I. Introduction

Schools and education stand as foundational pillars that influence not only individuals' pursuit for personal growth and success, but also the broader communities they serve. Beyond the conventional confines of academic instruction, schools play a pivotal role in empowering individuals with the capacity to think critically, equipping students not only with fundamental knowledge, but also the essential skills necessary for success in an ever-evolving world. The impact of education extends beyond the classroom, acting as a catalyst for economic growth by shaping a skilled and adaptable workforce. Furthermore, schools contribute to character development, fostering a sense of responsibility, empathy, and ethical values vital for navigating the complexities of the world as it is today. Schools and education are undoubtably the center of influence on individuals and society, and recognizing the importance of them and the role they play is pivotal to progress, well-being, and the cultivation of informed and empowered citizens.

II. About the Data

The following analysis aims to understand how different schools progress students through a similarly structured mathematics course.

This data consists of five schools (A, B, C, D, E) that have all implemented the same mathematics course, a course consisting of 35 different lessons that students are expected to progress through. Across all five schools, a total of 30 different sections are being taught (not necessarily evenly distributed among the five schools). At this point, the semester is 75% complete and it would be expected that the students are nearing the end of their lesson plan.

For each of the 30 sections, students are placed into different categories based on the amount of lesson plans completed to date. The ranges are as follows:

- Complete: Student has completed the course
- Very Ahead: Student is more than 5 lessons ahead
- Middling: Students are between 0 and 5 lessons ahead
- Behind: Students are 1 to 5 lessons behind
- More Behind: Students are 6 to 10 lessons behind
- Very Behind: Students are more than 10 lessons behind

Understanding the raw dataset ("story") is imperative to a thoughtful analysis. After reading in the CSV, checking for "NAs", and using functions such as str(), summary(), head(), etc., the dataset began to tell a high level story. Some initial observations include:

- Schools A and B have considerably more sections than schools C, D, and E
- No students are included in the "Very Ahead" bucket
- The majority of students appear to be in the "Behind" bucket meaning they are 1 to 5 lessons behind schedule

- The School and Section columns are character and numeric respectively when they should be factor

After the initial review of the data, it was clear that cleaning would be necessary, and the following actions were taken before starting the visual analysis:

- A new dataset was created called "story1"
- School and Section columns converted to factors
- Reordered columns to be in a more chronological order
- Removed the "Very Ahead" column (no students applicable)
- Added a column summing total students per section
- Renamed the columns to make them more clear and concise

Once the data cleansing was complete, it was time to start visually looking at the data in hopes of making observations that help drive conclusions. By exploring the distribution of student progress across schools and sections, the aim is to identify trends, challenges, and successes that contribute to a comprehensive understanding of the dynamics of the mathematics course implementation.

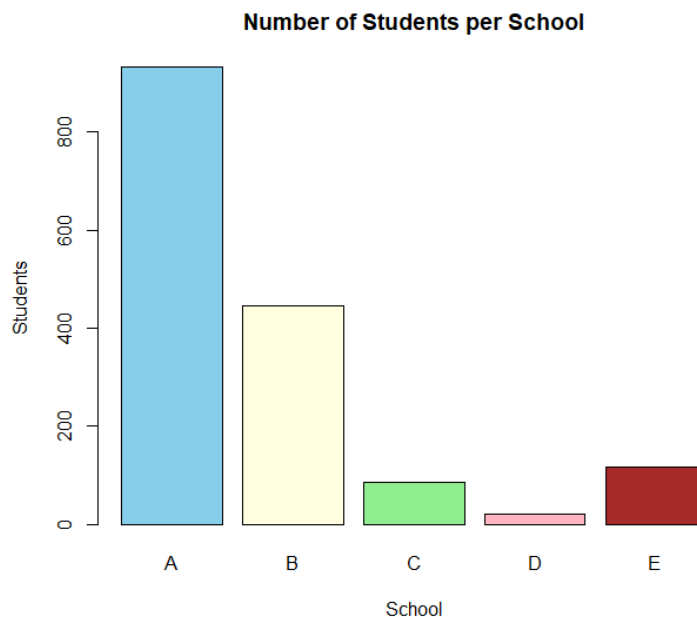## III.   Data Models and Results

Figure 1:

Figure 1 depicts the number of students per school that are enrolled in the mathematics course. School A is the largest in terms of total students enrolled (932) followed by School B (446), E (116), C (85), and D (22).
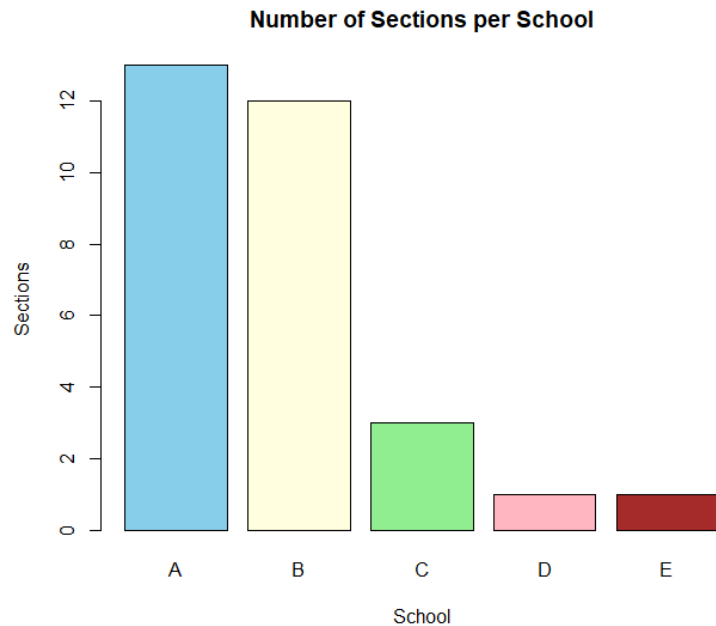
Figure 2:

Figure 2 shows the number of sections offered per school. Per the visual, Schools A (13) and B (12) offer considerably more sections than Schools C (3), D (1), E (1). When compared to Figure 1, Figure 2 shows that although Schools A and B offer a similar number of course sections, the number of students per section in School B is about half the amount as compared to School A.
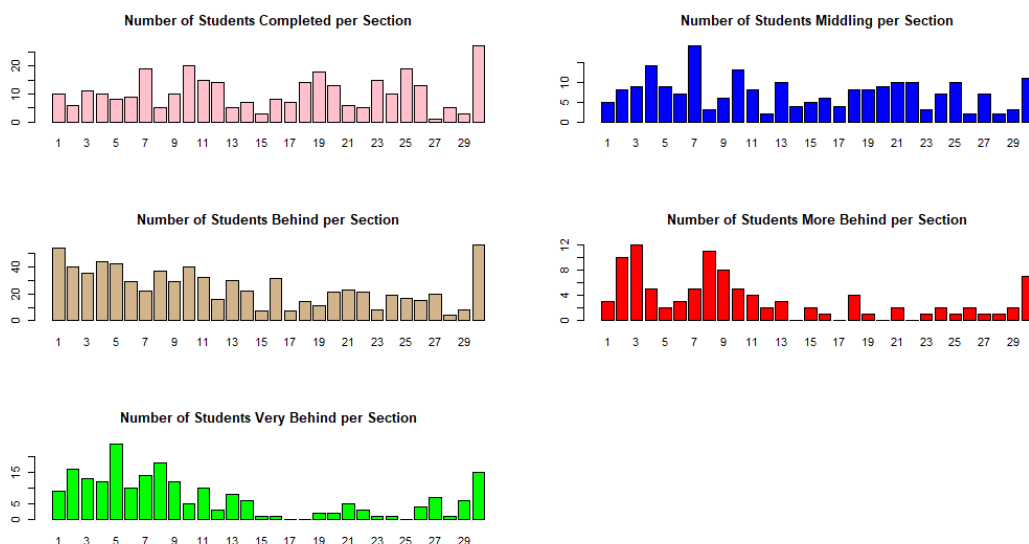
Figure 3:

Figure 3 is a comparison of all sections across all five schools and the distribution of how students are performing overall in each section. Overall, 316 students have completed the course, 222 students are middling, 754 students are behind, 100 students are more behind, and 209 students are very behind. Based on the distribution, most students across all Schools are 1-5 lessons behind schedule.

Figure 4:
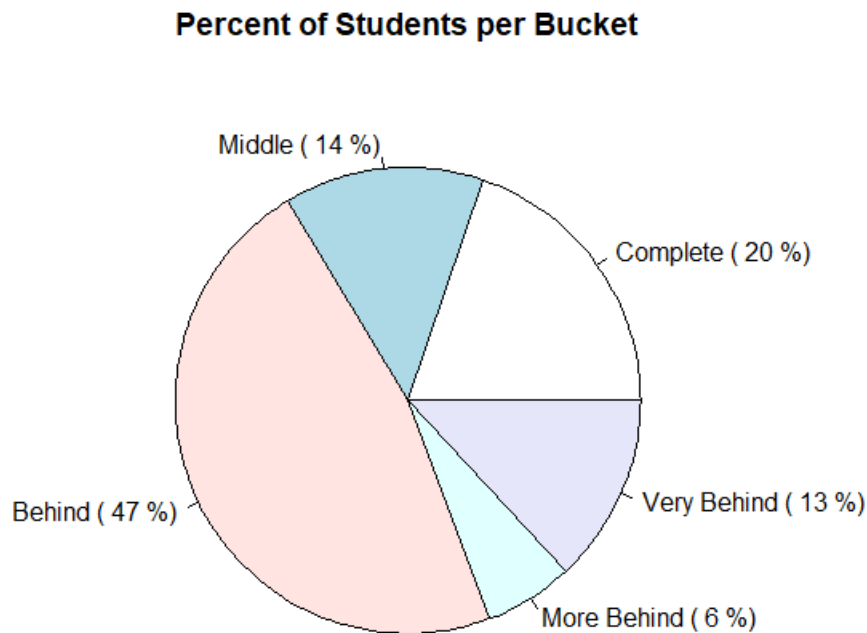

Percent of Students per Bucket

Figure 4 takes the above information and provides a graphical representation of the percentage of students that fall into each category. As alluded to, nearly half of the student population is 1-5 assignments behind what would be expected at this point in the semester.

Figure 5:

Figure 5 breaks down the number of students in each bucket per school. The visual again shows that most students at every school are behind schedule. It is easy to note that School B has the smallest percentage of students that are more behind and very behind while school D has the greatest percentage of students that are very behind. Because the number of students per school varies considerably, it is crucial to look at percentages rather than bar heights when analyzing the data.

IV.   Conclusion

The education system plays a fundamental role in nurturing the growth and development of individuals worldwide. The analysis of student progression through a standardized mathematics course across five schools (A, B, C, D, E) highlights significant trends and challenges within the educational landscape. While the findings provide valuable insights into student progress, they also emphasize the critical need for customized interventions and support systems to meet the diverse learning requirements and ensure equitable educational outcomes and opportunities across schools. Leveraging data insights, educators and administrators can prepare targeted strategies to enhance student success and cultivate an enriching learning environment conducive to academic advancement and achievement.