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Student Data Visualization of Metro City Using Google Looker Studio

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Abstract: Metro City educational landscape encompasses over 50,000 students across multiple institutional levels, yet systematic enrollment pattern analysis remains underdeveloped. Gender disparities and uneven institutional distribution challenge educational planners seeking evidence-based policy solutions. Our research examined student enrollment data from Metro City Education Department for the 2025/2026 academic year, focusing on gender balance and institutional representation across KB, TK, SD, SMP, SMA, SMK, and SLB schools. Using descriptive quantitative methodology, we processed secondary data through spreadsheet applications before implementing Google Looker Studio visualization. The platform transformed numerical datasets into interactive dashboards featuring bar charts, pie diagrams, and filterable tables accessible to non-technical stakeholders. Analysis revealed unexpected findings challenging conventional gender imbalance assumptions. Rather than anticipated male dominance, data showed near-equal gender distribution (55% male, 45% female) across 64 institutions serving 14,298 students. However, enrollment concentration became apparent when SMP Muhammadiyah Ahmad Dahlan Metro accounted for 50% of total student population, potentially skewing statistical interpretation. Educational staff demographics differed significantly, with female educators outnumbering males 2:1, suggesting professional preference rather than access barriers. Google Looker Studio demonstrated practical effectiveness for real-time data processing, enabling rapid information retrieval and policy formulation support. Research limitations include single-year scope without longitudinal analysis or socio-economic variables. Future investigations should incorporate historical perspectives and predictive modeling. The visualization platform successfully addressed research objectives, providing Metro City education leadership with actionable insights for policy development and resource allocation strategies.

Keywords: Student Enrollment Analysis; Gender Distribution Patterns; Educational Data Visualization; Google Looker Studio; Evidence-Based Educational Policy.

1. Introduction

Information technology advancement drives digital transformation across various sectors, including education. One manifestation of such transformation involves optimal data utilization for evidence-based decision making. Metro City, recognized as an educational hub in Lampung Province, accommodates over 50,000 students distributed across multiple educational levels including kindergarten (KB), preschool (TK), elementary (SD), junior high (SMP), senior high (SMA), vocational (SMK), and special needs schools (SLB). However, student data analysis remains suboptimal, particularly regarding gender equality and student distribution across educational institutions. Initial data reveals gender imbalances, such as male student proportions reaching approximately 55% compared to 45% female representation at junior and senior high levels, alongside uneven distribution among educational institutions. Therefore, the current research focuses on analyzing student data based on gender and educational institutions using Google Looker Studio as an interactive visualization medium that facilitates understanding and decision-making processes.

Education represents a vital sector in regional development. Formulating appropriate policies requires accurate data that can be analyzed effectively. Metro City, as one of the cities in Lampung Province, houses various educational institution levels with diverse student characteristics, including gender aspects. Previous research conducted by Hartama (2018) indicates that utilizing data visualization proves more effective through graphic visualization, as data representation appears stronger than numerical displays when analyzing academic data using Tableau Big Data [1]. Similar findings were also presented by Tupari *et al*. (2023) in their research on sentiment analysis visualization of the Health Omnibus Law Bill, noting that complex and diverse information from sentiment analysis can be represented through visual forms such as graphs or diagrams using KNN with RapidMiner software, making it easier for stakeholders without technical backgrounds to understand sentiment meanings [2].

Data visualization can be created using various visualization tools such as Tableau, Google Data Studio/Google Looker Studio, and Power BI. Google Looker Studio, previously known as Google Data Studio, serves as a user-friendly data visualization application. Cendana & Silmina (2022) demonstrated the effectiveness of Data Studio for COVID-19 data visualization in Yogyakarta City, showing how the platform can handle complex datasets and present them clearly [3]. The purpose of Google Data Studio application involves helping users create visually appealing reports so that obtained information can be clearly received, as evidenced by Saputri *et al*. (2021) in their warehouse management visualization project for UD Salim Abadi [4]. Google application is widely used by researchers for educational data visualization. Nisa *et al*. (2023) implemented Business Intelligence to analyze the number of elementary, junior high, senior high, and vocational school teachers in West Java [5]. Similarly, Saputra *et al*. (2023) applied Business Intelligence to analyze COVID-19 case data in West Java Province using Google Data Studio platform [6]. Puteri (2022) also demonstrated data visualization analysis for Kertapati District using Tableau Public [7]. Furthermore, Bahtiar *et al*. (2022) showed how data visualization competency can be enhanced among educational personnel [8].

Fernando (2018) emphasized the potential of Google Data Studio for data visualization in educational settings [9], while Gunawan *et al*. (2023) designed Business Intelligence systems for monitoring former migrant workers at BNP2TKI [10]. Tumini & Minatania (2023) visualized COVID-19 data for 2021 in West Java using Google Data Studio [11]. These studies demonstrate the versatility and effectiveness of Google Data Studio across various domains. Student data analysis based on gender and educational institutions proves essential for understanding distribution and educational access equality. Data visualization technology like Looker Studio provides convenience in presenting information visually and interactively, thereby enhancing understanding and data-based decision making. The educational sector in Metro City can benefit from such technological applications, as demonstrated by Sulistiyanto *et al*. (2023) in their competency assessment research at SMKN 3 Metro [12].

The current research aims to present student analysis in Metro City based on gender and educational institutions using Looker Studio as a visualization tool. Based on the background described above, problem formulations include: How is the student distribution in Metro City based on gender across each educational level? How is the student distribution based on educational institutions (KB, TK, SD, SMP, SMA, SMK, and SLB)? How effective is student data visualization using Google Looker Studio to support educational decision-making? These problem formulations become the analytical focus in providing data-based solutions for educational policies in Metro City.

2. Related Work

Data visualization has become increasingly valuable in educational environments, particularly as institutions seek better ways to understand student performance and make informed decisions. Educational stakeholders are turning to various platforms and techniques to transform raw data into meaningful visual

representations that support teaching and administrative processes. Yuan *et al*. (2024) examined how big data mining techniques can enhance educational data visualization processes. Their research demonstrated that schools could make more effective decisions about teaching plans and curricula when they had access to properly analyzed and visualized data [17]. The study showed that advanced analytics, when combined with visualization tools, helped educational institutions identify patterns that might otherwise remain hidden in large datasets. Building on similar themes, Taylor *et al*. (2024) conducted a case study examining K-12 state assessment data through visualization and machine learning approaches. Their work revealed that web-based technologies paired with machine learning algorithms offered cost-effective solutions for educational data visualization [16]. Teachers and school administrators found these tools particularly useful for understanding student performance trends and identifying areas where interventions might be needed.

The design of educational information platforms received attention from Ping *et al*. (2022), who focused specifically on big data visualization applications. Their research emphasized how visualization tools could help educators recognize learning trends and patterns among students [14]. The platform design principles they developed provided practical guidance for institutions looking to implement similar systems for their own data analysis needs. Educational data mining has evolved considerably over recent years, with Romero and Ventura (2020) providing an updated examination of the field. Their survey work noted the rapid development in educational data mining and learning analytics, while emphasizing the growing need for effective visualization methods [15]. The authors observed that as educational data becomes more complex, the ability to present findings through clear visual methods becomes increasingly valuable for educators and administrators.

Technology integration in educational settings extends beyond traditional data visualization approaches. Dendodi *et al*. (2024) investigated augmented reality applications in science education, demonstrating how interactive technologies could improve learning outcomes [13]. While their focus differed from data visualization specifically, their findings illustrated how various technological approaches could enhance educational experiences and student understanding. The practical application of these visualization techniques has been demonstrated across different educational settings and geographic regions. Research indicates that successful implementation requires careful consideration of user needs, data complexity, and available technological resources. Educational institutions have found that visualization tools can support both day-to-day teaching decisions and longer-term strategic planning.

Current research gaps exist particularly in studies that examine specific regional or demographic patterns using modern visualization platforms. Many existing studies focus on broad applications rather than detailed analysis of particular student populations or geographic areas. The present research addresses part of this gap by examining student data patterns in Metro City, using Google Looker Studio to analyze gender distribution and institutional characteristics. The literature demonstrates that data visualization tools have proven their value in educational settings, from supporting classroom instruction to informing policy decisions. As educational data continues to grow in volume and complexity, the need for effective visualization approaches becomes more apparent. Educational institutions that successfully implement these tools often find they can better understand their student populations and make more informed decisions about resource allocation and program development.

3. Research Method

The study employs a descriptive quantitative methodology to analyze student enrollment patterns within Metro City educational system. The research design focuses on systematic examination of numerical data without experimental manipulation or variable control. The primary aim involves documenting student distribution across various educational levels while identifying gender-based enrollment trends throughout Metro City academic institutions. Data collection operates through two distinct methods: documentation analysis and literature examination. Documentation analysis involves acquiring official records from Metro City Education Department Portal and verified online sources. The collected data encompasses student enrollment information categorized by educational level, gender, and institutional type, covering kindergarten (KB), preschool (TK), elementary school (SD), junior high school (SMP), senior high school (SMA), vocational high school (SMK), and special needs schools (SLB). Literature examination strengthens theoretical foundations through review of peer-reviewed journals, publications addressing data visualization via Google Looker Studio, and scholarly works discussing information technology applications in educational administration. The research utilizes secondary data obtained from Metro City Education Department for the 2025/2026 academic year. The dataset includes enrollment figures organized by gender and educational categories spanning early childhood education (PAUD), elementary education (SD), junior secondary education (SMP), senior secondary education (SMA), vocational education (SMK), and special education (SLB). The data provides complete demographic information across Metro City educational infrastructure.

Data processing and visualization occur through Google Looker Studio following established analytical protocols. The methodology begins with data preparation using spreadsheet applications to ensure accuracy and consistency. Following data cleaning and organization, information transfers to Google Looker Studio for visualization development. The platform facilitates creation of multiple chart formats including bar charts displaying student distribution across educational levels, pie charts illustrating gender proportions, and interactive tables enabling detailed data examination. Visualization design adheres to established principles for educational data representation. Charts incorporate clear labeling systems, appropriate color coding, and logical layouts ensuring accessibility for educational stakeholders including teachers, administrators, and policy makers. Interactive functionality allows users to filter and examine data according to specific analytical requirements. Design priorities emphasize clarity and functional usability to ensure effective information interpretation. Google Looker Studio functions as the primary visualization platform due to its collaborative features, accessibility, and integration capabilities with multiple data sources. Spreadsheet applications support preliminary data processing and validation procedures. The technological combination enables efficient conversion of raw statistical information into interpretable visual formats that effectively communicate enrollment patterns.

The analytical framework centers on descriptive statistical methods to reveal enrollment distributions and gender-based patterns across educational institutions. Analysis examines both absolute values and proportional relationships to provide multiple analytical perspectives on student demographics. The approach facilitates identification of enrollment trends that may inform educational planning and resource distribution decisions. Data validation procedures include source verification and cross-referencing with official educational statistics. Secondary data from Metro City Education Department undergoes accuracy checks to confirm completeness before visualization processing. The study recognizes methodological boundaries including reliance on secondary sources and descriptive analytical scope, which focuses on pattern documentation rather than causal relationship establishment. The research maintains academic rigor while acknowledging the inherent characteristics of descriptive quantitative analysis in educational demographic studies.

4. Result and Discussion

4.1 Results

The data visualization outcomes reveal Google Looker Studio's effectiveness in transforming educational statistics for Metro City student population during the 2025/2026 academic year. The platform converts raw enrollment data into accessible visual formats that enable stakeholders to understand student distribution patterns across kindergarten (KB), preschool (TK), elementary school (SD), junior high school (SMP), senior high school (SMA), vocational high school (SMK), and special needs schools (SLB). Metro City educational system operates through 64 schools serving 14,298 students total, with gender distribution among students showing remarkable equilibrium where female students slightly exceed male enrollment while maintaining near-equal representation.

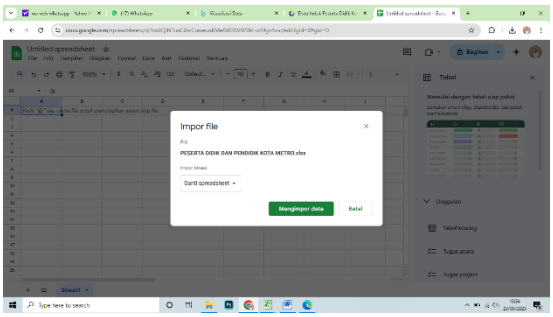

Figure 1. Excel Data Import

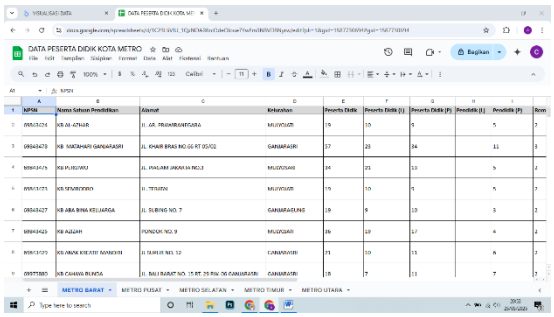

Figure 2. Google Spreadsheet Dataset Format

The initial data preparation phase begins with importing educational statistics from Excel format into Google Looker Studio's environment. Figure 1. Excel Data Import demonstrates the straightforward process of uploading raw educational data, where users simply select their Excel files containing student and educator information. The platform automatically recognizes standard Excel formats and begins the conversion process without requiring technical expertise from users. Following successful data import, the platform transforms Excel files into Google Spreadsheet format for enhanced accessibility and collaboration. Figure 2. Google Spreadsheet Dataset Format shows how the original data structure remains intact while gaining cloud-based functionality. The converted spreadsheet maintains all numerical values, categorical information, and

organizational structure from the original Excel file, ensuring data integrity throughout the visualization process.

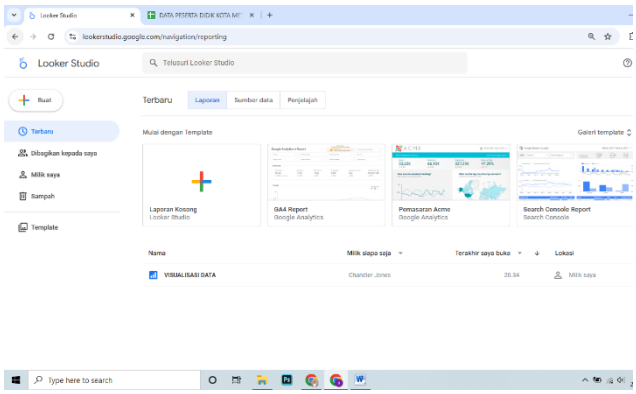

Figure 3. Google Looker Studio Initial Display

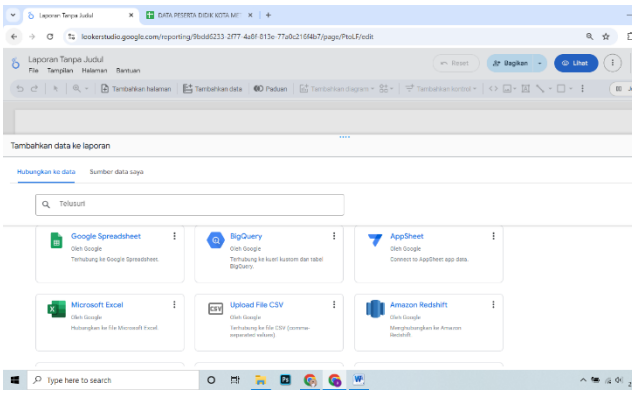

Figure 4. Data Addition in Google Looker Studio

The teaching workforce displays different characteristics, featuring female educators at approximately twice the number of male educators. The 2:1 female-to-male ratio among teaching staff reflects broader professional trends where education careers attract more women, particularly across primary and secondary levels. Institutional size analysis uncovers substantial variation among Metro City schools, with most institutions functioning as smaller establishments corresponding to typical urban educational patterns. However, one notable exception emerges: SMP Muhammadiyah Ahmad Dahlan Metro operates as a significantly larger institution, representing approximately 50% of total student enrollment within the dataset. Users encounter Google Looker Studio's clean, intuitive interface upon first access, designed to accommodate individuals regardless of technical background. Figure 3. Google Looker Studio Initial Display displays the platform's welcoming dashboard environment, featuring clearly labeled navigation options and straightforward menu structures. The interface design prioritizes user experience by minimizing complexity while maintaining access to powerful analytical tools. Google Looker Studio demonstrates exceptional capacity for educational data visualization tasks through its user-friendly interface that enables smooth data import from Excel formats, automatic formatting recognition, and rapid chart creation. The conversion process from raw Excel files to interactive Google Spreadsheet format preserves data accuracy while facilitating real-time collaboration and updates. Dashboard development follows a logical progression from data import through visualization selection and customization, where users navigate easily between chart types including bar charts that effectively display student and educator distributions, pie charts illustrating proportional relationships, and data tables providing detailed numerical information. The data integration process allows users to seamlessly connect their educational datasets with the visualization platform. Figure 4. Data Addition in Google Looker Studio illustrates how administrators can add multiple data sources to their projects, enabling analysis across different educational metrics. The platform's flexibility accommodates various data formats while maintaining consistent performance throughout the integration process.

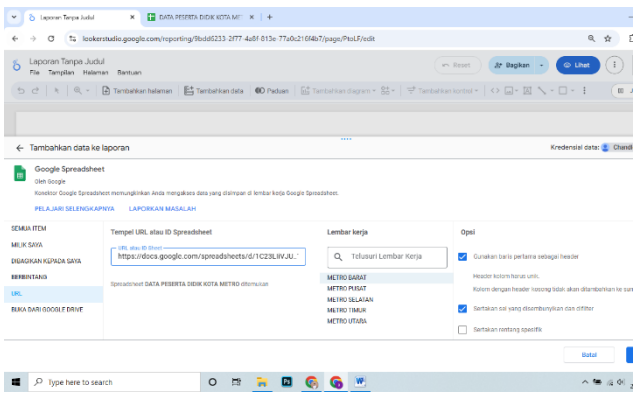

Figure 5. Data File Selection

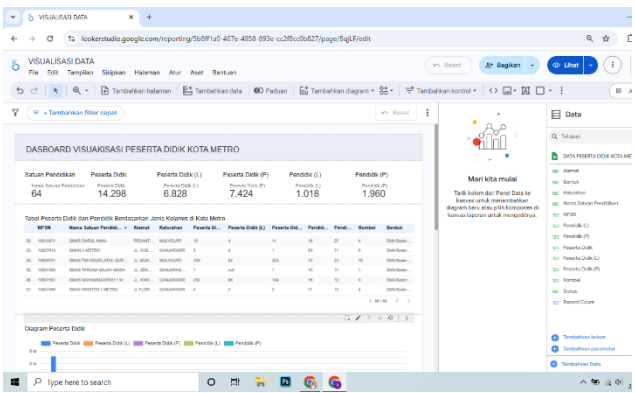

Figure 6. Metro City Student Data Table

File selection capabilities within Google Looker Studio provide users with multiple options for accessing their educational data. Figure 5. Data File Selection shows the file browser interface where users can select from locally stored files, cloud-based storage solutions, or previously uploaded datasets. The selection process includes preview functionality, allowing users to verify data accuracy before proceeding with visualization creation. Student gender distribution analysis demonstrates balanced enrollment across Metro City educational

institutions, with female students constituting a slight majority indicating equitable educational access regardless of gender. The near-equal distribution suggests successful elimination of gender-based educational barriers within Metro City system, while the modest female advantage may reflect demographic trends or successful female education promotion initiatives. Educator gender distribution reveals a distinctly different pattern, with female teachers comprising roughly two-thirds of the teaching workforce, aligning with national and international education employment trends rather than indicating access problems. The platform generates detailed data tables that serve as the foundation for all subsequent visualizations. Figure 6. Metro City Student Data Table presents Metro City complete student population data in tabular format, including enrollment numbers across different educational levels and gender distributions. The table format enables precise numerical analysis while serving as a reference point for stakeholders requiring exact figures for planning and reporting purposes.

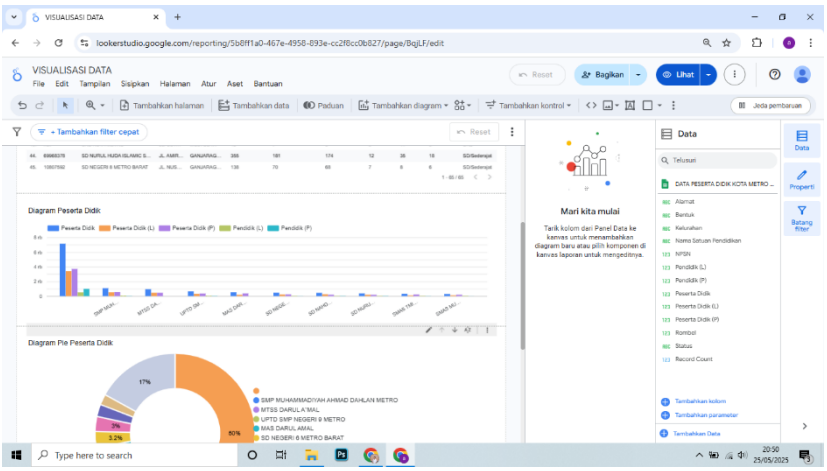

Figure 7. Student and Educator Bar Chart

School size examination reveals considerable diversity in enrollment capacity across Metro City educational landscape, where most schools maintain moderate student populations creating manageable learning environments that support individualized attention. The final dashboard combines multiple visualization types into a unified analytical tool serving diverse stakeholder requirements, enabling educational administrators to rapidly assess enrollment trends, gender distributions, and institutional comparisons through interactive charts and tables. Bar chart visualizations effectively communicate comparative relationships between different educational demographics. Figure 7. Student and Educator Bar Chart displays student and educator distributions across various categories, making quantitative comparisons immediately apparent to viewers. The bar chart format excels at showing differences in magnitude between groups, enabling stakeholders to quickly identify patterns and trends within Metro City educational system. Technical implementation demonstrates the platform's effectiveness as an educational data visualization solution through seamless transition from Excel-based storage to cloud-based visualization, eliminating technical barriers while providing collaborative features for simultaneous access and interaction. The visualization creation workflow spans initial data import through final dashboard publication, requiring minimal technical knowledge while producing professional-quality results that serve diverse analytical needs.

4.2 Discussion

The analysis of Metro City educational demographics through Google Looker Studio visualization reveals several significant patterns that warrant careful examination. The balanced gender distribution among students indicates that current enrollment policies effectively promote educational equity, suggesting successful implementation of inclusive educational practices across all institutional levels. However, the concentration of students within SMP Muhammadiyah Ahmad Dahlan Metro, accounting for half the total student population in certain visualizations, requires nuanced interpretation to avoid drawing conclusions that may not apply to smaller institutions throughout the system. Pie chart representations provide clear visual understanding of proportional relationships within educational demographics. Figure 8. Metro City Student and Educator Pie Chart illustrates gender distribution percentages among both students and educators, making proportional relationships immediately visible through circular segments. The pie chart format proves particularly effective for displaying percentage breakdowns, enabling stakeholders to grasp relative proportions at a glance without requiring detailed numerical analysis. The pronounced female majority among educators, while not inherently problematic, reflects broader societal trends in career selection and may prompt consideration of strategies to attract more male teachers for creating diverse educational environments. The pattern demonstrates teaching profession's appeal to women, potentially influenced by work-life balance considerations, professional

satisfaction opportunities, and societal perceptions of education as a nurturing career. Rather than indicating systemic issues, the gender distribution among educators suggests successful career accessibility for women in educational fields, though diversification efforts could enhance role model availability for students of all genders.

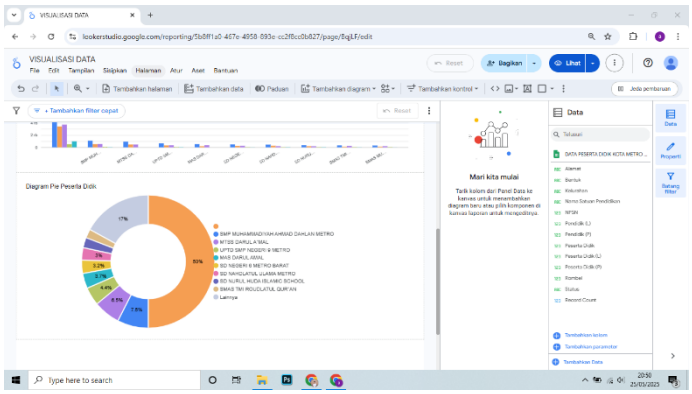

Figure 8. Metro City Student and Educator Pie Chart

Institutional capacity variations revealed through visualization provide valuable insights for educational planning and resource allocation decisions. The presence of one exceptionally large institution alongside numerous smaller schools raises questions about resource distribution and educational equity throughout the system. While SMP Muhammadiyah Ahmad Dahlan Metro's substantial enrollment reflects successful student attraction, the size disparity may indicate need for capacity planning analysis to ensure quality educational experiences across all institutions. The visualization effectively identifies such outliers, enabling administrators to account for anomalies during strategic planning processes. The integrated dashboard represents the culmination of the visualization development process, combining multiple chart types into a unified analytical environment. Figure 9. Metro City Student and Educator Data Dashboard demonstrates how bar charts, pie charts, and data tables work together to provide educational demographic insights for data-driven decision-making. The dashboard design enables users to examine the same data through different visual lenses, accommodating various analytical preferences and information processing styles. The platform's technical performance demonstrates significant advantages for educational stakeholders seeking accessible data analysis tools. Google Looker Studio's intuitive interface eliminates traditional barriers to advanced visualization techniques, enabling users with varying technical expertise to extract meaningful insights from educational data. The seamless workflow from initial data import through final dashboard publication requires minimal technical knowledge while producing professional-quality results, making sophisticated analytical capabilities available to educational administrators who may lack specialized training in data visualization techniques.

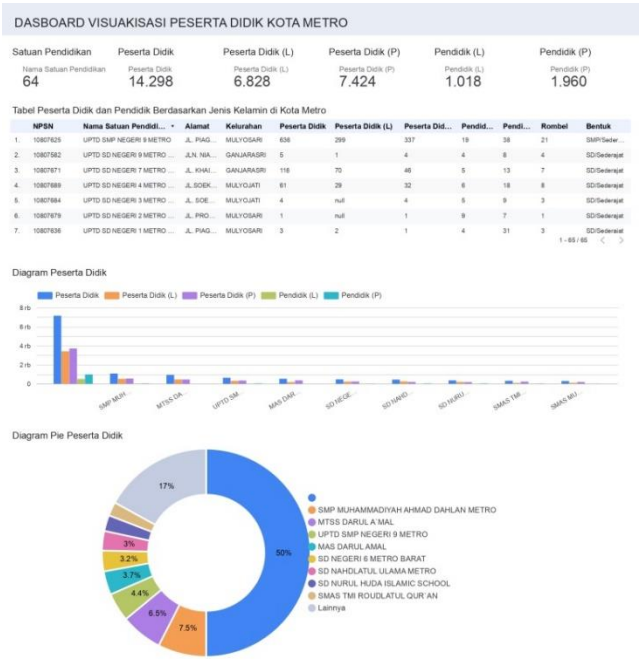

Figure 9. Metro City Student and Educator Data Dashboard

The integration of multiple visualization types within a single dashboard provides diverse analytical perspectives on identical information, enhancing user understanding through complementary chart formats. Bar charts effectively communicate comparative relationships between educational levels and gender groups, while pie charts clearly illustrate proportional distributions making percentage relationships immediately visible. Data tables offer precise numerical information for users requiring exact figures for planning and reporting activities, creating a versatile analytical environment that accommodates different information processing preferences and requirements. Educational planning applications of the visualization results extend beyond demographic documentation to strategic decision-making support. The balanced student gender distribution suggests current policies successfully promote educational access equity, while institutional size variations could inform decisions regarding school expansion, new facility construction, or student redistribution to optimize learning conditions system-wide. The female educator majority may prompt targeted recruitment strategies to enhance teaching workforce diversity, potentially improving educational outcomes through varied role model availability and teaching approach diversity.

5. Conclusion

Google Looker Studio proves to be an exceptionally capable platform for transforming Metro City educational statistics into meaningful visual representations. The research successfully demonstrates how educational administrators can leverage advanced data visualization tools without requiring extensive technical training. Through systematic analysis of student and educator demographics across 64 schools serving 14,298 students during the 2025/2026 academic year, the study reveals balanced enrollment patterns and workforce characteristics that inform strategic planning decisions. Metro City educational landscape exhibits remarkable gender equity among students, with female enrollment slightly exceeding male participation while maintaining near-equal representation across all educational levels. The teaching workforce displays different patterns, where female educators outnumber their male counterparts by approximately two-to-one ratios, reflecting broader professional trends in education careers. School capacity analysis reveals significant institutional diversity, with most facilities operating at moderate enrollment levels while SMP Muhammadiyah Ahmad Dahlan Metro accommodates substantially larger student populations.

The platform's technical architecture eliminates traditional barriers between raw data storage and actionable intelligence. Users can seamlessly import Excel files, convert them to Google Spreadsheet format, and create interactive dashboards without specialized programming knowledge. The workflow progression from initial data upload through final visualization publication requires minimal technical expertise while producing professional-quality results that serve diverse analytical requirements. Multiple visualization formats work together to accommodate different information processing preferences among educational stakeholders. Bar charts effectively communicate quantitative comparisons between demographic groups and educational levels, while pie charts make proportional relationships immediately apparent through circular segment displays. Data tables provide precise numerical references for administrators requiring exact figures during budget planning and resource allocation activities. The integrated approach allows users to examine identical datasets through various analytical lenses simultaneously.

Educational planning applications extend far beyond simple demographic documentation toward strategic decision-making support systems. The balanced student gender distribution validates current enrollment policies and suggests successful implementation of educational equity initiatives. Institutional size variations provide valuable guidance for capacity planning, facility expansion decisions, and student redistribution strategies aimed at optimizing learning conditions throughout the district. The female educator majority may prompt targeted recruitment efforts designed to enhance teaching workforce diversity and improve educational outcomes through varied role model availability. Real-time collaboration features enable multiple stakeholders to access and interact with educational data simultaneously, facilitating coordinated planning efforts across different administrative levels. The cloud-based architecture ensures data accuracy and consistency while supporting immediate updates when new enrollment information becomes available. Educational administrators can share dashboard access with school principals, district supervisors, and policy makers, creating transparent communication channels that support evidence-based decision making.

The research establishes a practical framework for educational institutions seeking to modernize their data analysis capabilities. Google Looker Studio's combination of user-friendly interface design, powerful visualization options, and collaborative functionality makes advanced analytical techniques accessible to educational professionals regardless of their technical background. The platform successfully bridges the gap between complex statistical information and practical administrative applications. Future applications of the established visualization framework could include longitudinal trend analysis, comparative studies across different educational districts, and predictive modeling for enrollment forecasting. The foundation created through the current study provides educational administrators with proven methodologies for transforming

raw demographic data into strategic planning tools. The successful implementation demonstrates that sophisticated data visualization capabilities can be integrated into educational administration workflows without requiring significant technical infrastructure investments or specialized training programs.

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