CODE

Data Analysis and Visualization of Bang Khun Thian Senior Academy

Atippat Tanasetsiri[a], Assoc. Prof. Dr. Nalinpat Bhumpenpein[b], Asst. Prof. Dr. Nattaporn Utakrit[c]

[a]Dao De Xin Xi Club, Building, 2nd floor Bang Khun Thian Sports Center Thonburi Community Housing 3 Rama II Road, Soi 62, Intersection 1-8 Samae Dam, Bang Khun Thian, Bangkok 10150, Thailand
[b,c]King Mongkut's University of Technology North Bangkok, 1518 Pracharad Road, Wong Sawang, Bang Sue, Bangkok 10800, Thailand

Abstract

This project aims to determine the effectiveness of data analysis and data visualization techniques in enhancing the learning experience and engagement of members of the Dao De Xin Xi Club in continuing education settings. The purpose of this study is to examine the key factors that influence learning outcomes among elderly individuals, including attendance patterns, course preferences, engagement metrics, and learning progressions over time, based on data-driven insights. A user-centered visualization approach is also introduced to create an environment that is supportive and empathetic to the needs of senior learners, making complex data more accessible and encouraging a supportive learning environment. Through a combination of statistical analysis and interactive dashboards, this work seeks to empower educational facilitators with actionable insights and foster a deeper understanding of the unique learning needs within senior academy programs, ultimately promoting lifelong learning and cognitive well-being.

Introduction

The project requirements involved utilizing Looker Studio to conduct data analysis and visualization aimed at enhancing the educational experience for elderly students in continuing education programs. By collecting and analyzing data on student demographics, attendance, course selections, engagement patterns, and learning progress, this project identifies trends that influence learning outcomes and engagement levels among elderly learners.

Through Looker Studio's interactive and customizable dashboards, this work presents data insights in a visually accessible format tailored to the cognitive and perceptual needs of elderly users. These visualizations empower educators and administrators with actionable insights to refine curriculum design, track learner engagement, and adapt teaching strategies. The study demonstrates the value of data-driven visualization in fostering more inclusive and responsive educational settings for elderly students, ultimately promoting lifelong learning and social engagement.

Methodology

1.Create App Script:

- A script was developed to facilitate data entry through a customized form, capable of collecting user input and handling database operations. This script supports essential functionalities, including *submit*, *update*, and *delete*, ensuring a dynamic and user-friendly way to manage student data efficiently.

2.Setup Looker Studio:

- Looker Studio was configured to integrate seamlessly with the database, enabling real-time synchronization of data. This setup allows for consistent updates, making data readily available for visualization and analysis within the platform.

3.Develop App Script:

- The App Script was further refined to include backend operations, such as data validation, error handling, and automated timestamping. Additional functions were developed to categorize data points according to predefined criteria, which aids in organizing the data for more targeted analysis and visualization within Looker Studio.

4.Test Data Collecting:

- The data entry form and synchronization mechanisms were thoroughly tested to ensure accuracy and functionality. This testing phase involved verifying that each operation—*submit*, *update*, and *delete*—was reflected correctly in the database and Looker Studio visualizations. Sample data sets were used to simulate real-time input, allowing for debugging and optimization of data handling processes.

5.Illustrate the Data Using Looker Studio:

- Looker Studio's visualization tools were employed to create interactive dashboards that display essential data metrics, such as student attendance trends, course participation, and engagement patterns. These dashboards were designed with accessibility in mind, ensuring that information is easily interpretable by educators and administrators. The visualizations provide clear insights into learning progress and demographic trends, allowing stakeholders to make informed, data-driven decisions.
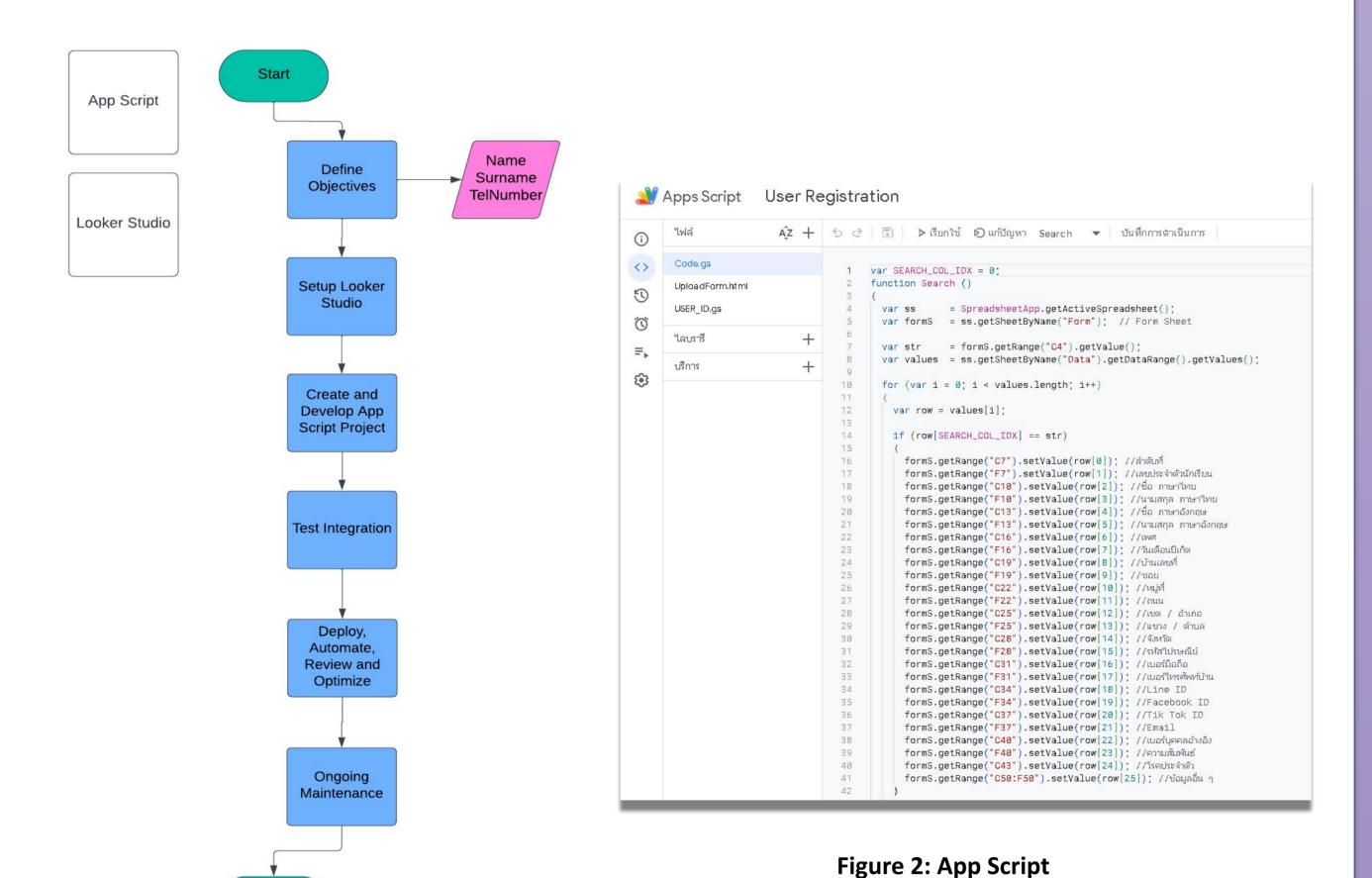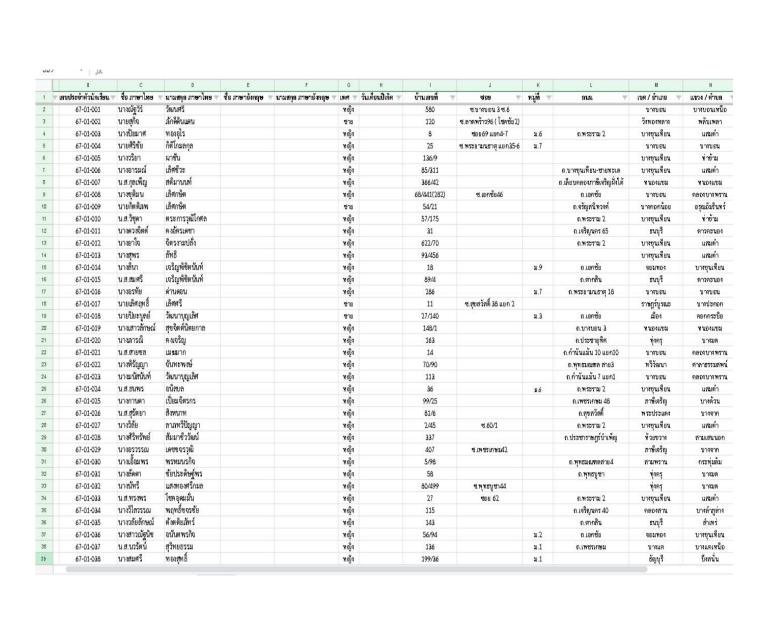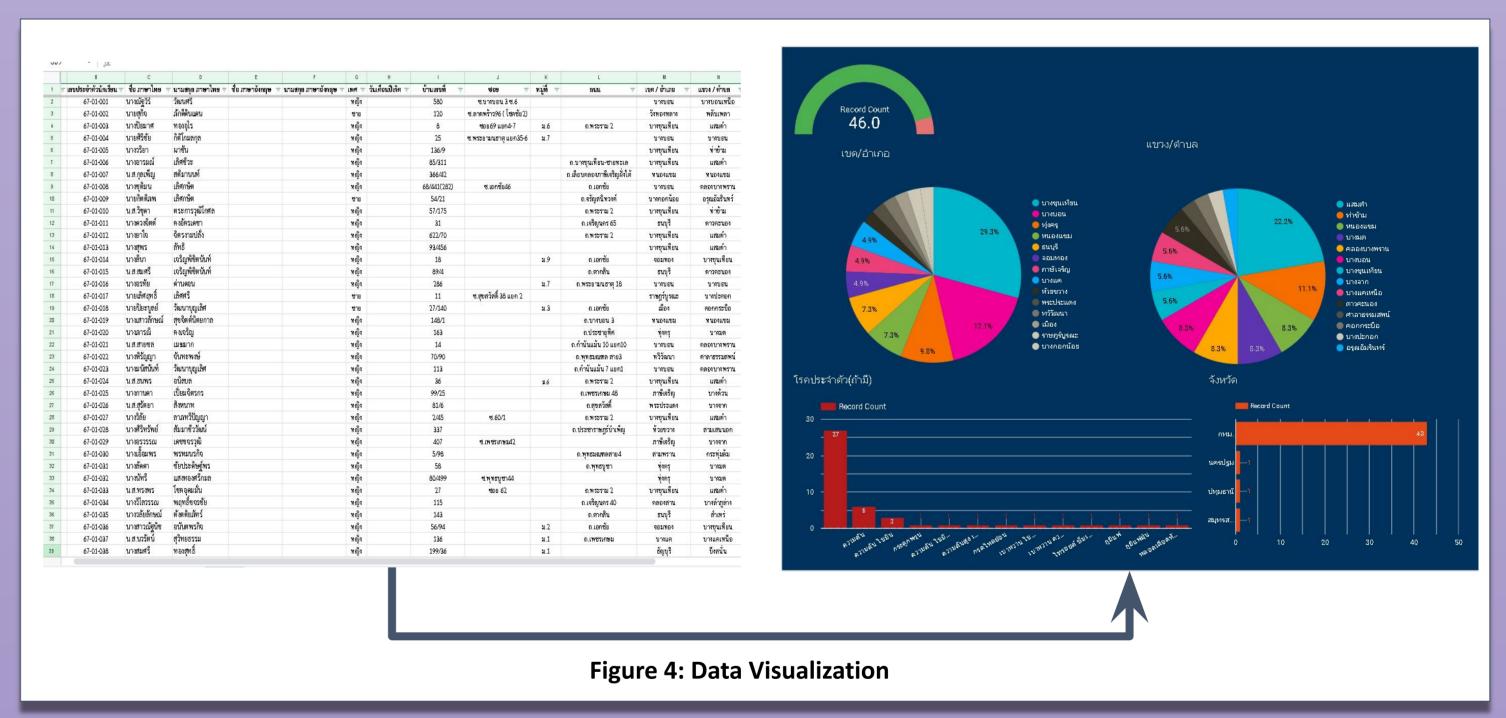
Figure 1: Flowchart

Figure 2: App Script

References

1. Create a Form to Enter Google Sheets Data
   https://budibase.com/blog/data/using-a-form-to-enter-google-sheets-data/
2. How to Create a Data Entry Form in Google Sheets - Bricks
   https://www.thebricks.com/resources/how-to-create-a-data-entry-form-in-google-sheets
3. Data Visualization with Google Looker Studio
   https://medium.com/@subitobito/data-visualization-with-google-looker-studio-2c64b6305f02
4. Effective Data Visualization in Looker Studio
   https://www.lovesdata.com/blog/effective-data-visualization-in-looker-studio

Figure 2: Data Entry Form

Figure 3: Data Entry Form

Results

Implementing App Script and Looker Studio has systematically improved data management and analysis within the organization. App Script facilitated automation and seamless integration across Google Workspace, allowing for efficient data collection and handling processes. Meanwhile, Looker Studio provided robust data analysis and reporting capabilities, transforming raw data into insightful, accessible visualizations. Together, these tools enhanced the organization's data management processes, creating a more streamlined, efficient approach to data-driven decision-making and reporting.

1. Data Collecting :All stages of the data collection process and the post-process have been successfully completed
2. Data Analysis : Analyze the data collected through the data gathering process, and then transform them into useful conclusions based on the analysis
3. Data Visualization : Visualize data in a manner that is easy to comprehend by casual users

Figure 4: Data Visualization

Conclusion

In conclusion, this project successfully demonstrated the effectiveness of data analysis and visualization techniques in enhancing the learning experience and engagement for members of the Dao De Xin Xi Club in a continuing education setting. By utilizing Looker Studio, the project was able to identify key factors influencing learning outcomes, such as attendance patterns, course preferences, engagement levels, and progression over time. The use of interactive, user-centered visualizations tailored to the needs of elderly learners created an accessible, supportive environment that promotes lifelong learning.

These visualizations provided educators and administrators with actionable insights, enabling more responsive curriculum design and improved engagement tracking. This project illustrates the significant impact of data-driven insights on creating inclusive, adaptive educational experiences for elderly students, ultimately fostering cognitive well-being and social engagement within senior education programs.

Acknowledgements