**Project On Illinois School District**

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**Summary:**

The dataset for the Illinois School District contains useful information on student and teacher traits, academic performance, and the functioning of schools. The components included in the dataset, the association between low-income student percentage and student attendance rates, and the relationship between teacher retention rate and multiple variables are among the research questions explored. Student enrolment, statistics, attendance, and mobility rates, chronic truancy rates, class size, teacher demographics and attributes, and academic achievement rates are all included in the dataset. I have used Factor analysis, Correlation analysis, and Linear regression methods to find. Overall, the Illinois School District dataset is a beneficial resource for academics, educators, and representatives committed to enhancing educational quality for all students in the state.

1. **Factor Analysis:**

**What are the principal factors involved in an Illinois School District dataset?**

Factor analysis is a statistical technique used to discover the unobservable factors that explain the variation in a set of observed variables. The approach aims to identify the hidden factors that account for the correlations among the measured variables. The method involves selecting the factors with the largest amount of variation and rotating the factor structure to obtain a more comprehensible and meaningful factor solution. The purpose of factor analysis is to reduce the complicated relationships among numerous variables by identifying the underlying factors that capture the fundamental patterns in the data.

From the dataset, for the first time, there are 5 factors with eigenvalues that are greater than 1. So, we run the model for the second time with 5 factors. The original factors do not correlate with any of the factors, so we eliminate the factors which have connections of more than 1 and rerun the model. Then we will get the principal factors that are involved in an Illinois School District dataset.

Factor 1- (student mobility rate, student attention rate, student chronic rate, chronic absenteeism)

Factor 2- (student enrolment, total teaching FTE)

Factor 3- (Teacher Average salary, Average class size, Average teaching experience)

Factor 4- (Total number of school days, principal turnover)

Factor 5- (Teacher Attendance Rate)

Factor 1 is named student attendance and engagement. These variables reflect student engagement and involvement in the school, which is an important factor in academic success.

Factor 2 is named school size and staffing. These variables reflect the size and staffing of the school, which can have important implications for resources and student-teacher ratios.

Factor 3 is named Teacher Experience. These variables reflect the compensation and experience of teachers, which can influence teacher retention and the quality of instruction.

Factor 4 is named school operations. These variables reflect the operations and leadership of the school, which can have important implications for school culture and academic outcomes.

Factor 5 is named teacher attendance. This variable reflects the attendance of teachers, which is important for ensuring continuity and consistency in instruction.

1. **Correlation Analysis:**

**Does the percentage of low-income students in a district correlate with student attendance rates?**

The correlation coefficient between the percentage of low-income students and student attendance rates was found to be -0.608, indicating a weak negative correlation between the two variables. The p-value for the correlation coefficient was 0.036, which is statistically significant at the 0.05 level. The negative correlation suggests that low-income students may face additional barriers to attending school, such as lack of transportation or access to healthcare, which can affect their attendance rates. This suggests that there is a low but statistically significant negative relationship between the percentage of low-income students and student attendance rates.

Based on these findings, we can conclude that there is a weak negative correlation between the percentage of low-income students in a district and student attendance rates. This indicates that as the percentage of low-income students in a district increases, there may be a slight decrease in student attendance rates. Overall, our findings suggest that addressing the needs of low-income students and providing support to help them overcome these barriers may improve attendance rates and reduce educational disparities in the Illinois School District.

1. **Simple Linear Regression:**

**What is the relationship between teacher retention rate and the percentage of female teachers, average teaching experience, teacher evaluation rating, and principal turnover?**

To identify the variables that impact teacher retention rate I have conducted a simple linear regression method. The results of the regression analysis indicate that two of the predictor variables, average teaching experience, and teacher evaluation rating, have statistically significant positive effects on teacher retention rate. However, the percentage of female teachers and principal turnover rate are not found to have significant effects on teacher retention rates.

There was a significant positive relationship between teacher retention rate and average teaching experience indicating that as the average teaching experience of teachers in a district increases, so does the teacher retention rate. Additionally, there was a significant positive relationship between teacher retention rate and teacher evaluation rating suggesting that schools with higher teacher evaluation ratings may have higher teacher retention rates.

we would reject the null hypothesis that none of the predictor variables influence the teacher retention rate, since at least two predictor variables they are average teaching experience and teacher evaluation rating were found to have a statistically significant effect.

Therefore, we can conclude that while the percentage of female teachers and most of the principal turnover rates do not have a significant relationship with the teacher retention rate, the average teaching experience and teacher evaluation rating are important predictors for teacher retention in the analyzed dataset. The average teaching experience and teacher evaluation rating are important factors to consider when trying to improve teacher retention rates in the Illinois School District.

**APPENDIX:**

**Table

Description automatically generatedFactor Analysis:**

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Description automatically generated Graphical user interface, application

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Table

Description automatically generated

Diagram

Description automatically generated

**Correlation Analysis:**

**Table

Description automatically generated**

**Simple Linear Regression:**

Graphical user interface, text, application

Description automatically generated Table

Description automatically generated

Table

Description automatically generatedTable

Description automatically generated

Chart, scatter chart

Description automatically generated Graphical user interface, application

Description automatically generated