TEKS Proficiency of the First Quarter

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Purpose

The purpose of this report is to identify correlation, if any, between the factors (see next section) and Texas Essential Knowledge and Skills (TEKS) proficiency, and to identify low proficiency TEKS that should be retaught. TEKS are the instructional standards that students need to meet before moving on to the subsequent course. The data was gathered during the first quarter of the 2023-2024 school year in Algebra II class. Google Sheets was used to organize the data, and Pandas/Matplotlib was used for analysis. A list of TEKS covered in this report can be found in the reference section.

Factors and Data Gathering

The factors from the initial dataset being included in this analysis are: score on first assessment (Test1_Score), score on second assessment (Test2_Score), overall grade for the first quarter (Class_Grade), daily grade (Daily_Grade), number of unexcused absences for the first quarter (Attendance) and effort in the classroom (Effort). Assessments were given on Eduphoria, and returned an overall score and individual TEKS breakdown per student. A positive correlation is expected between the test score and TEKS proficiency because they have shared parameters.

Class grade and attendance were both exported from Skyward, which is a digital gradebook and attendance system. Daily grade was then computed by removing the assessment scores and recalculating student average. Since the assessment scores are 30% of the class grade, daily grade was computed to eliminate the intrinsic correlation between TEKS proficiency and class grade. The attendance report was exported as a list of student names and dates when absent. It did not include an overall count of absences per student, so a *countif* function was used to find that information.

"Effort" is a score that was created to display how hard the student worked in class during the first quarter. It ranges from zero to three inclusive, with zero being the lowest effort and three the highest. Below is the outline used to assign each student a score:

0 - rarely (if ever) does work
1 - on task about 50% of the time, majority of assignments are only partially completed
2 - good work ethic, on task over 75% of the time and completes nearly all assignments
3 - exceptional work ethic, on task nearly 100% of time and completes all assignments

Information was collected in Google Sheets and displayed on a single sheet using VLOOKUP on student ID numbers.

Once the dataset was imported into the Python project, the average TEKS proficiency per student was added. Pandasql was used to query data on different groupings of factors. Since

Pandasql is limited on data analysis functions (unfortunately standard deviation and square root are not in their library) a nested query was used to calculate the variance used for hypothesis testing.

Data Analysis

The mean TEKS score, test scores and class grade have shared factors so their correlation will not be considered in this analysis. Focusing on mean TEKS score, the largest correlation was with Effort at a moderately strong 0.6. The correlation between mean TEKS score and daily grade was moderate at 0.4, and correlation between mean TEKS score and days missed (as attendance) was a low negative correlation of -0.2. Another notable correlation was between class grade and effort, with a high positive relationship of 0.79. Below is the correlation table of the data frame:

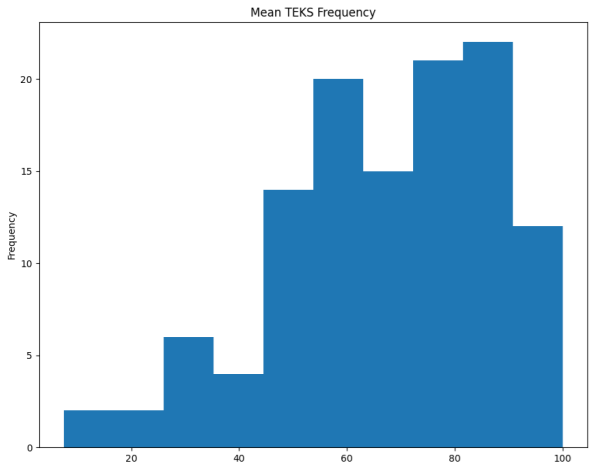
	Test1_Score	Test2_Score	Attendance	Class_Grade	Effort	mean_teks	Daily_Grade
Test1_Score	1.000000	0.404699	-0.232695	0.678302	0.546201	0.782518	0.390059
Test2_Score	0.404699	1.000000	-0.106250	0.582941	0.498043	0.821464	0.282279
Attendance	-0.232695	-0.106250	1.000000	-0.328586	-0.260690	-0.199403	-0.337696
Class_Grade	0.678302	0.582941	-0.328586	1.000000	0.792799	0.732917	0.900537
Effort	0.546201	0.498043	-0.260690	0.792799	1.000000	0.606205	0.706740
mean_teks	0.782518	0.821464	-0.199403	0.732917	0.606205	1.000000	0.405249
Daily_Grade	0.390059	0.282279	-0.337696	0.900537	0.706740	0.405249	1.000000

TEKS_4B	50.847458
TEKS_3A	54.237288
TEKS_4F	55.508475
TEKS_4A	61.016949
TEKS_6E	63.559322
TEKS_7A	72.033898
TEKS_3C	73.728814
TEKS_2A	80.508475
TEKS_3B	81.355932
TEKS_4D	85.169492

The TEKS proficiencies range from 50.8 to 85.2. STAAR proficiency rating of "meets grade level" averages around 60%, so the three lowest proficiency TEKS should be retaught. Scores above 75% are generally classified at "masters grade level". The top three TEKS are in the masters range. To the left is the table of TEKS sorted lowest to highest proficiency. Some of the TEKS are multifaceted and will be revisited in later lessons, which may increase proficiency levels.

Two tests were performed on the relationship between attendance and TEKS proficiency. The data was divided into two groups based on attendance. The low absence group had 0 or 1 absences, and the high absence group had 2 or greater absences.

The chi-squared test was chosen to compare the number of students in each attendance grouping that scored higher than 60% on mean TEKS proficiency. No significant relationship was found between attendance and



TEKS proficiency with this test. The next test performed was the Shapiro-Wilk Test, to test for normality. It returned a p-value < 0.001. Outliers were removed and the Shapiro-Wilk Test was performed again, but the p-value returned was 0.011, so the two sample t-test was not performed due to the skew of the distribution. As seen from the histogram above, the mean TEKS score is skewed left and does not satisfy the normal distribution assumption of the two sample t-test.

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High Absence Mean  High Absence Count
        63.884615                  65
High Absence Variance
           453.716947
Low Absence Mean  Low Absence Count
        72.59434                   53
Low Absence Variance
           317.539006
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To the left are summary statistics of the data. The information shows a nine point difference in mean by group. This was most likely caused by the skewed distribution of the mean TEKS proficiency score, and the outlier values lowering the average of the high absence group.

Conclusion

The factor with the strongest correlation to mean TEKS proficiency is effort followed by daily grade with a moderate correlation. Attendance did not have a statistically significant impact on TEKS proficiency. In conclusion, the effort the student makes while in class along with their participation in the class assignments may play a more important role in TEKS proficiency than attendance.

References

2A.2(A) - graph the functions f(x) =$\sqrt{XX}$, f(x) = 1/x, f(x) = x3, f(x) = 3$\sqrt{xx}$, f(x) = bx , f(x) = |x|, and f(x) = logb (x) where b is 2, 10, and e, and, when applicable, analyze the key attributes such as domain, range, intercepts, symmetries, asymptotic behavior, and maximum and minimum given an interval

2A.3(A) - formulate systems of equations, including systems consisting of three linear equations in three variables and systems consisting of two equations, the first linear and the second quadratic

2A.3(B) - solve systems of three linear equations in three variables by using Gaussian elimination, technology with matrices, and substitution

2A.3(C) - solve, algebraically, systems of two equations in two variables consisting of a linear equation and a quadratic equation

2A.4(A) - write the quadratic function given three specified points in the plane

2A.4(B) - write the equation of a parabola using given attributes, including vertex, focus, directrix, axis of symmetry, and direction of opening

2A.4(D) - transform a quadratic function f(x) = ax2 + bx + c to the form f(x) = a(x – h)2 + k to identify the different attributes of f(x)

2A.4(F) - solve quadratic and square root equations

2A.6(E) - solve absolute value linear equations

2A.7(A) - add, subtract, and multiply complex numbers