Implementing MTSS in Math (Algebra & Geometry)

A Data-Driven Approach to USA Tracking, Predictive Modeling for EOCs, and Targeted Interventions

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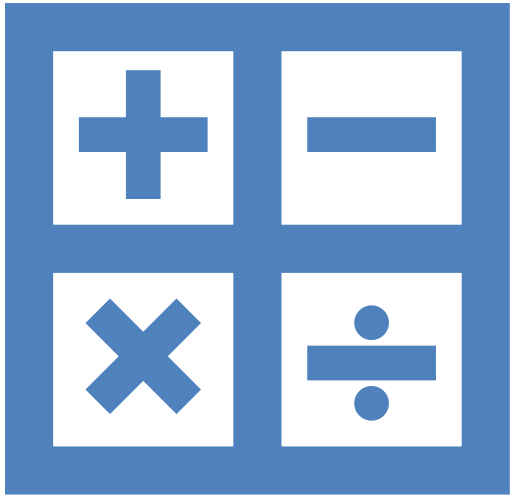
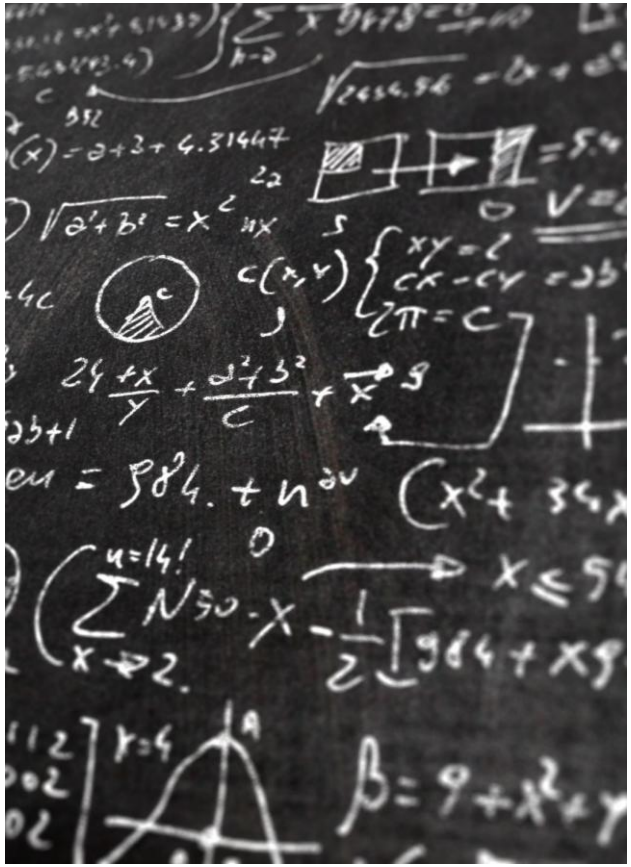


What is MTSS?

- Multi-Tiered System of Supports (MTSS) is a proactive, data-driven framework used to provide targeted support to students based on their specific needs.
  - Tier 1 (Universal): Core instruction for all students.
  - Tier 2 (Targeted): Small-group interventions for students falling behind benchmark expectations.
  - Tier 3 (Intensive): Individualized, intensive support for students with significant learning gaps or persistent negative growth.

The Math Data Pipeline

- We tailored the data pipeline specifically for Algebra and Geometry Unit Assessments (USAs):
  - Missing Data (Median Imputation): Missing USA scores are filled using class medians to maintain trajectory accuracy.
  - Sequential Growth: Tracks the step-by-step point improvement between consecutive USA tests.
  - 60% Benchmark: The standard proficiency threshold used to evaluate Tier placement.
  - K-Prototypes Clustering: Groups students inside each Tier based on test scores, standards mastery, and demographic profiles for optimal intervention seating.



Demystifying the Data Columns

- Key columns in your generated Excel reports:
  - Average_USA: Overall average percentage across all available USA assessments.
  - Growth: The point difference between tests (positive number = improving).
  - Above_Benchmark: 1 = Yes (≥60% Average), 0 = No (<60% Average).
  - Tier: Official MTSS placement (Tier 1, Tier 1 - Monitoring, Tier 2, or Tier 3).
  - Cluster: The specific sub-group inside the Tier containing students with highly similar learning gaps.

Predicting EOC Outcomes

- Understanding the 'EOC_Predictions_and_Gains' File:
  - Machine Learning Ensemble: The pipeline uses advanced ML (like XGBoost and Random Forest) trained on sequential USA scores to predict the official B.E.S.T. EOC Scale Score (325-475).
  - Predicted_EOC_Level: The predicted scale score is mapped to a predicted Achievement Level (1-5).
  - Prior_Math_Level: Historical baseline data used to calculate growth expectations.
  - Predicted_Gain: Answers 'Yes' or 'No' based on Florida's official Learning Gains criteria (e.g., maintaining a Level 3+, moving up a level, or significant score growth).

Evaluating Model Accuracy

- Understanding the 'Predictive_Model_Metrics_Explanation.pdf':
  - RMSE (Root Mean Squared Error): The primary metric used. It represents the average error in EOC scale score units. Lower is better.
  - MAE (Mean Absolute Error): The straightforward average of how many scale score points the prediction is off by.
  - R-Squared (R2): The percentage of variance in EOC scores explained by our USA data. Closer to 1.0 indicates higher reliability.
  - The pipeline automatically tests multiple models via 'Walk-Forward Nested Cross-Validation' and selects the one with the lowest RMSE to generate your final predictions.

How to Use the Excel Reports

- Your specific Teacher Rosters are heavily formatted for ease of use:
  - Sheet Navigation: Start at the 'OVERALL' tab to review school-wide Tier Distributions, then locate your specific tab.
  - Auto-Filters: Every column has a drop-down arrow. Instantly filter your students by Tier, Cluster, Period, or Growth Level.
  - Actionable Steps: Filter down to a specific Tier and Cluster, then look at the 'Standards_Needing_Intervention' column to plan targeted lessons.

Turning Data into Action

Immediate Next Steps:

- Review your Class Tier Distribution tab.
- Identify the priority standards dragging down your Tier 2 and Tier 3 students.
- Use the Cluster column to seat students with similar gaps together during intervention days.
- Target the 'Bubble Students': Look at your EOC Predictions file to find students predicted to score a high Level 2 and intervene to push them to a Level 3.

Questions? Email me at capiroxanalytics@gmail.com