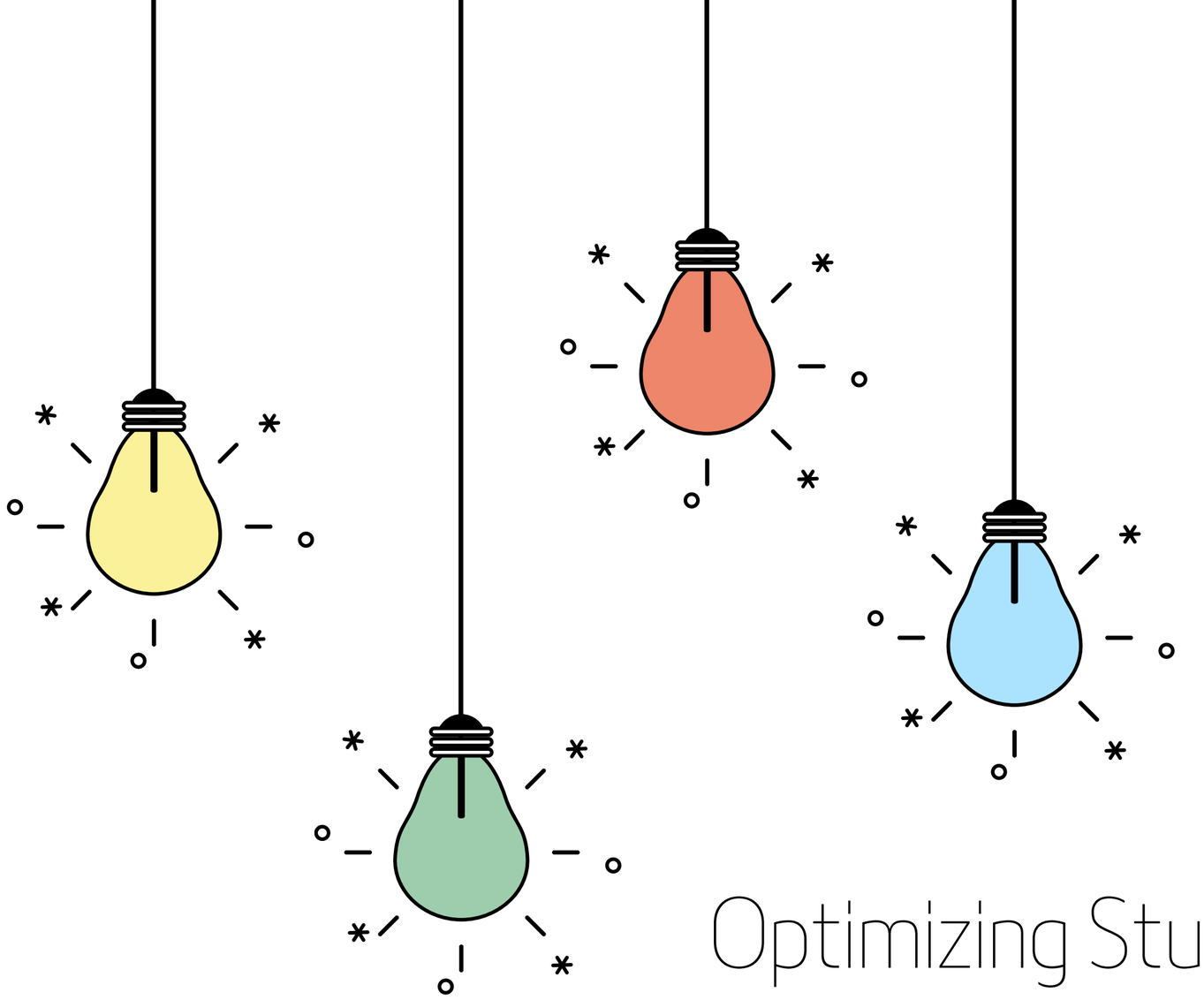


Boosted Reteach Planning

Optimizing Student Learning Outcomes

Zehra Erden

Index

Background

No Child Left Behind
(NCLB)
2001

Every Student
Succeeds Act
(ESSA)
2015

STAAR

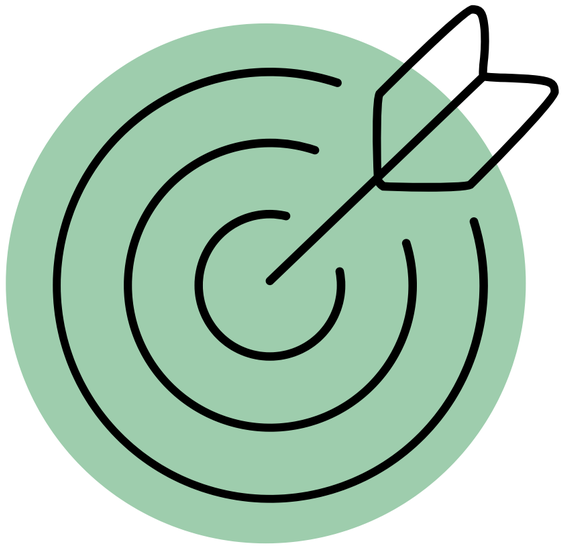
The federal government of the United States authorized the No Child Left Behind Act (NCLB) in 2001 to ensure that schools are held accountable for every student's performance and to provide more opportunities for students in need. Until 2015, local states were required to conduct yearly assessments to demonstrate their students' improvement.

In 2015, the federal government signed Every Student Succeeds Act (ESSA), replacing the NCLB. ESSA grants more flexibility to states and, once again, requires every state to assess the performance of their students in reading, math, and science.

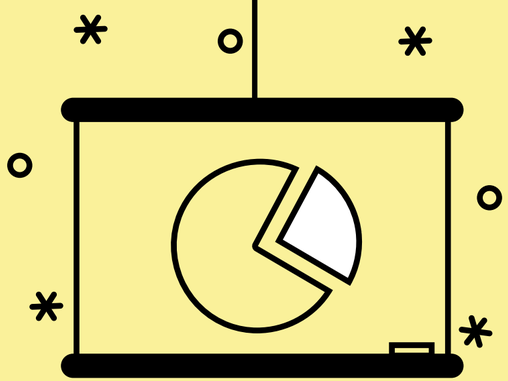
STAAR tests cover the yearly curriculum to measure students' performance and readiness for the next academic year's curriculum. Every year, students from the 3rd to the 12th grade take STAAR tests in core subjects, including Reading and Language Arts (RLA), math, science, and social studies.

Task/Objective

Building a ML model to analyze the effectiveness of different resources in improving 8th graders' math scores



Dataset



8th Grade Math Interim assessment scores (Dec. 2022 - Feb. 2023)

A	B	C
Student Name	Interim and TELPAS STAAR Interim Mathematics 2022-2023 Window 1 Scale Score	Interim and TELPAS STAAR Interim Mathematics 2022-2023 Window 3 Scale Score
Axxxx, Mxxx	1765	1628
Axxxxxxxxx, Hxxxxxx	1647	1603
Axxxx, Hxxxxx	1647	1755
Axxxxxxx, Axxx	1576	1589
Axxxxx, Jxxxxx	1478	1549
Axxxxxxx, Nxxxxx	1519	1388
Axxx, Mxxx	1582	1589
Axxx, Sxxx	1569	1585
Cxxxxx, Zxxx	1859	1796
Cxxxxx, Mxxx-Zxxxx	1492	1666
Dxxx, Txxxxx	1668	1523
Exxxxxx, Dxxxx	1569	1585
Ex-Mxxxx, Zxxxxx	1506	1576
Exxxxxxx, Axxxx	1492	1573
Ixxx, Ixxxxxx	1731	1762

Reteach Plans of 2022-2023

6 Week Instructional Plan for _____

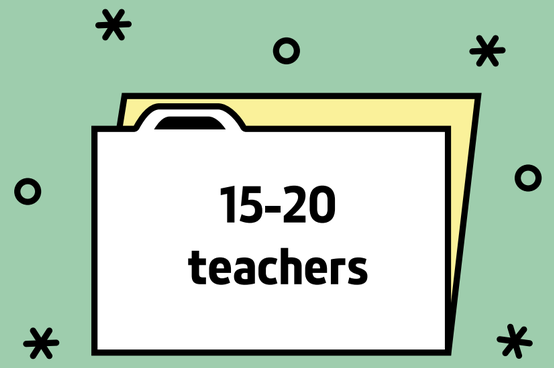
WEEK 1 – ?	WEEK 2 – ?	WEEK 3 – ?
Standards for Review (list objectives and activities aimed to re-teach based on the data)	Standards for Review (list objectives and activities aimed to re-teach based on the data)	Standards for Review (list objectives and activities aimed to re-teach based on the data)
8.2(A) 8.2(B) 8.2(C) Small group instruction one on one practice reteach problems sample practice problems ALEKS practice covering TEK	8.4(B) 8.4(C) 8.5(D) 8.5(G) Small group instruction one on one practice reteach problems sample practice problems ALEKS practice covering TEK	8.5(I) 8.6(A) 8.7(A) Small group instruction one on one practice reteach problems sample practice problems ALEKS practice covering TEK

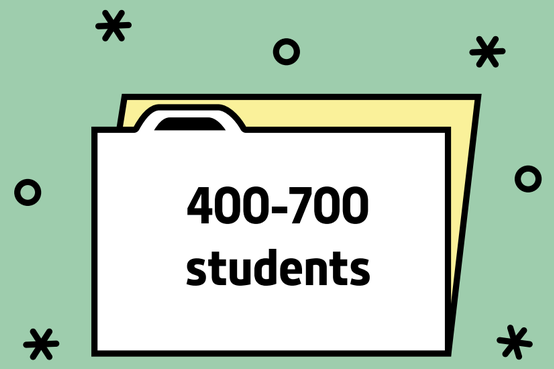
Dataset

Source:

Harmony Public Schools Administration

Carrolton - HSI
Dallas - HSE
Dallas - HSI
Garland - HSI
Waco - HSI
Euless - HSI
Fort Worth - HSI
Grand Prairie - HSI





Type:

Reteach Plans - Word documents
Interim Scores - csv

Feature Engineering

Creating the features:

- Resource Type
- Teacher
- Student Performance Improvement

Match students with resources of their teachers used.

Resource Types:

- Small /Whole Group
- ALEKS
- Do Now
- Past Released/Similar Questions

8.2(A) 8.2(B) 8.2(C) Small group instruction one on one practice reteach problems sample practice problems ALEKS practice covering TEK	8.4(B) 8.4(C) 8.5(D) 8.5(G) Small group instruction one on one practice reteach problems sample practice problems ALEKS practice covering TEK	8.5(I) 8.6(A) 8.7(A) Small group instruction one on one practice reteach problems sample practice problems ALEKS practice covering TEK

Feature Engineering / Data Transformation

- **Label the resources with binary labels for each student:**

“Effective” and “Not Effective”.

Resource Types:

- **Small /Whole Group**
- **ALEKS**
- **Do Now**
- **Past Released/Similar Questions**

Student Name	Scale Score	Scale Score
Axxxx, Mxxx	1765	1628
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Data Preprocessing / EDA

Segment students into groups based on their performance.
(Red-Green-Blue-Black below)

Clustering Analysis: k-means

effectiveness of resources varies among different student groups

Red: Did not meet

Green: Approach

Blue: Met

Black: Master

Student Name	Scale Score	Scale Score
Axxxx, Mxxx	1765	1628
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Data Preprocessing / EDA

Handling of Missing Data

Missing data = Student is not retaught

Outliers

Will be kept.

Red: Did not meet

Green: Approach

Blue: Met

Black: Master

Student Name	Scale Score	Scale Score
Axxxx, Mxxx	1765	1628
Axxxxxxxxx, Hxxxxxx	1647	1603
Axxxx, Hxxxxx	1647	1755
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Model Development / Selection

XGBOOST

Feature Importance +
High Predictive Performance +

Complexity (small dataset) -
Computational Intensity -

Random Forest

Feature Importance+
Ensemble Learning+
Hyperparameter Tuning +

Less interpretability-
Computational Overhead-

Logistic Regression

Binary Classification +
Easy to interpret +
Low Complexity (small dataset)+

Limited Expressiveness -
Difficulty with Feature Interactions -

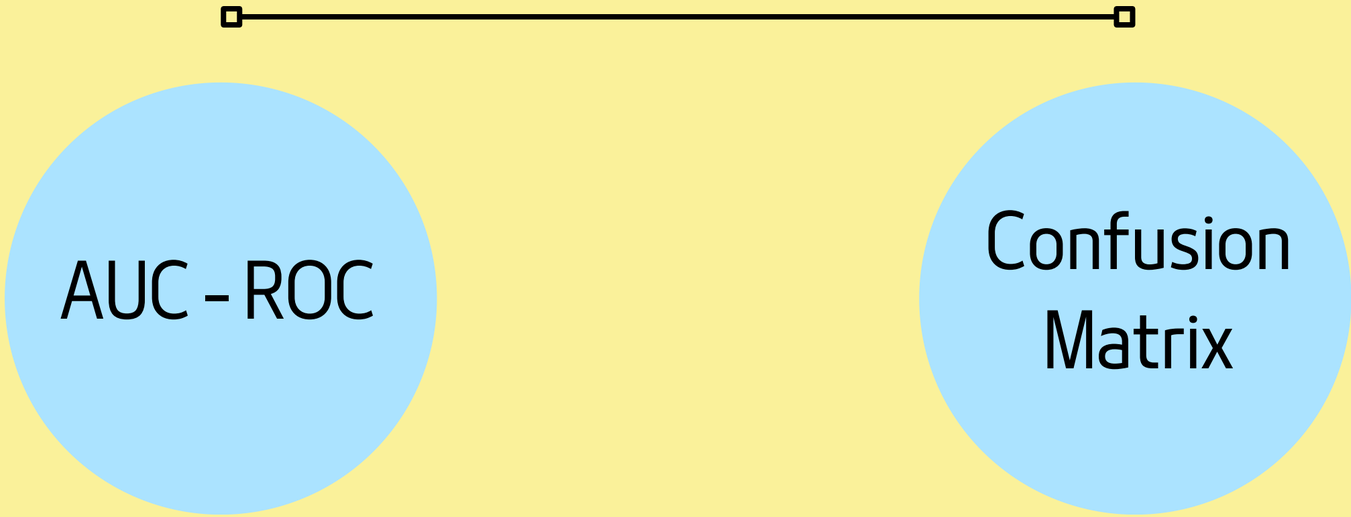
Model Training and Evaluation

XGBOOST

70% for training

30% for testing

Performance Metrics



Expected Outcome

- Report on effectiveness of different resources in improving 8th graders' math scores
- Research paper