

ITL PUBLIC SCHOOL

Active Engagement of Young Minds during Summer Vacations 2026-27

Class : XI

Subject: Mathematics

- **Project Title: A Statistical Analysis and connection with computational Mathematics.**

Introduction

In today's increasingly interconnected world, the ability to communicate in more than one language is both common and valuable. Multilingualism refers to the ability of an individual or community to use multiple languages. In many countries, being multilingual is a norm due to cultural diversity, immigration, and global connectivity.

This project aims to explore the prevalence and patterns of multilingualism using mathematics—specifically statistics and data analysis. The objective is to analyze how various factors like age, region, education level, and exposure to media influence the number of languages spoken by individuals.

Objectives of the Project

- To understand the distribution of multilingualism in a chosen population.
- To use mathematical tools like **graphs, mean, median, mode, range, and standard deviation** to analyze the data.
- To explore the **correlation** between different variables (e.g., age vs. number of languages).
- To present findings using appropriate **mathematical and visual representations**.
- To understand how AI processes different languages.
- To apply computational mathematics in language recognition and translation.

Data Collection: You can choose one or a combination of the following sources:

Primary Data (Survey): **Create a short questionnaire and collect data from:**

- Classmates
- Teachers
- Neighbors
- Family members

Sample Survey Questions:

1. How many languages do you speak?
2. What languages do you speak?
3. What is your age group? (e.g., 10–20, 21–30...)
4. What is your highest level of education?
5. Do you use more than one language at home, school, or work?
6. How often do you watch or read media in other languages?

Collect responses from **at least 30–50 individuals** for meaningful analysis.

Secondary Data

- Use online sources such as:
 - UNESCO multilingualism data
 - National census reports
 - Educational or linguistic research reports

Data Representation

Use various **graphical tools** to make the data visually appealing and easy to understand.

- **Bar Graph:** Number of people vs. Number of languages spoken
- **Pie Chart:** Proportion of different languages spoken
- **Histogram:** Age group vs. Number of multilingual individuals

- **Line Graph:** Trends of multilingualism across years (if using secondary data)

Mathematical Analysis: Apply these concepts to analyze your data:

1. Measures of Central Tendency

- **Mean (Average):** Total number of languages spoken \div Total number of people surveyed
- **Median:** The middle value in the sorted data
- **Mode:** The most frequently occurring number of languages

2. Measures of Dispersion

- **Range:** Difference between the highest and lowest number of languages spoken
- **Standard Deviation:** Measure of how spread out the number of languages spoken is

3. Percentages and Ratios

- Percentage of people who speak only one language vs. two or more
- Ratio of multilingual to monolingual individuals

4. Correlation and Trends

- Use a **scatter plot** to determine correlation between:
 - Age and number of languages
 - Education level and multilingualism
 - Media exposure and multilingualism

Discuss whether the correlation is positive, negative, or none.

5. Connection with Computational Mathematics

- Computational Mathematics uses algorithms and numerical methods to solve problems using computers.
- In multilingual systems, computational mathematics helps in:

Language prediction, Speech recognition, Translation systems, Pattern analysis Data classification

Examples:

Predicting the most spoken language in a city.

- Calculating probability of language usage.
- Using matrices for translation models.
- Frequency analysis of words

Interpretation of Results

Analyze the patterns in your data. For example:

- Is there a clear age group that tends to be more multilingual?
- Do people with higher education levels speak more languages?
- Does exposure to foreign media (movies, YouTube, books) relate to multilingualism?

Support your conclusions with the data visualizations and calculations you've done.

Conclusion: Summarize your key findings:

- How multilingualism varies by age, education, etc.
- Insights from the mean, mode, and standard deviation
- Whether your hypothesis was supported by the data

Discuss the implications of multilingualism, such as:

- Benefits in cognitive development
- Better career opportunities
- Cross-cultural understanding

- **Complete the given 10 activities in the Maths Activity File**