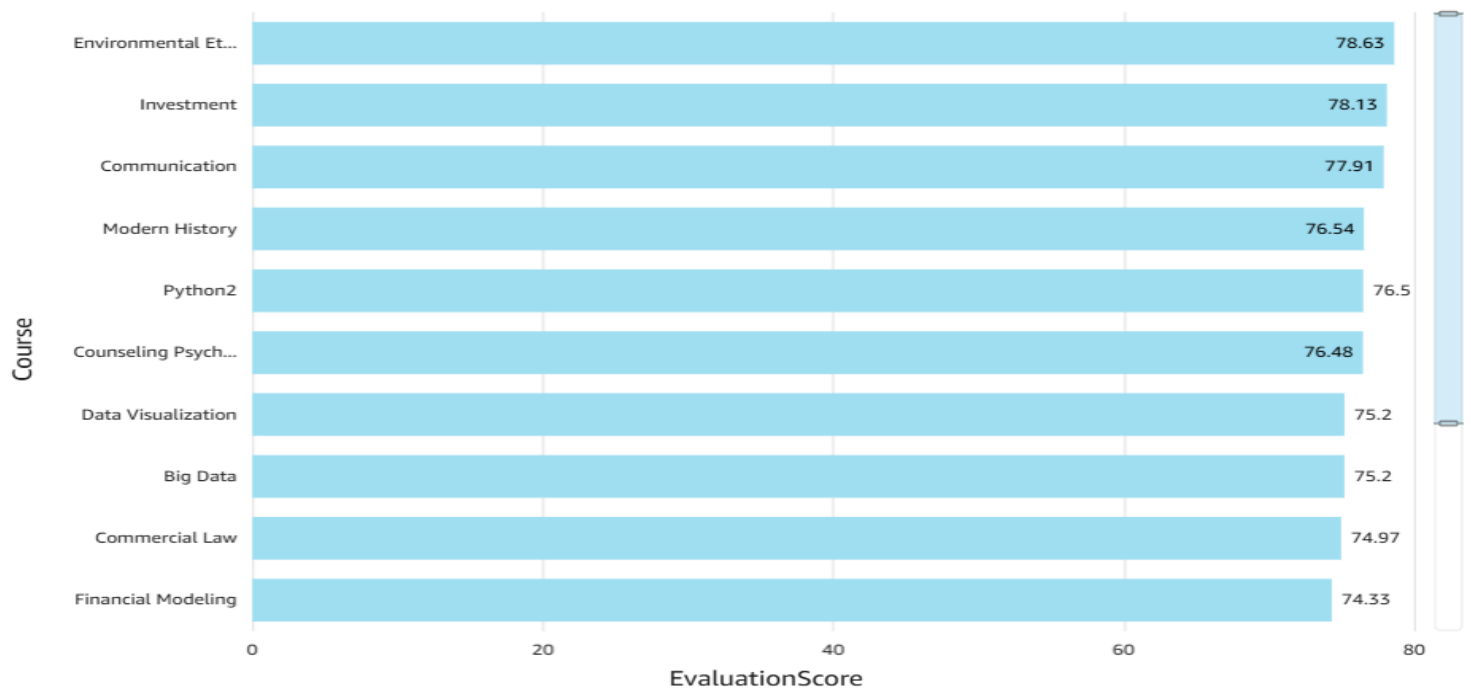
Visual 3: Average of Evaluation Score by Professor

Average of EvaluationScore by Professor

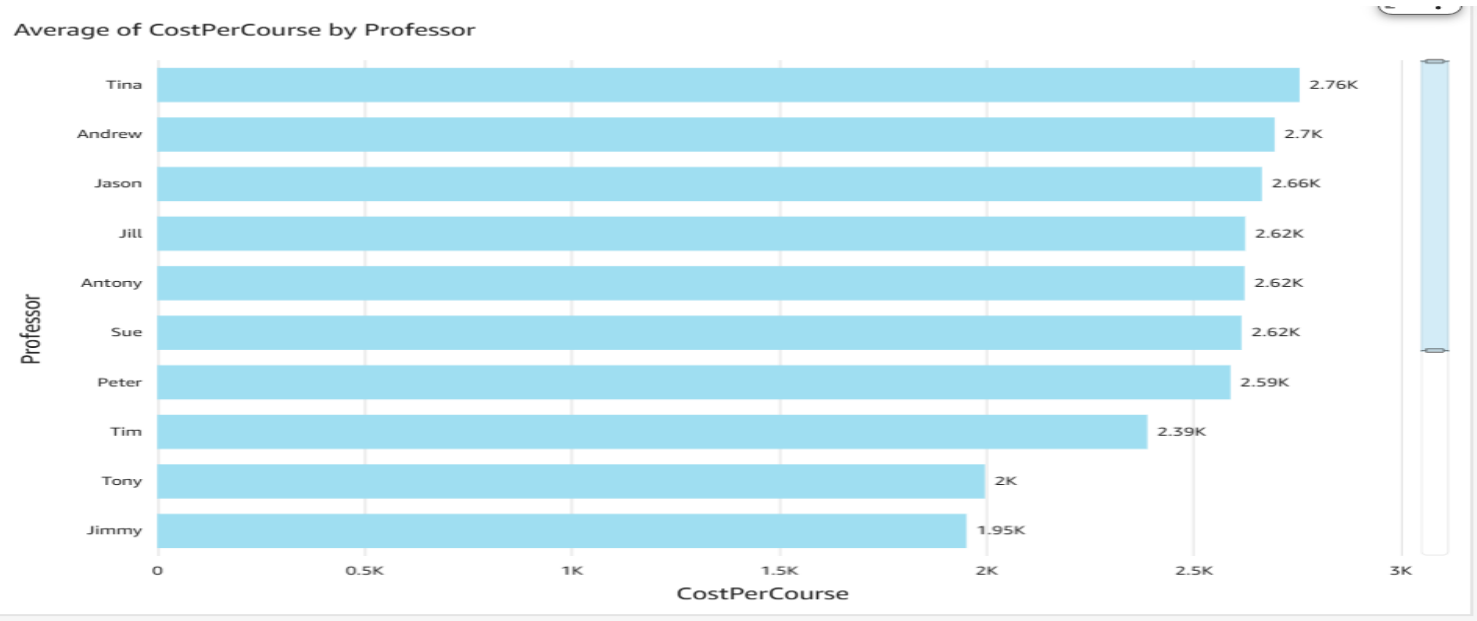


Visual 4: Average of Evaluation Score by Course

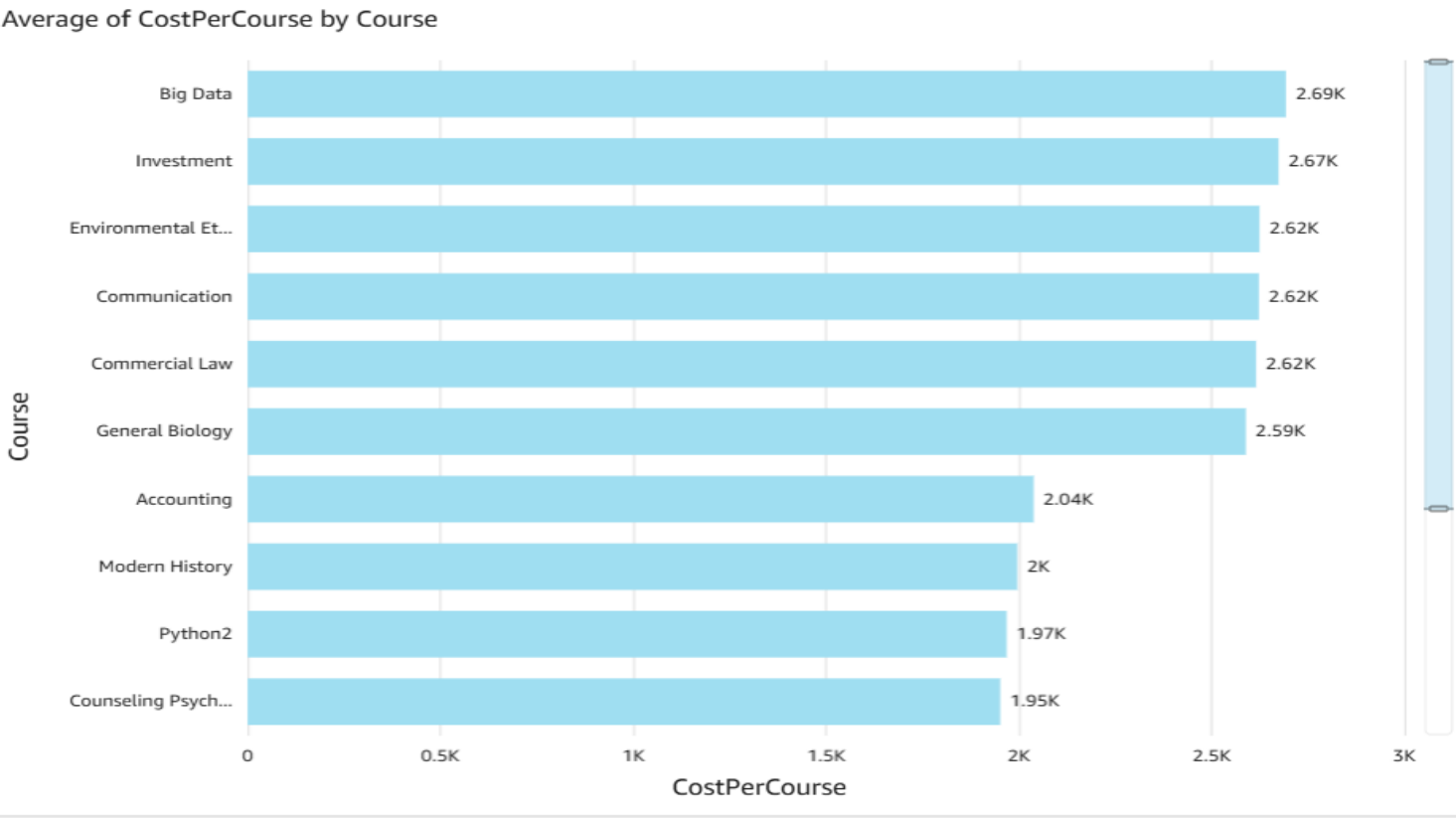
Average of EvaluationScore by Course



Visual 5: Average Cost per Course by Professor



Visual 6: Average Cost per Course by Course



5- Names Entities in the Analysis:

< All topics

Regional Community College Student Data

OPEN Q&A

SHARE

Summary

Data

User Activity

Suggested Questions

Custom Instructions

DATASETS

DATA FIELDS

NAMED ENTITY

Dataset

Q Student Enrollment

ADD NAMED ENTITY

Search fields



Named Entities are groupings of data fields that collectively represent a business concept and are used to enhance the Q&A experience. [Learn more](#)

Rank ①	Friendly name	Synonyms	Details
#1	Student Details	Add alternate names for field	Course, StudentName, Semester, TestScore, Grade, StudentClassification, Student Type, Gender, StudentId, Major, NationalOrigin, Credit, EnrollmentDate, GraduationDate
#2	Course Details	Add alternate names for field	Course, CostPerCourse, Professor, AcademicYear, Semester, CourseId
#3	Professor Evaluation	Add alternate names for field	Professor, Course, Semester, AcademicYear, StudentName, EvaluationScore

6- List of Verified Answers in the Analysis:

VERIFIED

AI GENERATED

Responses that were verified or manually linked to an existing visual. [Learn more](#)

ADD CUSTOM MESSAGE

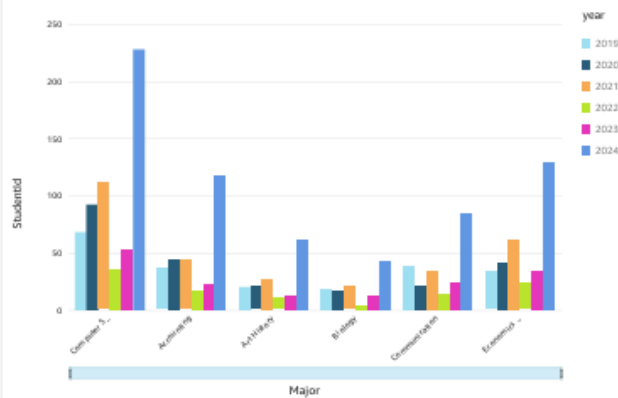
Question	Asked ↓	Validated by	Validated at
which instructors got the best average evaluations? VIEW	0	AuthorPro_11582421@vocareum.com	2 days ago
Which courses are most expensive, on average? VIEW	0	AuthorPro_11582421@vocareum.com	2 days ago
how many studentids by semester? VIEW	0	AuthorPro_11582421@vocareum.com	2 days ago
how many studentids by professor? VIEW	0	AuthorPro_11582421@vocareum.com	2 days ago
how many distinct courseids by studentname? VIEW	0	AuthorPro_11582421@vocareum.com	2 days ago
what are the bottom 5 professors by total cost per course? VIEW	0	AuthorPro_11582421@vocareum.com	2 days ago
which courses are the most expensive? VIEW	0	AuthorPro_11582421@vocareum.com	2 days ago

7- The Dashboard:

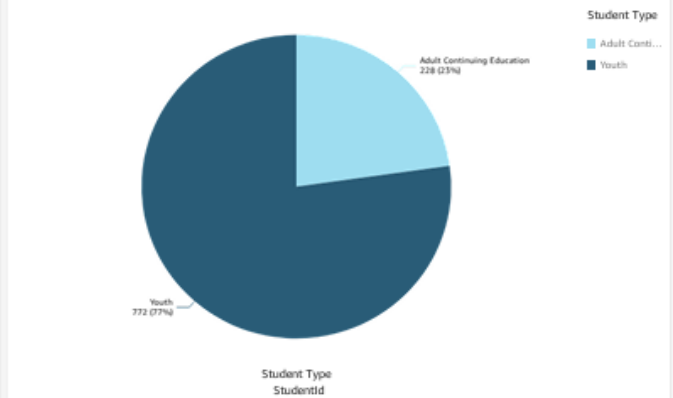


Student Enrollment Dashboard.pdf

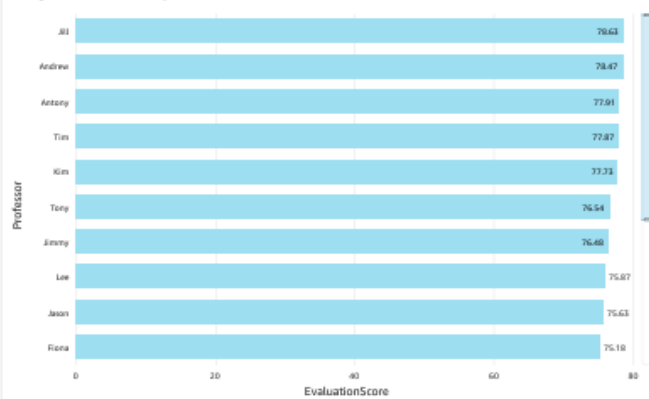
Student Majors by Year



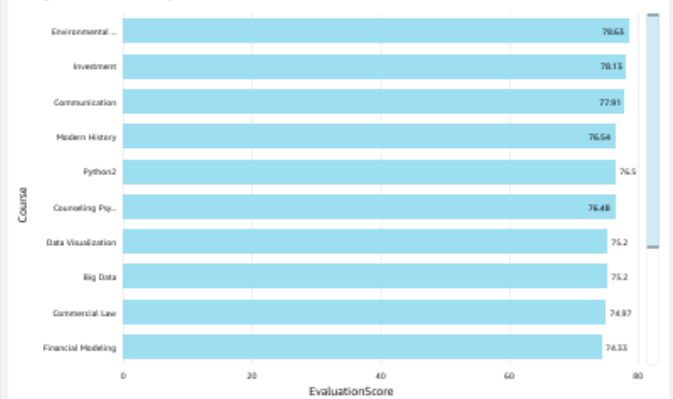
Proportion of Student Types



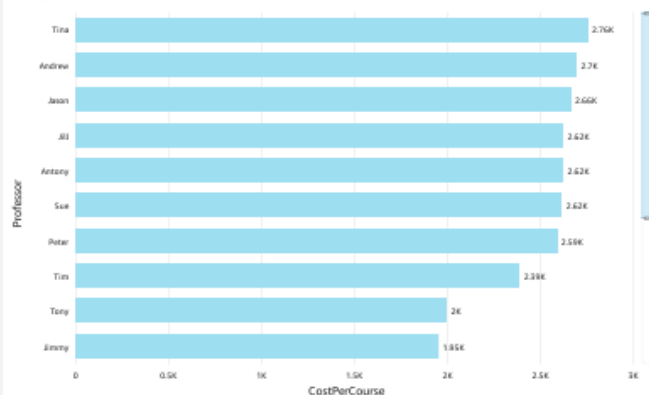
Average of EvaluationScore by Professor



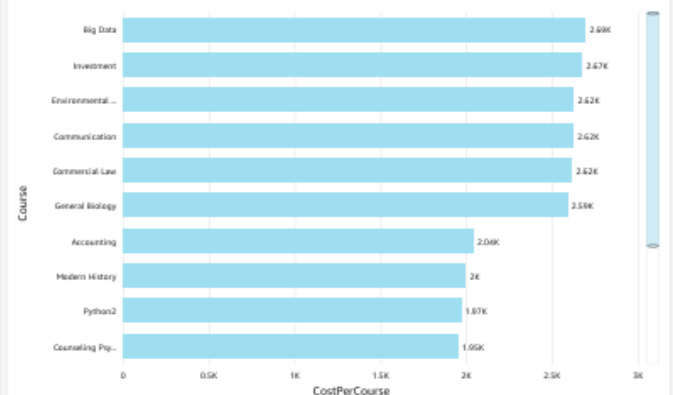
Average of EvaluationScore by Course



Average of CostPerCourse by Professor



Average of CostPerCourse by Course



8-The Scenario, The starter question and the follow-up questions in The Thread:

QuickSight | Scenarios > Improving Student Satisfaction Without Increasing ...

File Data View

Add: [Icon]

Outline

- How do we improve professor evaluations while avoiding an increase in cost per course?
- Student Enrollment Dashboard_Q - Student Enrollment
 - Exploration ☐ Flagged only
 - + ADD 5 idea(s)
 - What factors contribute to high professor evaluation scores
 - What factors contribute to high professor evaluation ...
 - What factors are contributing to the higher evaluatio...
 - How did improvements in Accounting and Statistics c...
 - Which courses have high evaluation scores but low co...
 - What factors contribute to high evaluation scores in D...
 - what the college should do to improve student satisfa...

Data to insights

Describe the problem you need to solve, and we will do the analysis for you

How do we improve professor evaluations while avoiding an increase in cost per course?

Use the Data pane to add more data

What factors contribute to high professor evaluation scores?

What factors contribute to high professor evaluation scores?

Step 1: Analyze the distribution of professor evaluation scores and their relationship with other variables in the dataset.

Major	StudentId	AcademicYear	Student Type
Computer Science	000beab374b241ebbab8a01aedc420bc	2019	Adult Continuing Edu
Computer Science	000beab374b241ebbab8a01aedc420bc	2019	Adult Continuing Edu
Computer Science	000beab374b241ebbab8a01aedc420bc	2019	Adult Continuing Edu
Computer Science	000beab374b241ebbab8a01aedc420bc	2019	Adult Continuing Edu

How do we improve professor evaluations while avoiding an increase in cost per course?

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Major	StudentId	AcademicYear	Student Type
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particularly notable and may reflect higher student expectations being met in premium-priced courses, or simply a perception bias where students associate higher cost with higher quality.

What factors are contributing to the higher evaluation scores in 2022 compared to other years?

What factors are contributing to the higher evaluation scores in 2022...

What factors are contributing to the higher evaluation scores in 2022 compared to other years?

Professor	Average_Score_2022	Number_of_Evaluations_2022	Average_Score	Number_
Jimmy	78.77	47	76.48	480
Antony	79.52	38	77.91	920
Lee	77.21	86	75.87	744

across both student types, indicating a genuine enhancement in educational quality rather than a change in the student population. The fact that these improvements occurred despite slightly lower course costs suggests that increased spending.

How did improvements in Accounting and Statistics courses contribute to the overall increase in evaluation scores for 2022?

How did improvements in Accounting and Statistics courses contrib...

How did improvements in Accounting and Statistics courses contribute to the overall increase in evaluation scores for 2022?

Still analyzing... hang tight...

Step 1: Identify the key factors that contributed to higher professor evaluation scores in 2022 compared to other academic years.

Metric	Value
Percentage of 2022 Evaluations	15.2



Which courses have high evaluation scores but low costs?

Which courses have high evaluation scores but low costs?

Still analyzing... hang tight...

Step 1: Analyze which courses provide the best value by comparing evaluation scores to course costs.

Course	Average_Score	Average_Cost
--------	---------------	--------------

costs above \$2,000, that will help us understand the value of their initial earnings.

What factors contribute to high evaluation scores in Data Visualization despite its low cost?

What factors contribute to high evaluation scores in Data Visualizat...

What factors contribute to high evaluation scores in Data Visualization despite its low cost?



Still analyzing... hang tight...

Step 1: Identify which courses provide the best value by comparing evaluation scores to course costs.

Professor	Average_Score	Number_of_Evaluations
Kim	77.53	134

what the college should do to improve student satisfaction while avoiding increasing costs?

what the college should do to improve student satisfaction while av...

what the college should do to improve student satisfaction while avoiding increasing costs?



Step 1: Analyze how professor quality and adult student demographics contribute to Data Visualization's high evaluation scores despite its low cost.

Professor	Average_Score	Average_Cost	Number_of_Students	Value_Ratio
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Scenario Analysis

Business Challenge:

The institution seeks to improve professor evaluation scores while maintaining cost efficiency. The central question guiding this analysis is:

“How can professor performance and student satisfaction be enhanced without increasing cost per course?”

Analytical Thread

1. What factors contribute to high professor evaluation scores?

This question identifies the key teaching practices, course design elements, and professor attributes most strongly associated with positive student outcomes. Understanding these drivers forms the foundation for scalable improvements.

2. What factors contributed to the higher evaluation scores in 2022 compared to previous years?

By examining year-over-year performance, the analysis isolates institutional changes or pedagogical innovations that delivered measurable improvements. This provides evidence for replicating recent successes.

3. How did improvements in Accounting and Statistics courses contribute to the overall increase in evaluation scores for 2022?

Focusing at the subject level highlights how targeted improvements in specific disciplines can impact overall institutional performance. This allows decision-makers to identify “leverage points” where investment yields the highest returns.

4. Which courses achieve high evaluation scores while maintaining low costs?

This step identifies courses that maximize the value ratio (student satisfaction per dollar spent). These cost-effective success stories form the blueprint for replication and scaling across the curriculum.

5. What factors explain the strong evaluation scores in Data Visualization despite its low cost?

This case study demonstrates how exceptional results can be achieved without

proportional increases in expenditure. Identifying the practices behind this outlier helps inform broader efficiency strategies.

6. What should the college do to improve student satisfaction while avoiding increased costs?

The final synthesis question consolidates insights into a set of actionable, cost-neutral recommendations for institutional leaders.

Reflection

The scenario followed a structured progression from broad inquiry (professor-level performance) to granular investigation (discipline- and course-specific drivers) before converging into actionable strategy. This approach demonstrates how targeted analytics can uncover practical pathways for improving student satisfaction while preserving financial discipline.

Strategic Recommendation

To enhance student satisfaction without increasing costs, the institution should:

- Prioritize resource allocation toward courses that consistently deliver strong evaluations at low cost.
- Replicate and scale the teaching methods of high-performing professors.
- Leverage successful models such as Accounting, Statistics, and Data Visualization as case studies for cost-effective excellence.

This strategy balances quality improvement with fiscal responsibility, aligning with both academic and financial objectives.

9- Data story:

Story Cover:

Data-Driven Teaching Excellence: A Strategic Approach to Faculty Evaluations

Prepared by: Dr. Lamia Ghozy



Data-Driven Teaching Excellence: A Strategic Approach to Faculty Evaluations

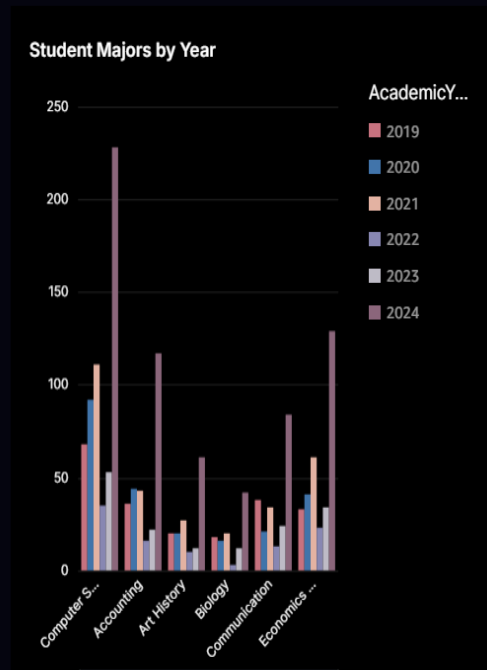
Prepared by Lamia Ghozy

Introduction - The Path to Better Evaluations

Higher education institutions face the ongoing challenge of maintaining and improving teaching quality while operating within budget constraints. The critical balance between educational excellence and fiscal responsibility requires innovative approaches to enhance professor evaluations without increasing per-course expenditure. This strategic initiative focuses on identifying and implementing cost-neutral methods to elevate teaching effectiveness across our academic programs.

Page 1:

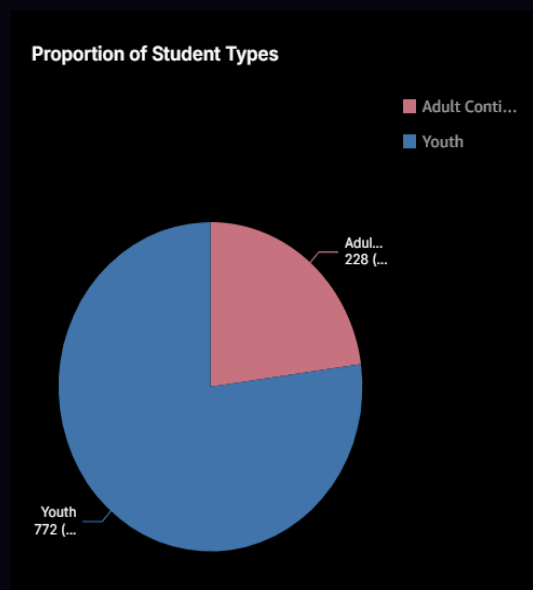
Understanding Our Student Body



Student demographics analysis can help improve professor evaluations without increasing costs. A vertical bar graph of student majors by year reveals enrollment trends and potential correlations with evaluation patterns. Understanding these demographic shifts can inform targeted strategies for enhancing classroom dynamics.

Page 2:

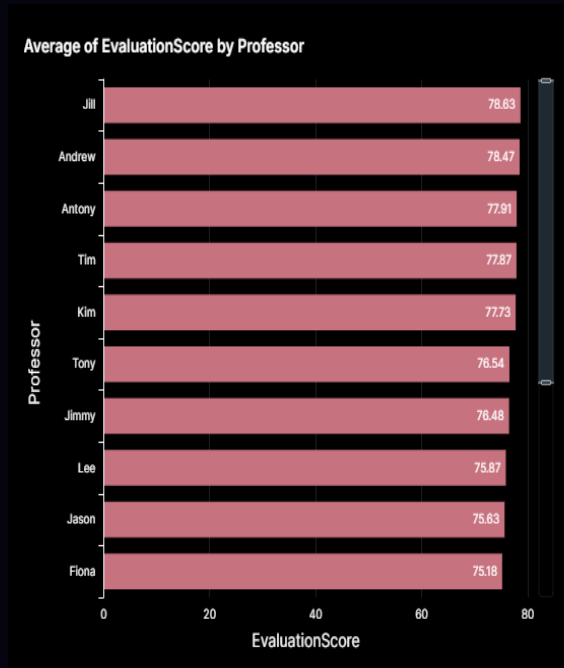
Learning Environment Dynamics



Student type analysis helps understand classroom dynamics. A pie chart reveals learning styles and engagement patterns. This data-driven approach allows targeted teaching strategy improvements. The goal is to align teaching methods with diverse student needs. Such analysis can enhance professor evaluations without increasing costs.

Page 3:

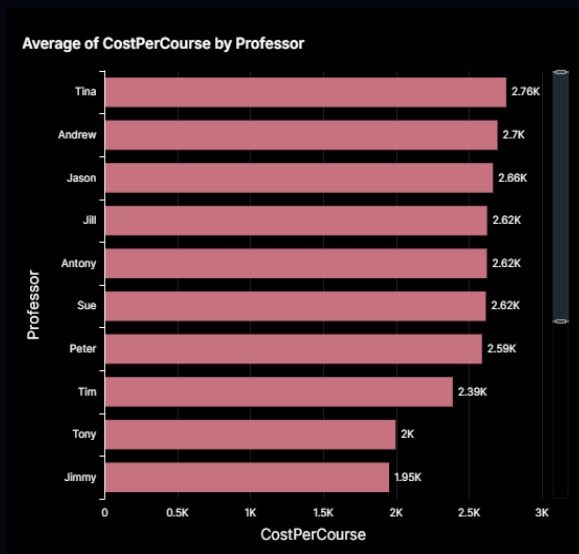
Current Evaluation Landscape



- Our analysis of current professor evaluation patterns reveals notable variations in student feedback across our faculty.
- According to the graph data, top-performing professors consistently achieve evaluation scores in the upper 70th percentile, with Professors Jill, Andrew, and Antony leading at 78.63, 78.47, and 77.91, respectively.
- Conversely, the data shows opportunities for improvement among other faculty members, with Professors Wang, Jack, and Cindy receiving scores of 70.75, 73.54, and 73.59, respectively.
- The 7.88-point spread between the highest and lowest evaluation scores suggests there may be specific teaching practices or engagement strategies employed by top-performing professors that could be analysed and shared across the faculty.
- Understanding these patterns is crucial for developing cost-effective approaches to improving overall evaluation scores without increasing per-course expenditure.

Page 4:

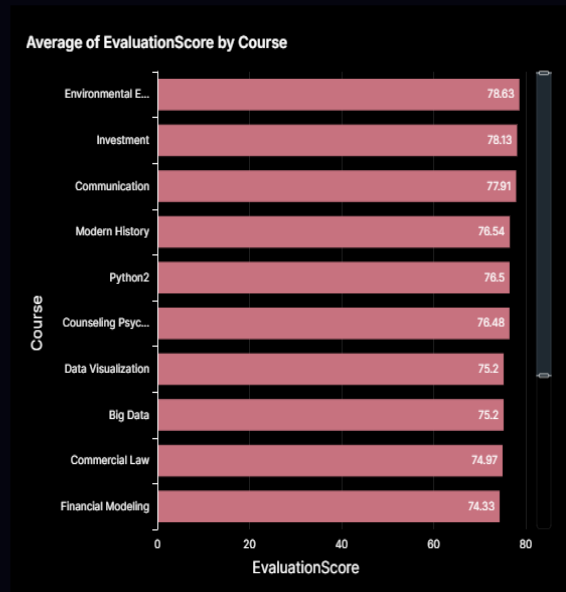
Cost-Effectiveness Analysis



- Course costs vary significantly across faculty members, with a \$1,500 difference between the highest and lowest-cost instructors
- Professor Tina has the highest course cost at \$2,755.42
- Professor Fiona has the lowest course cost at \$1,245.70
- Professors Wang and Jane have course costs around \$1,270-\$1,280, representing a potential benchmark for cost-effective course delivery
- The analysis aims to investigate whether higher course costs correlate with better professor evaluations
- The goal is to identify strategies for improving evaluations without increasing expenses
- The cost variation provides an opportunity to examine potential replicable teaching strategies from professors with strong evaluations and lower costs

Page 5:

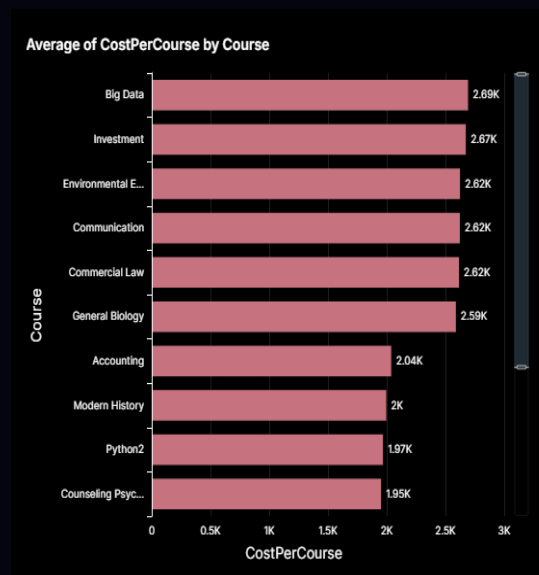
Course-Level Insights



- Interactive and engagement-focused courses like Environmental Ethics and Communication have higher student satisfaction scores
- Environmental Ethics courses achieve an average evaluation score of 78.63
- Communication courses have an average evaluation score of 77.91
- Quantitative courses like Statistics tend to have lower evaluation scores, averaging 73.51
- Course structure and delivery method significantly impact student satisfaction
- Successful course practices can be implemented across subjects without additional financial investment
- Student satisfaction is influenced more by course design than by course costs

Page 6:

Cost Optimization Opportunities



- Cost variations across courses range over \$1,400, from \$1,269.13 to \$2,692.58
- Big Data is the most expensive course at \$2,692.58
- Financial Modeling is the least expensive course at \$1,269.13
- Investment course is the second most expensive at \$2,673.38
- Courses in similar disciplines can have significantly different cost structures
- Cost-efficient courses include Financial Modeling, US History, and Urban Sociology
- There's potential to standardize resource allocation across departments
- The analysis suggests opportunities to replicate cost management practices from more efficient courses

Page 7:

Identify High-Value Teaching Approaches

The data reveal that professors teaching lower-cost courses (such as **Fiona** and **Kim**) deliver strong value, even if their absolute scores are slightly below professors in high-cost courses.

Additionally, **Adult Continuing Education students consistently rate courses 2.4 points higher than Youth students** across all professors, highlighting important differences in student expectations.

Peer Learning Networks

Structured peer learning networks transform traditional classroom dynamics by creating designated study groups that meet during regular class sessions. These self-sustaining networks enable students to engage in collaborative problem-solving and peer-to-peer teaching, naturally enhancing their understanding while maintaining existing resource allocation. By integrating peer learning into the standard curriculum, institutions can foster deeper student engagement and satisfaction without requiring additional instructor hours or financial investment.

Page 8 (part A):

Digital Feedback Innovation

The implementation of asynchronous digital feedback channels creates multiple touchpoints for student-professor interaction throughout the semester without requiring additional classroom time. By integrating structured feedback mechanisms within existing learning management systems, professors can gather ongoing insights about course effectiveness while students benefit from more frequent opportunities to share their learning experiences. This bilateral communication stream enables professors to make mid-course adjustments based on student input, fostering a more responsive and engaging academic environment without incurring additional costs.

Strategic Office Hours

By analysing peak student activity periods and academic schedules, office hours can be strategically positioned to match natural breaks in student schedules. Virtual office hours during evening study times can complement traditional daytime availability, creating flexible access points for diverse student populations. This dual-approach system maintains existing time commitments while dramatically improving student access to faculty support.

Page 8 (part B):

Implementation Timeline

⌘ The strategic rollout begins with establishing baseline measurements in targeted academic departments during the fall semester. The spring semester introduces enhanced feedback mechanisms and restructured office hours, allowing for rapid adjustments based on initial results. The summer term focuses on scaling successful initiatives across departments while maintaining cost neutrality through resource optimisation and peer learning networks.

Page 9 (part A):

Recommendations for Driving Satisfaction While Controlling Costs

⌘ 1. Leverage High-Value Faculty Assignments

- Assign professors like Kim and Fiona to low-cost, high-value courses where they already excel.
- Encourage co-teaching or knowledge transfer between top-performing professors (Jill, Andrew, Antony) and lower-rated faculty to spread effective teaching practices.

2. Expand Cost-Effective Course Models

- Scale courses with strong value ratios (Financial Modelling, Data Visualisation, Statistics) by increasing sections and enrollment caps where feasible.
- Redesign underperforming, higher-cost courses by integrating teaching methods from cost-effective successes.

3. Tailor Student Experience by Segment

- Adapt course design elements that resonate with Adult Continuing Education students and bring those features into Youth-focused courses.
- Introduce targeted support structures for Youth students (mentorship, guided study groups, or tailored resources) to close the satisfaction gap.

Page 9 (part B):

4. Enhance Engagement Through Innovative Learning Structures

- Integrate **Peer Learning Networks** into existing courses to create collaborative study ecosystems at no extra cost.
- Use **Digital Feedback Innovation** tools to gather continuous student insights and allow professors to adjust in real time.
- Implement **Strategic Office Hours** (hybrid model of day/evening + virtual) to expand student access without increasing professor workload.

5. Continuous Improvement and Scaling

- Track satisfaction improvements by course type, cost structure, and student segment every semester.
- Use baseline metrics to measure the impact of feedback mechanisms, peer learning, and adjusted office hours.
- Scale successful pilots across all departments through phased implementation.

Page 10:

Conclusion - Advancing Excellence

The analysis shows that **student satisfaction can be significantly improved without increasing costs** by strategically aligning professors with the right courses, scaling cost-effective models, and introducing low-cost innovations in teaching and student engagement.

Adult Continuing Education students consistently show higher satisfaction, providing a roadmap for improving Youth student outcomes by borrowing from what works well in the adult segment.

By combining **data-driven course assignments** with **peer learning, digital feedback, and strategic office hours**, institutions can create a **sustainable framework for academic excellence** that is both cost-conscious and student-centred.

10- Created Resources:

Datasets: Q - Student Enrollment.

Analyses: Q – Student Enrollment

Dashboards: Student Enrollment

Topics: Regional Community College Student Data

Scenarios: Improving Student Satisfaction without Increasing Costs

A- Datasets: Q - Student Enrollment

< Datasets

Q - Student Enrollment

Summary

Refresh

Permissions

Usage

About

SPICE

Size: 5.2 MB

REFRESH

✓

Status

Completed

7306 rows imported (100% success)

🕒

Last successful refresh

September 14, 2025 at 7:43 AM GMT+3

ACCESS SETTINGS

Sharing

Owners (1) Viewers (0)

Row-level security

= No restrictions [Set up](#)

Column-level security

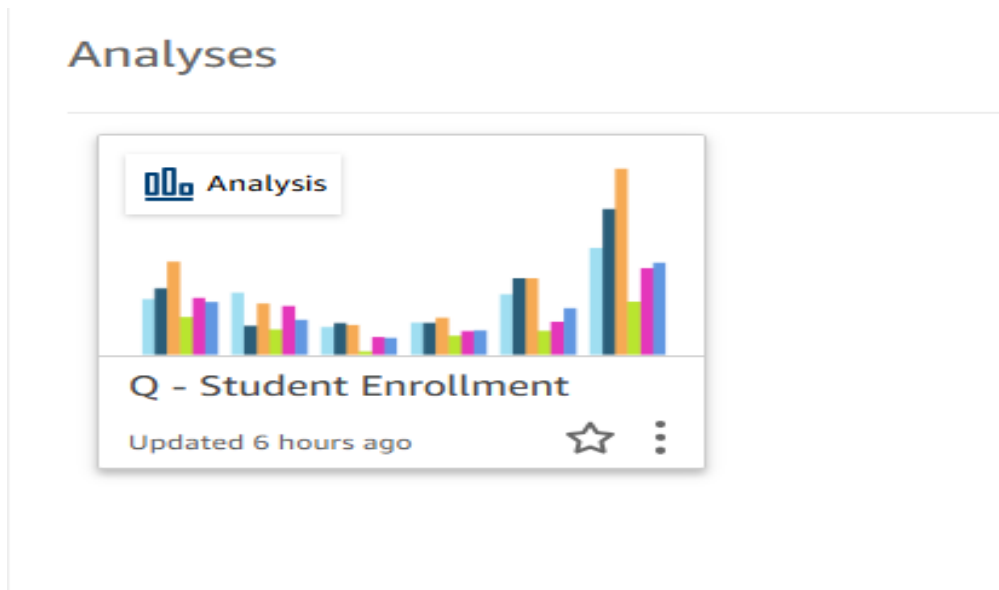
|| No restrictions [Set up](#)

SCHEMA

Unique key [Learn more](#)

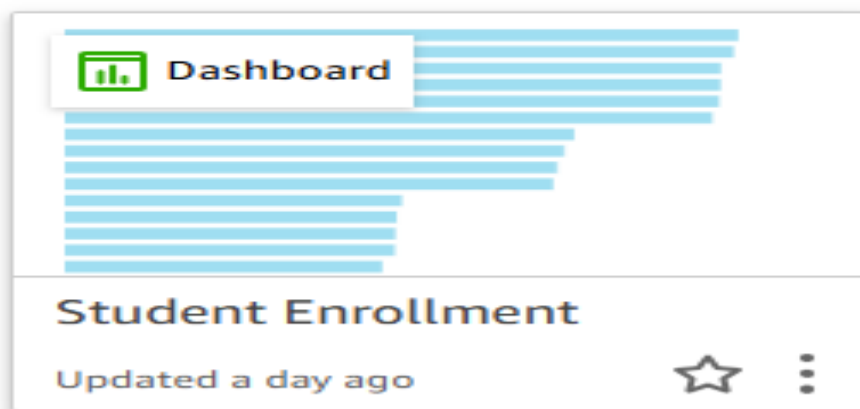
Disabled

B- Analyses: Q – Student Enrollment



C- Dashboards: Student Enrollment

Dashboards









D- Topics: Regional Community College Student Data

Amazon Q Topics

NEW SAMPLE TOPIC

NEW TOPIC

A Topic is a collection of datasets that represent a subject matter such as Sales, Media or Marketing about which questions can be asked. [Learn more](#)

Name	Owner	Status	Last Modified	Usage	Actions
  Regional Community Colle...	Me	Refreshed 3 days ago	2 days ago	9 questions  0  0  0	

E- Scenarios: Improving Student Satisfaction Without Increasing Costs

Scenarios


CREATE SCENARIO

Automate your data analysis using generative AI

Elevate your data analysis experience and get to answers faster using generative AI capabilities. Let AI suggest relevant data to enrich your insight discovery.

LEARN MORE

DISMISS



Name	Owner	Last Modified	Actions
 Improving Student Satisfaction Without Increasing Costs	Me	a day ago	

Final Deliverables

This project highlights a full spectrum of Business Intelligence and Data Storytelling capabilities using Amazon QuickSight:

- **Data Preparation & Modeling**

- Dataset structuring, enrichment, and creation of calculated fields (e.g., *Student Type*).
- Configured dataset refresh schedules to ensure data accuracy and timeliness.

- **Data Visualization & Dashboard Design**

- Built interactive dashboards with multiple visual types (bar, line, heatmaps, etc.).
- Applied best practices in labeling, formatting, and visual clarity for business audiences.

- **Advanced BI Features**

- Developed *Topics* with named entities and verified answers for natural-language queries.
- Designed *Scenarios* with multi-step analytical reasoning, connecting data exploration to business strategy.
- Crafted a *Data Story* to communicate insights effectively through visuals, narrative, and actionable recommendations.

- **Business Communication**

- Synthesized technical findings into executive-ready insights.
- Framed analysis around strategic goals: improving professor evaluations, enhancing student satisfaction, and optimizing cost efficiency.

Closing Note

This project demonstrates how Business Intelligence can transform raw educational data into **strategic insights** that improve student satisfaction while optimizing costs. The approach reflects not only technical execution but also **business-oriented problem solving**—a skill set directly transferable to real-world organizational challenges.