School Scorecard Logic

Overview

This scorecard evaluates elementary schools (including King Arts) for potential closure based on five main categories: Equity, Geography, Building Functionality, Income Potential, and Financial Costs. The system uses a 1-5 scoring scale where **1 = Least Harmful to Close** and **5 = Most Harmful to Close**.

Scoring System

- **1** = Least Harmful to Close
- **5** = Most Harmful to Close

Normalization Function

All raw scores are normalized to a 1-5 scale using this mathematical formula:

For Direct Relationships (where higher raw values should get higher scores):

$$Normalized\ Score = 1 + 4\left(\frac{Value - min}{Max - Min}\right)$$

For Inverse Relationships (where higher raw values should get lower scores):

$$Normalized\ Score = 1 + 4\left(\frac{Max - Value}{Max - Min}\right)$$

Direct Relationship: Higher raw values → Higher normalized score (closer to 5)

Inverse Relationship: Higher raw values → Lower normalized score (closer to 1)

Limitations of the Normalization Function

Outlier Sensitivity

The min-max normalization method is sensitive to extreme values (outliers). If one school has exceptionally high or low raw values in any metric, it can compress the normalized scores for all other schools toward the middle of the 1-5 range, potentially reducing the discrimination between schools that are actually quite different.

Category 1: Equity (31% Weight)

Purpose

- Measures the harm of closure based on student displacement and impact on marginalized populations.

Subcategory 1: Percentage of Total District Students (50% of Equity Score)

- **Calculation**: Number of students assigned to each new attendance area ÷ Total district students
- **Normalization**: Direct relationship
- **Logic**:
    - Higher percentage = More students displaced
    - More students displaced = More harmful
    - More harmful = Higher score (5)

Subcategory 2: Proportion of Marginalized Students (50% of Equity Score)

- **Calculation**: Marginalized students at each school ÷ Total students at each school
- **Normalization**: Direct relationship
- **Logic**:
    - Higher proportion = More marginalized students impacted
    - More marginalized students impacted = More harmful
    - More harmful = Higher score (5)

Marginalized Student Definition: Students who meet ANY of these criteria:

- IEP = 'Yes'
- LEP = 'Yes'
- Low Income = 'Yes'

Final Equity Score: Average of both subscores

Category 2: Geography (32% Weight)

Purpose

- Measures geographic difficulty of closure based on proximity to alternative schools.

Subcategory: School Proximity (100% of Geography Score)

- **Data Source**: External analysis of school locations and distances
- **Normalization**: Direct relationship
- **Logic**:
    - Higher proximity values = Schools farther apart
    - Schools farther apart = More harmful
    - More harmful = Higher score (5)

Scenario-Specific Geography Calculation

For all scenario-based analysis (including both single and multi-school closures), geography includes four subcategories weighted equally (25% each):

Subcategory 1: Walkability (25% of Geography Score)

- **Calculation**: Percentage of students within 0.75 miles walking distance to their assigned school after closure
- **Data Source**: Walk distance calculations from student addresses to schools
- **Normalization**: Inverse relationship
- **Logic**:
    - Higher percentage walkable = Less harmful
    - Less harmful = Lower score (1)

Subcategory 2: IDOT Hazards (25% of Geography Score)

- **Calculation**: Percentage of students who must cross IDOT-designated hazards within 1.5 miles of school
- **Data Source**: Transportation status analysis with hazard identification
- **Normalization**: Direct relationship
- **Logic**:
    - Higher percentage crossing hazards = More harmful
    - More harmful = Higher score (5)

Subcategory 3: Transportation Needs (25% of Geography Score)

- **Calculation**: Percentage of students requiring bus transportation
- **Data Source**: Transportation status determinations
- **Normalization**: Direct relationship
- **Logic**:
    - Higher percentage needing transport = More harmful
    - More harmful = Higher score (5)

Subcategory 4: School Proximity (25% of Geography Score)

- **Calculation**: Sum of proximity values for schools being closed in the scenario
- **Data Source**: External analysis of school locations and distances
- **Normalization**: Direct relationship
- **Logic**:
    - Higher proximity values = Schools farther apart
    - Schools farther apart = More harmful
    - More harmful = Higher score (5)

Final Geography Score: Average of all applicable subcategories

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Category 3: Building Functionality (16% Weight)

Purpose

- Measures building condition and capacity as factors that make closure more or less likely.

Subcategory 1: ADA Compliance (33.3% of Building Score)

- **Data Source**: Accessibility assessments
- **Raw Score Mapping**:
    - '1-50% Accessible' = 1
    - '51-75% Accessible' = 2
    - '76-99% Accessible' = 3
    - 'Fully Accessible' = 4
- **Normalization**: Direct relationship
- **Logic**:
    - More accessible = Better facility
    - Better facility = Less likely to close
    - Less likely to close = Higher score (5)

Subcategory 2: Teaching Stations (33.3% of Building Score)

- **Data Source**: Classroom counts
- **Normalization**: Direct relationship
- **Logic**:
    - More classrooms = Better capacity
    - Better capacity = Less likely to close

    - Less likely to close = Higher score (5)

Subcategory 3: Gym/Cafeteria Separation (33.3% of Building Score)

- **Data Source**: Facility assessments
- **Raw Score Mapping**:
    - 'Yes' (separated) = 1
    - 'No' (not separated) = 0
- **Normalization**: Direct relationship
- **Logic**:
    - Separated facilities = Better
    - Better = Less likely to close
    - Less likely to close = Higher score (5)

Final Building Score: Average of all three subscores

Category 4: Income Potential (0% Weight)

Purpose

- Measures potential income from selling/developing the property.
- Income Potential weighted at zero as we are not planning to sell property
- The original 9% was moved to Equity

Calculation

Property Assessment Composite Score

- **Normalization**: Inverse relationship

- **Logic**:

    - Higher income potential = More likely to close
    - More likely to close = Lower score (1)

Category 5: Financial Costs (21% Weight)

Purpose

- Measures the financial burden of maintaining/updating the facility.

Subcategory 1: Capital Expenses (50% of Financial Costs)

- **Data Source**: Capital improvement cost estimates
- **Normalization**: Inverse relationship
- **Logic**:
    - Higher costs = More likely to close
    - More likely to close = Lower score (1)

Subcategory 2: Monthly Operating Costs (50% of Financial Costs)

- **Data Source**: Monthly facility operating expenses
- **Normalization**: Inverse relationship
- **Logic**:
    - Higher costs = More likely to close
    - More likely to close = Lower score (1)

Final Financial Costs Score: Average of capital and operating costs

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Final Weighted Score Calculation

Total Score = (Equity Score × 0.31) + (Geography Score × 0.32) + (Building Score × 0.16) + (Financial Costs Score × 0.21)

Data Sources

Student Data

- **Source**: Student enrollment and demographic data
- **Filters**: Elementary schools and King Arts only, excludes Foster School
- **Key Information**: New attendance area assignments

Building Data

- **ADA Compliance**: Accessibility assessments
- **Teaching Stations**: Classroom counts
- **Gym/Cafeteria Separation**: Facility assessments

Financial Data

- **Capital Expenses**: MFP cost estimates for building improvements
- **Monthly Operating Costs**: District budget data for facility operations
- **Zoning**: Municipal zoning classifications
- **Landmark Status**: Historical landmark designations

Geographic Data

- **Proximity Values**: Analysis of distances between schools

Interpretation Guide

For Review

1. **Lower Total Scores** = Schools more likely to be recommended for closure
2. **Higher Total Scores** = Schools less likely to be recommended for closure
3. **Category Breakdowns** show which factors most influence each school's ranking

Key Considerations

- **Equity**: Schools serving more students or marginalized populations are less likely to close
- **Geography**: Schools with poor proximity to alternatives are less likely to close
- **Building**: Schools with better facilities are less likely to close
- **Income Potential**: Schools with high development potential are more likely to close
- **Financial Costs**: Schools with high costs are more likely to close

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Scenario Analysis

Ran 24 distinct scenarios by varying equity calculation methods, financial calculation methods, and weighting schemes. Geography and Building calculations remain constant across all scenarios.

Equity Calculation Methods:

- **`percentage_ratio` (Current)**: Uses percentage of total district students and proportion of marginalized students.
- **`absolute_counts`**: Uses raw counts of total students and marginalized students.

Financial Calculation Methods:

- **`raw_costs` (Current)**: Uses raw capital expenses, monthly operating costs, and income potential.
- **`per_sqft`**: Normalizes capital expenses, monthly operating costs, and income potential by building square footage.

Weighting Schemes:

Each weighting scheme is applied to the five main categories: Equity, Geography, Building, Income Potential, and Financial Costs.

- **`baseline`**: {"equity": 0.22, "geography": 0.32, "building": 0.16, "financial_income": 0.09, "financial_costs": 0.21}
- **`equity_heavy`**: {"equity": 0.40, "geography": 0.25, "building": 0.15, "financial_income": 0.08, "financial_costs": 0.12}
- **`geography_heavy`**: {"equity": 0.15, "geography": 0.40, "building": 0.15, "financial_income": 0.12, "financial_costs": 0.18}
- **`building_heavy`**: {"equity": 0.15, "geography": 0.20, "building": 0.30, "financial_income": 0.15, "financial_costs": 0.20}
- **`financial_heavy`**: {"equity": 0.15, "geography": 0.20, "building": 0.15, "financial_income": 0.15, "financial_costs": 0.35}
- **`balanced`**: {"equity": 0.20, "geography": 0.20, "building": 0.20, "financial_income": 0.20, "financial_costs": 0.20}

Complete Scenario List (24 Combinations):

Click to expand all 24 scenarios
Baseline Weights (4 Scenarios):

- `baseline_current_raw`: Baseline weights with current equity and raw financial calculations.
- `baseline_absolute_raw`: Baseline weights with absolute counts equity and raw financial calculations.
- `baseline_current_persqft`: Baseline weights with current equity and per-square-foot financial calculations.
- `baseline_absolute_persqft`: Baseline weights with absolute counts equity and per-square-foot financial calculations.

Equity-Heavy Weights (4 Scenarios):

- `equity_heavy_current_raw`: Equity-heavy weights with current equity and raw financial calculations.
- `equity_heavy_absolute_raw`: Equity-heavy weights with absolute counts equity and raw financial calculations.
- `equity_heavy_current_persqft`: Equity-heavy weights with current equity and per-square-foot financial calculations.
- `equity_heavy_absolute_persqft`: Equity-heavy weights with absolute counts equity and per-square-foot financial calculations.

Geography-Heavy Weights (4 Scenarios):

- `geography_heavy_current_raw`: Geography-heavy weights with current equity and raw financial calculations.
- `geography_heavy_absolute_raw`: Geography-heavy weights with absolute counts equity and raw financial calculations.
- `geography_heavy_current_persqft`: Geography-heavy weights with current equity and per-square-foot financial calculations.
- `geography_heavy_absolute_persqft`: Geography-heavy weights with absolute counts equity and per-square-foot financial calculations.

Building-Heavy Weights (4 Scenarios):

- `building_heavy_current_raw`: Building-heavy weights with current equity and raw financial calculations.
- `building_heavy_absolute_raw`: Building-heavy weights with absolute counts equity and raw financial calculations.
- `building_heavy_current_persqft`: Building-heavy weights with current equity and per-square-foot financial calculations.
- `building_heavy_absolute_persqft`: Building-heavy weights with absolute counts equity and per-square-foot financial calculations.

Financial-Heavy Weights (4 Scenarios):

- `financial_heavy_current_raw`: Financial-heavy weights with current equity and raw financial calculations.
- `financial_heavy_absolute_raw`: Financial-heavy weights with absolute counts equity and raw financial calculations.
- `financial_heavy_current_persqft`: Financial-heavy weights with current equity and per-square-foot financial calculations.
- `financial_heavy_absolute_persqft`: Financial-heavy weights with absolute counts equity and per-square-foot financial calculations.

Balanced Weights (4 Scenarios):

- `balanced_current_raw`: Balanced weights with current equity and raw financial calculations.
- `balanced_absolute_raw`: Balanced weights with absolute counts equity and raw financial calculations.
- `balanced_current_persqft`: Balanced weights with current equity and per-square-foot financial calculations.

- `balanced_absolute_persqft`: Balanced weights with absolute counts equity and per-square-foot financial calculations.