

ABSTRACT

This study aims to analyze and visualize SMK students' report card data longitudinally over a five-year period in order to identify grade distribution, subject-to-subject relationships, performance differences based on gender, and academic trends over time. The dataset consists of 600 students from SMK Plus Pratama Adi, cohorts 2015–2021, covering five subject groups as defined by the 2013 Curriculum. The analytical methods employed include descriptive statistics to identify distribution characteristics, the Shapiro–Wilk test and residual normality test for data normality, clustering analysis for student grouping, Spearman's Rank correlation test for inter-semester relationships, the Mann–Whitney U test for gender differences, and trend visualization using an interactive dashboard. The results indicate that the average score across all subject groups is above 80, with a median consistently at 82. Clustering produced three main groups: high-performing students, students with stable average performance, and low-performing students. Correlation analysis revealed varying patterns, with some subjects showing consistent relationships while others were more fluctuating. Gender analysis indicated significant differences, with female students achieving higher grade rankings compared to male students. The developed dashboard effectively presents the data in a concise and informative manner, supporting data-driven decision-making in the educational context.

Keywords: *Statistical Analysis, Data Visualization, Report Card, Clustering, Correlation, Gender Gap, Longitudinal Data*

ABSTRAK

Penelitian ini bertujuan untuk menganalisis dan memvisualisasikan data nilai rapor siswa SMK secara longitudinal selama lima tahun, guna mengidentifikasi distribusi nilai, pola hubungan antar mata pelajaran, perbedaan performa berdasarkan gender, serta tren nilai dari waktu ke waktu. Data yang digunakan berjumlah 600 siswa SMK Plus Pratama Adi angkatan 2015–2021, mencakup lima kelompok mata pelajaran sesuai Kurikulum 2013. Metode analisis yang digunakan meliputi statistik deskriptif untuk mengidentifikasi karakteristik distribusi nilai, uji normalitas Shapiro-Wilk dan normalitas residual, analisis *clustering* untuk pengelompokan siswa, uji korelasi Spearman's Rank untuk hubungan antar semester, uji Mann-Whitney U untuk analisis ketimpangan gender, serta visualisasi tren nilai berbasis dashboard interaktif. Hasil penelitian menunjukkan bahwa rata-rata nilai seluruh kelompok mata pelajaran berada di atas 80, dengan median yang konsisten di angka 82. Clustering menghasilkan tiga kelompok utama: siswa berperforma tinggi, siswa dengan nilai rata-rata stabil, dan siswa dengan nilai rendah. Korelasi antar mata pelajaran menunjukkan variasi pola, dengan beberapa mata pelajaran cenderung konsisten dan lainnya fluktuatif. Analisis gender mengungkapkan adanya perbedaan signifikan, di mana siswa perempuan memiliki peringkat nilai lebih tinggi dibandingkan siswa laki-laki. Visualisasi dashboard yang dikembangkan mampu menyajikan data secara ringkas dan informatif untuk mendukung pengambilan keputusan berbasis data.

Kata kunci: Analisis Statistik, Visualisasi Data, Nilai Rapor, Clustering, Korelasi, Ketimpangan Gender, Data Longitudinal.