Optimizing Operational Scalability and Outreach in a Small-Scale Coaching Institute

Mid Term report for the BDM capstone Project

Submitted by

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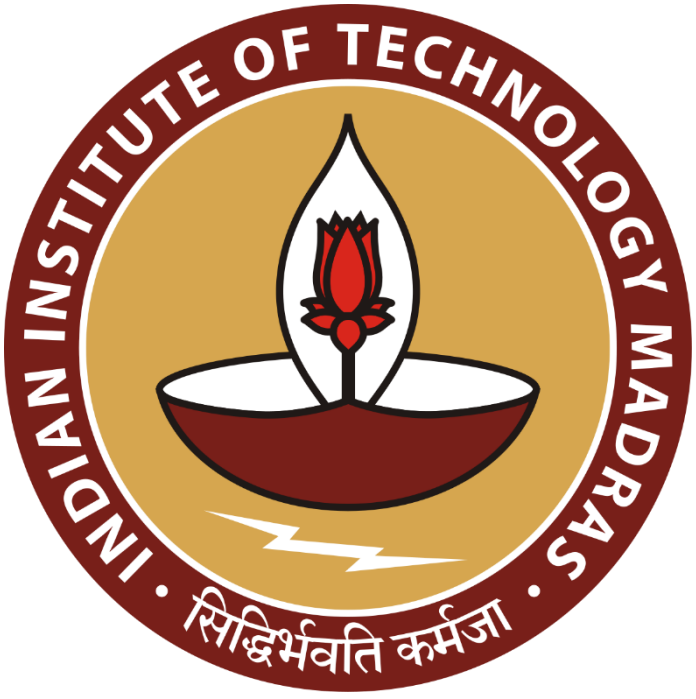

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1) Executive Summary

This project explores the stagnated growth of A-Grade Academy, an institute that aims to provide quality foundation education from class 6 to class 12.

The key problem to stagnated growth were inconsistent and limited revenue and limited outreach. Even after operating for three years, they were able to attract only a modest number of students, which is insufficient to generate stable income and invest in scaling.

The student data was gathered from the past three academic years (2021 to 2024). In the early years, records were kept in basic Excel sheets without any structure. Eventually, physical admission forms were introduced to standardize information. The dataset includes monthly fee payments from April to March, student class, subjects opted, total fees, and mode of attendance (online/offline). We also collected data on students' localities, the school they attended, and the location of nearby coaching institutes and schools.

We used tools like Excel, Pandas, GeoPandas, and Folium to analyze revenue patterns and perform spatial analysis. The results revealed clear seasonal patterns in admissions, uneven revenue inflow. The map visuals showed clusters of students, as well as nearby schools with no coaching options within a 1km radius and the untapped market that the institute could target.

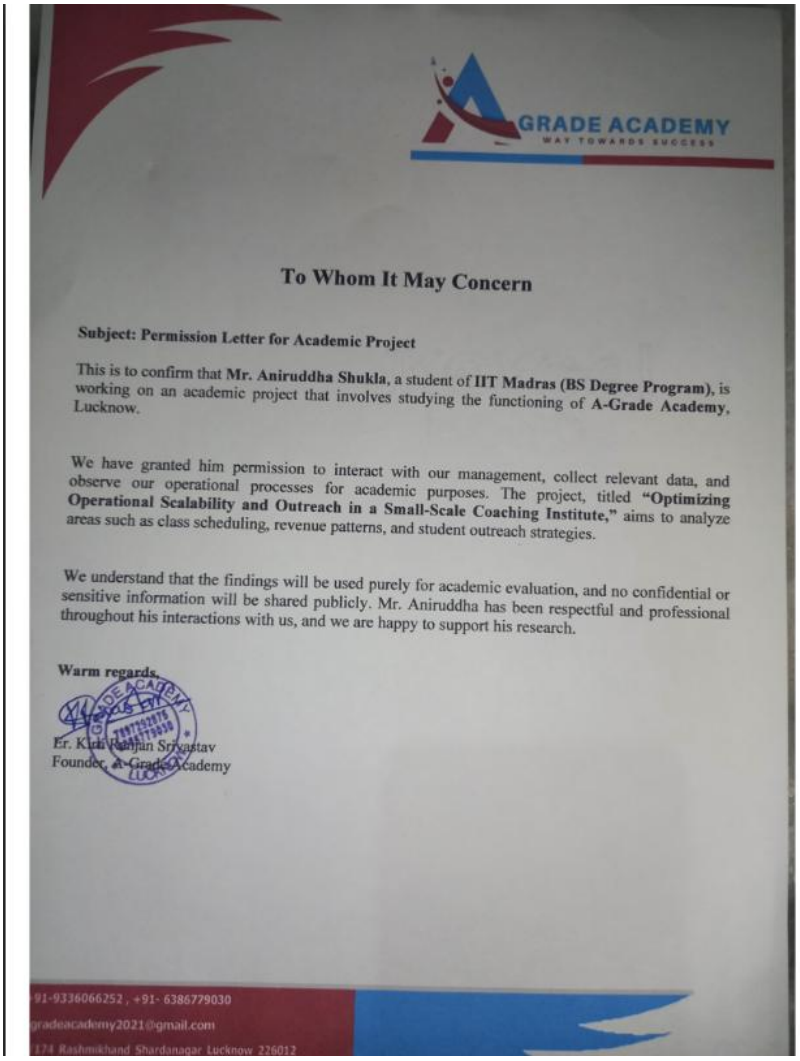
These findings helped recommend not only specific localities for expansion, but also months when targeted outreach would be most effective. While operational inefficiencies existed, the real bottleneck was the lack of structured, location-based marketing. With minimal resources, A-Grade Academy can take focused, data-informed steps toward expanding its reach and stabilizing its revenue.

2) Proof Of Originality

The following documents and media have been provided to validate the authenticity and originality of the data used in this project:

Drive Link: https://drive.google.com/drive/folders/1z2m8QnsxZ6AM8JoI10zPUxotoqi58Pud

2.1) Official Letter from A-Grade Academy



A-GRADE ACADEMY
WAY TOWARDS SUCCESS

To Whom It May Concern

Subject: Permission Letter for Academic Project

This is to confirm that **Mr. Aniruddha Shukla**, a student of **IIT Madras (BS Degree Program)**, is working on an academic project that involves studying the functioning of **A-Grade Academy**, Lucknow.

We have granted him permission to interact with our management, collect relevant data, and observe our operational processes for academic purposes. The project, titled **"Optimizing Operational Scalability and Outreach in a Small-Scale Coaching Institute,"** aims to analyze areas such as class scheduling, revenue patterns, and student outreach strategies.

We understand that the findings will be used purely for academic evaluation, and no confidential or sensitive information will be shared publicly. Mr. Aniruddha has been respectful and professional throughout his interactions with us, and we are happy to support his research.

Warm regards,

Er. Kuldeep Ranjan Srivastav
Founder, A-Grade Academy

91-9336066252, +91- 6386779030
gradeacademy2021@gmail.com
174 Rashmikhand Shardanagar Lucknow 226012

Figure 1 Letter from A-Grade Academy

2.2) Images of the Institute

Photographs showcasing the physical premises, classrooms, and infrastructure of A-Grade Academy is available on the shared Google Drive folder.

2.3) Video Evidence

A video recording of a conversation with the founder discussing the institute's challenges, goals, and context for data sharing is available on the shared Google Drive folder.

2.4) Scanned Admission Form

An image of the physical student admission form used by the institute in recent years to collect enrollment information.

A-GRADE ACADEMY

Way Towards Success

Add: 1/174 RashmiKhand ,Sharda Nagar, Lucknow- 226002

Mob: +91- 9336066252, +91-6386779030 || Email: agradeacademy2021@gmail.com

ADMISSION FORM

1: Registration No: _____ 2: CLASS (in which you want to take admission): 6th

3: Coaching Plan: ☐ Coaching Institute (Offline) ☑ Home Tution

4: Student Name: SHRINIKA SINGH

5: Father's Name: DR. PAWAN SINGH

6: Mother's Name: MRS. GARIMA SINGH

7: Gender: ☐ Male ☐ Female ☑ Other 8: Date O f Birth: 1-7-2011

9: Category: ☐ SC ☐ ST ☐ OBC ☑ General ☐ other _____

10: Permanent Address: [redacted]

11: City: LUCKNOW 12:State: U.P 13: Nationality: INDIAN

14:Email ID: [redacted] ident mobile: [redacted]

16: Guardian (Father/Mother) Mobile No: [redacted]

17: Current School : CMS

18: School Address: LDA KANPUR ROAD.

19: Board: I.C.S.E 20: Last Class Percentage: 73%

21: Father Occupation: BUSINESS Note: (Attach the Previous Class Marksheet)

23: If Home tuition then Subject: MATHS , SCIENCE

24: How did You Come to know about A-Grade Academy: ☐ Advertisments ☐ Instagram ☐ Facebook ☐ Friends ☐ Website ☑ Relative

☑ I hereby declare that all the information given by me in this application is true and correct to the best of my knowledge and belief.

Student Signature (Shrinika) Parents Signature(Sig)

(For Office Use): Subjects for Coaching: _____

Total Fees for Coaching: RS _____ Fees for Home Tuition Rs _____

Office Stamp M.D. Signature: _____

Figure 2 Admission form image

3) Metadata

The dataset compiled for A-Grade Academy spans over three academic years (April 2021 to March2024), and includes both structured and manually collected variables that are critical for understanding the institute's performance.

The dataset used for revenue analysis includes the columns such as Student ID, Class, Subjects divided into maths, science and computer, student mode (offline or online student), each month

column which showed if the student was attending the classes in that month or not. The subject level data provides insight into the popularity of different courses and allows for course-specific revenue analysis. The Mode column helps distinguish between online and offline students, which is key to understanding outreach effectiveness across delivery formats. The New Student indicator was added to distinguish between new admissions and retained students. Each academic year was filled as described above in new sheet and each sheet contains analysis for that academic term.

In addition, variables like Locality, School, Latitude, and Longitude were manually collected to support geographical and demographic analysis. These help in mapping student clusters, identifying under-served zones, and locating nearby schools or competing coaching institutes.

4) Descriptive Statistics

To understand trends in revenue and outreach, key descriptive statistics were calculated from the cleaned dataset.

Revenue Statistics: To understand how revenue patterns have changed over time, average monthly revenue was compared across three academic sessions:

Academic Year	Minimum Revenue in a month	Maximum Revenue in a month	Average Monthly Revenue (in Rs)	Standard Deviation (in Rs)
2022 -23	7420	27690	18582	7369.12
2023-24	15640	35625	27450	7693.86
2024-25	14950	52525	40068	14624.7

Descriptive statistic for revenue in tabulated form

The average monthly revenue has steadily increased over the last three academic years, indicating growing demand and enrolment. In 2022-23, the average monthly revenue was Rs.18,582. This rose by approximately 47% to Rs.27,450 in 2023-24, and then again increased by 45.9% to Rs.40,068 in 2024-25.

However, the standard deviation also grew from Rs.7369.1 in 2022-23 to Rs.14,624.28 in 2024-25, nearly doubling in two years. This increase variability indicates that although overall revenue is improving, the monthly inflow remains inconsistent. This could be linked to seasonal admission.

Subject and class-wise enrolment:

Subject and class-wise enrollment counts over three academic years is provided below. Each count reflects the number of subject enrollments, not unique students, a student taking multiple subjects is counted more than once. This helps identify demand patterns across subjects and classes.

class	2022-23			2023-24			2024-25		
	Maths	Science	Computer	Maths	Science	Computer	Maths	Science	Computer
6	2	2	2	1	3	1	2	4	1
7	3	1	2	4	3	1	5	4	2
8	4	3	4	3	3	3	5	6	3
9	5	4	3	4	5	2	5	5	3
10	3	4	2	5	7	5	7	9	6
11	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0

Subject-wise and Year-wise enrolment of Students

No admissions were recorded in Classes 11 and 12 across all three years. This points to a gap in the institute's presence or appeal at the senior secondary level, possibly due to limited faculty, subject options, or perception of the institute being focused only on foundation-level classes (6-10).

The enrolments increased gradually each academic year. Science saw the most significant increase in enrolments, doubling over three years, while Maths remained the most consistent in demand.

5) Detailed Explanation of Analysis Process

We began by consolidating student data from three academic years (2022-23, 2023-24 and 2024-25) into a structured format. Since the data was manually maintained in excel spreadsheets and physical admission forms, there were many inconsistencies throughout the data. The following steps were undertaken:

- The "Name" column was removed as it was not required for analysis and to protect student privacy.

- Dates were parsed and restructured to align admissions with calendar months. This helped in creating month-wise revenue and student count trends.
- Category values were standardized. Variations such as “offline”, “OFFline”, and other typos were corrected to “Offline”; similar corrections were made for “Online”.
- Duplicate student entries (arising from both forms and Excel records) were removed, and a unique Student ID was assigned to each valid entry.

A separate sheet was created for the most recent year, containing location details for each student, the data was cleaned and transformed into new columns which consisted of details like school, student’s locality. Geographic data (latitude and longitude) for nearby coaching institutes, schools, and student localities was manually collected and added to the dataset for proper geographical analysis.

This structured data creation and cleaning process was essential to avoid misleading results in the subsequent analysis.

- A **time-series analysis** was performed on the monthly fee collection data. For each academic year, the total fees collected in every month (April to March) were aggregated. This data was used to calculate the average monthly revenue for each academic term, and also a time-series line graph was then plotted to visually represent the overall revenue growth across the three academic terms, along with identifying peak admission periods and low-revenue months.
- For every month, the total number of students in each mode (offline or online) was counted using the formulas available in Excel. The resulting counts were plotted in a clustered bar chart, with "Online" and "Offline" values displayed side by side for each month from April to March in each academic term. The visualization made it easier to identify trends, mode shifts, or consistent dominance of one delivery type over the other.
- A subject-wise and class-wise enrolment analysis was also done; this helped identify the most and least preferred subjects among students. This analysis would help in understanding if any subject was being overburdened on the faculty and if more faculty was required for load distribution. It also connects directly to revenue generation as more students enrolled means more fees and this would also help to know if fees should be increased for any subject due to its high demand.

- A separate dataset of nearby schools and coaching institutes was manually compiled, including coordinates (latitude and longitude) and descriptions. A-Grade Academy's coordinates were used as the reference point (centre). This data was plotted using Python's Folium and Pandas library and a modern base map was created for Geographical analysis. This visual map which would consist of all the nearby competing coaching, schools and their students' localities would help in finding high density zones of schools and competitors and also help in locating unreached zones, possible zones for expansion and solving limited outreach problem.

6) Results and Findings

The following key results and insights were derived from the analyses conducted across revenue trends, student enrolment modes, subject preferences, and geographic distribution.

Revenue Analysis:

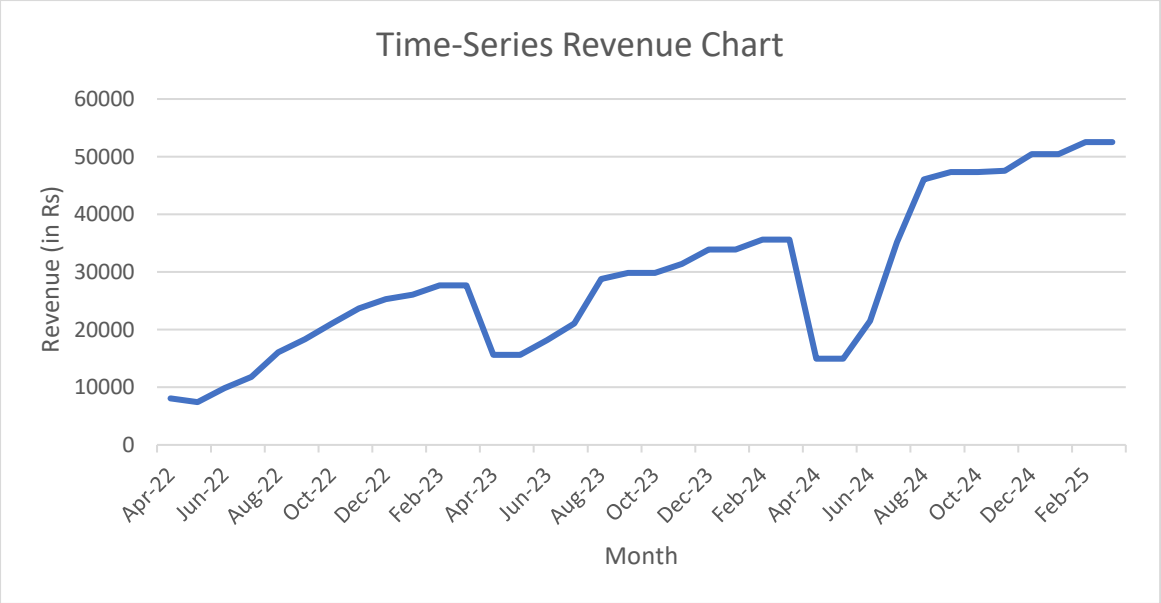


Figure 3 Time-Series Revenue Chart

The chart illustrates a clear upward trend in revenue across the past three academic years, indicating positive growth in overall student enrolments and fee collection.

However, a notable dip in revenue is consistently observed during the months of April, May, and June. This seasonal decline aligns with the summer vacation period in schools, particularly

for students in classes below 10, where academic pressure is relatively low. During this time, parents often pause tuition enrolment to reduce expenses, and many students are occupied with family travel plans or leisure activities. As a result, the academy witnesses a temporary reduction in student attendance and fee intake, leading to lower revenues during these months.

This pattern highlights the need to plan financial and marketing strategies accordingly — such as promoting short-term summer programs, discounted bridge courses, or early-bird enrolment campaigns to maintain cash flow during low-demand periods.

Student mode Count Analysis:

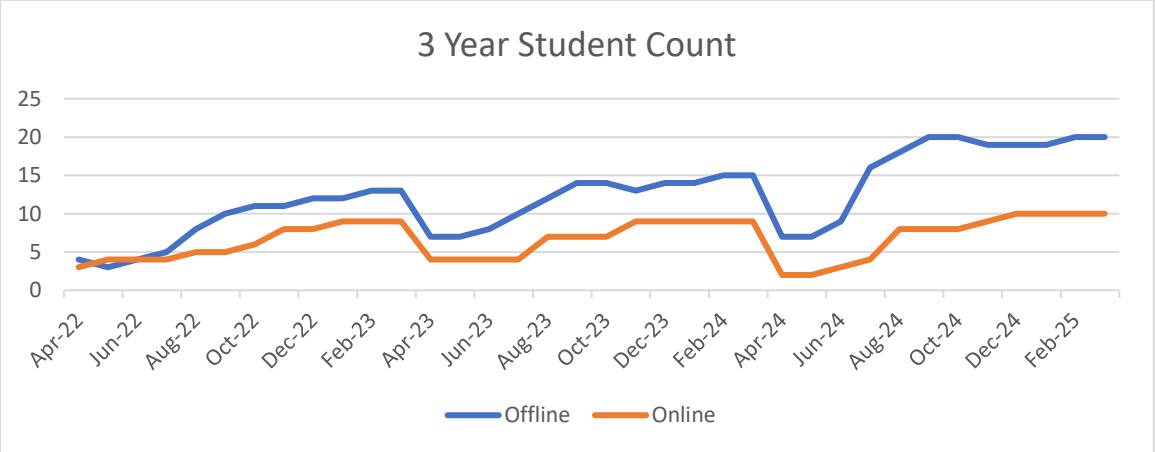


Figure 4 Student Enrolment count and mode

A month-wise analysis of student mode distribution was conducted for each academic year to compare the number of students attending classes via Offline and Online modes. The results were visualized through clustered line graph that clearly highlight the evolving preference in class delivery formats.

Over the three academic sessions (2022–23, 2023–24, and 2024–25), there was a clear and consistent rise in offline enrolments. While the number of online students remained relatively stable or showed marginal growth, offline enrolments nearly tripled by the end of the third academic year.

This indicates a significant shift in student and parent preference toward in-person learning. This shift may be attributed to multiple factors, such as:

- Improved trust in physical learning
- Better academic engagement and discipline in offline settings
- Limited digital access or fatigue from online modes

This suggests that A-Grade Academy's core strength and future focus should remain on offline classroom delivery. The trend supports investment in expanding physical infrastructure and increasing offline teaching capacity. At the same time, the institute can maintain online offerings for flexibility but should position it as a secondary option rather than the core delivery mode.

Subject-wise and class-wise analysis:

class	2022-23			2023-24			2024-25		
	Maths	Science	Computer	Maths	Science	Computer	Maths	Science	Computer
6	2	2	2	1	3	1	2	4	1
7	3	1	2	4	3	1	5	4	2
8	4	3	4	3	3	3	5	6	3
9	5	4	3	4	5	2	5	5	3
10	3	4	2	5	7	5	7	9	6
11	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0

Class-wise and Subject-wise table

Subject-wise Observation:

Mathematics consistently had the highest enrolment across all years and classes. Its foundational importance and parental emphasis on strong math skills make it a high-demand subject.

Science showed a steady rise in enrolment, especially in higher classes (8, 9, 10), indicating increased focus on board preparation and future competitive exams.

Computer had the lowest enrolment, and its growth remained relatively flat across years. This suggests that students may not see it as essential or may view it as optional due to academic pressure from core subjects.

High demand for Math and Science could be leveraged through premium subject offerings, batch segmentation, or faculty expansion. On the other hand, low enrolment in Computer indicates a need for curriculum redesign, better marketing, or offering it as a skill-based add-on course rather than academic support as the knowledge for this domain is nowadays easily available and simple to understand.

Class-Wise Observations:

Classes 8 to 10 consistently had higher enrolment across all subjects, compared to Classes 6 and 7.

This pattern aligns with academic pressure increasing in higher grades, especially due to the board exam in Class 10.

There was no student admissions recorded in Classes 11 and 12, indicating that A-Grade Academy currently does not cater to senior secondary students.

The institute may consider launching pilot batches for Classes 11 and 12, especially for Math and Science, to retain students who progress beyond Class 10 and increase long-term revenue.

Geographical Analysis Results:

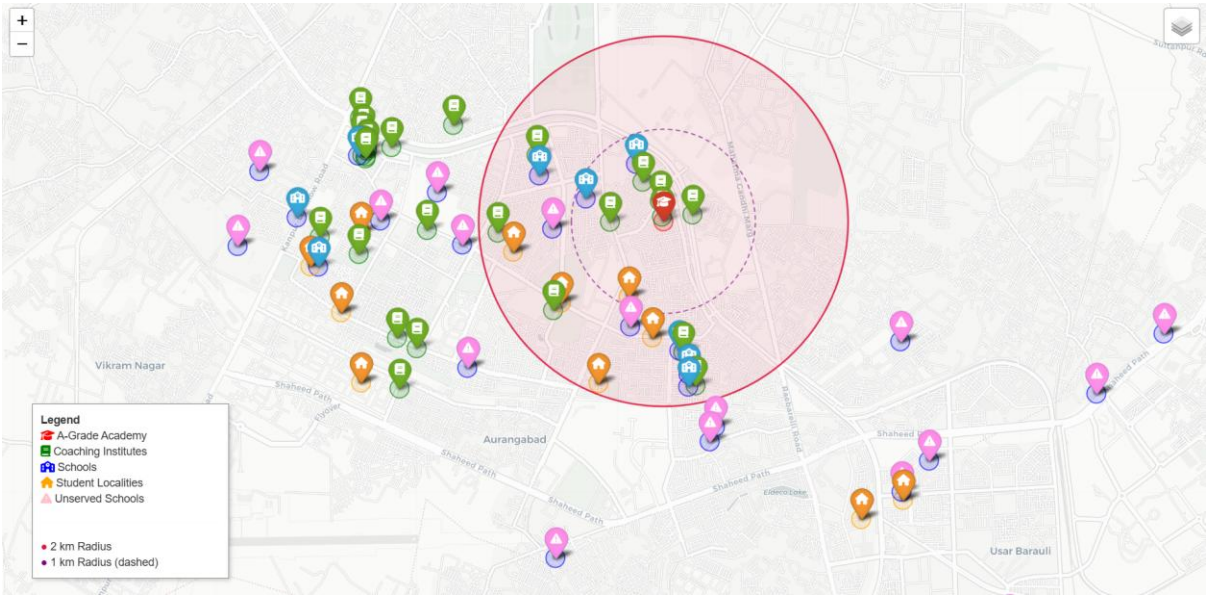


Figure 5 Geographical Analysis

An interactive map was created using Folium, Pandas, and manually collected latitude-longitude data to analyze the spatial distribution of: A-Grade Academy, nearby coaching institutes (competitors), nearby schools (potential student sources) and localities where offline students reside

This analysis revealed several critical insights:

- A-Grade Academy is surrounded by at least 6–8 active coaching institutes within a 1.5 km radius, indicating a highly competitive micro-market.

- However, many localities that contain schools do not have nearby coaching centres, representing underserved zones.
- These underserved zones offer opportunities for targeted marketing, collaboration with schools, or even launching a satellite branch in a less saturated neighbourhood.
- The map also includes nearby schools — these are not only potential sources of new students, but also partners for conducting school seminars, demo classes, or scholarship tests.
- Most current offline students come from 5–6 known schools, suggesting loyalty or word-of-mouth influence from those institutions.

The use of mapping tools also made it easy to communicate and visualize these patterns effectively to stakeholders.

More geographical analysis would be shown in the End Term report as well.

I would extend this report by adding more analysis based on revenue and the institute's expense. I would do more analysis based on their student's location and nearby competitive coaching and provide solution to limited outreach in the future submission and report.