



# Using Value Tables to Explicitly Value Student Growth

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# Assessment vs. Accountability

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- Assessment
    - The process of acquiring, summarizing and reporting information
  - Accountability
    - The process of assigning consequences to assessment results
  - Valid accountability requires valid assessment
  - Valid assessment does not necessarily lead to valid accountability
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# Validity of Accountability

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- System must correctly sort units into those that are meeting stated goals of the system vs. those that are not
  - If intent is to reward schools where effective instruction is going on, but then sorts schools according to percent Proficient, system will not be valid
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# Goal of Accountability

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- Change behavior
  - Required elements
    - Expectations known—in advance
    - Perception that goals are accomplishable
    - Required resources available
    - At least partial control over accomplishing goal
    - Incentives consistent with effort
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# Status vs. Progress

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- Status: performance of school at given time
  - Progress: status relative to prior status
    - Improvement: status relative to status of previous cohort at same grade
    - Growth: status relative to status of same cohort at previous grade
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# Two Points

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- Fair description of school requires both a status score and a progress score—not combined
  - Progress scores are really nothing more than conditional status scores (Braun)
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# Existing Measures of Growth

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- Regression Models

- HLM
- TVAAS

- Problems

- Complex calculations made after the fact
  - Scaled scores rather than performance levels
  - Norm-referenced standard for evaluating growth
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# Additional NCLB-related Problems

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- Compensatory throughout entire scale
  - No information about progress of students below Proficient
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# Alternatives

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- REACH (Doran)
  - Hybrid Success Model (Kingsbury et al.)
  - Simpler, but still somewhat complex
  - Still rely on scaled scores rather than performance levels
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# Value Tables

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- Determine a student's performance level in two consecutive years, then assign points based on the combination
  - More points assigned to outcomes that are more highly valued
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# Sample Value Table

| Year 1 Level | Year 2 Level |       |            |          |
|--------------|--------------|-------|------------|----------|
|              | Below Basic  | Basic | Proficient | Advanced |
| Below Basic  | 0            | 100   | 150        | 150      |
| Basic        | 0            | 50    | 125        | 125      |
| Proficient   | 0            | 0     | 100        | 100      |
| Advanced     | 0            | 0     | 100        | 100      |

# Computing the Growth Score for a School

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- Compute points earned by each student in accountability system
  - Compute mean
  - Example:
    - 2 students: 1 Basic/Basic, 1 Basic/Proficient
    - School score =  $(50 + 125) / 2$ , or 87.5
    - If 100 is the required score, that's not good enough
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# Building a Value Table (Table B)

| Year 1 Level | Year 2 Level |    |     |    |   |
|--------------|--------------|----|-----|----|---|
|              | I            | II | III | IV | V |
| I            |              |    |     |    |   |
| II           |              |    |     |    |   |
| III          |              |    | 100 |    |   |
| IV           |              |    |     |    |   |
| V            |              |    |     |    |   |

# Building a Value Table (Table B)

| Year 1 Level | Year 2 Level |     |     |     |     |
|--------------|--------------|-----|-----|-----|-----|
|              | I            | II  | III | IV  | V   |
| I            | 100          |     |     |     |     |
| II           |              | 100 |     |     |     |
| III          |              |     | 100 |     |     |
| IV           |              |     |     | 100 |     |
| V            |              |     |     |     | 100 |

# Building a Value Table (Table B)

| Year 1 Level | Year 2 Level |     |     |     |     |
|--------------|--------------|-----|-----|-----|-----|
|              | I            | II  | III | IV  | V   |
| I            | 100          |     |     |     |     |
| II           |              | 100 |     |     |     |
| III          | 0            | 50  | 100 | 150 | 200 |
| IV           |              |     |     | 100 |     |
| V            |              |     |     |     | 100 |

# Building a Value Table (Table B)

| Year 1 Level | Year 2 Level |     |     |     |     |
|--------------|--------------|-----|-----|-----|-----|
|              | I            | II  | III | IV  | V   |
| I            | 100          | 150 | 200 | 250 | 300 |
| II           | 50           | 100 | 150 | 200 | 250 |
| III          | 0            | 50  | 100 | 150 | 200 |
| IV           | -50          | 0   | 50  | 100 | 150 |
| V            | -100         | -50 | 0   | 50  | 100 |

# Problem with Table B

| Year 1 Level | Year 2 Level |    |     |    |    | Ave. Growth Score |
|--------------|--------------|----|-----|----|----|-------------------|
|              | I            | II | III | IV | V  |                   |
| I            | 64           | 27 | 8   | 0  | 0  | 120.5             |
| II           | 24           | 43 | 32  | 1  | 0  | 105.0             |
| III          | 4            | 18 | 64  | 13 | 1  | 94.5              |
| IV           | 0            | 2  | 39  | 51 | 8  | 82.5              |
| V            | 0            | 0  | 10  | 53 | 37 | 63.5              |

# Revision

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- No value less than 0
  - Any student at Level I in Year 2 should get 0
  - More points for maintaining status at higher levels
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# Value Table C

| Year 1 Level | Year 2 Level |     |     |     |     |
|--------------|--------------|-----|-----|-----|-----|
|              | I            | II  | III | IV  | V   |
| I            | 0            | 200 | 250 | 300 | 230 |
| II           | 0            | 100 | 130 | 180 | 230 |
| III          | 0            | 50  | 100 | 150 | 200 |
| IV           | 0            | 20  | 70  | 120 | 180 |
| V            | 0            | 0   | 40  | 100 | 160 |

# Value Table C

| Year 1 Level | Year 2 Level |     |     |     |     | Ave. Growth Score |
|--------------|--------------|-----|-----|-----|-----|-------------------|
|              | I            | II  | III | IV  | V   |                   |
| I            | 0            | 200 | 250 | 300 | 230 | 74.0              |
| II           | 0            | 100 | 130 | 180 | 230 | 86.4              |
| III          | 0            | 50  | 100 | 150 | 200 | 94.5              |
| IV           | 0            | 20  | 70  | 120 | 180 | 103.3             |
| V            | 0            | 0   | 40  | 100 | 160 | 116.2             |

# Neutral Value Table (Table D)

| Year 1 Level | Year 2 Level |     |     |     |     |
|--------------|--------------|-----|-----|-----|-----|
|              | I            | II  | III | IV  | V   |
| I            | 0            | 200 | 400 | 500 | 600 |
| II           | 0            | 100 | 150 | 200 | 250 |
| III          | 0            | 50  | 100 | 150 | 200 |
| IV           | 0            | 10  | 60  | 110 | 160 |
| V            | 0            | 0   | 20  | 90  | 120 |

# Neutral Value Table (Table D)

| Year 1 Level | Year 2 Level |     |     |     |     | Ave. Growth Score |
|--------------|--------------|-----|-----|-----|-----|-------------------|
|              | I            | II  | III | IV  | V   |                   |
| I            | 0            | 200 | 400 | 500 | 600 | 86.0              |
| II           | 0            | 100 | 150 | 200 | 250 | 93.0              |
| III          | 0            | 50  | 100 | 150 | 200 | 94.5              |
| IV           | 0            | 10  | 60  | 110 | 160 | 92.5              |
| V            | 0            | 0   | 20  | 90  | 120 | 94.1              |

# Issues

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- Not completely aligned to NCLB goals
    - Severe penalty for Level I
    - High points for moving from Level I to Level II, as well as low score for keeping students at Level II, so pressure to move students to Level III (NCLB Proficient)
  - Correlations between status and growth
    - $B = -0.23$
    - $C = +0.61$
    - $D = +0.44$
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# Issues (cont'd)

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- Reliability
    - Status = .99
    - Improvement = .87
    - Value Table D = .94
  - “Churn”
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# Issues (cont'd)

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- Dividing low categories
    - Better measurement of progress toward Proficient
    - Requirements
      - Width of interval  $>$  standard error
      - Should be able to define achievement at each sublevel
  - Extreme off-diagonals
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# Relationship between Value Tables and Other Measures

|               | ANCOVA | HLM Slope | Value Table B | Value Table C | Value Table D |
|---------------|--------|-----------|---------------|---------------|---------------|
| Year 1 Index  | 0.70   | -0.19     | -0.20         | 0.65          | 0.44          |
| Year 2 Index  | 0.88   | 0.12      | 0.08          | 0.82          | 0.64          |
| ANCOVA        |        | 0.57      | 0.56          | 0.93          | 0.85          |
| HLM Slope     |        |           | 0.98          | 0.53          | 0.67          |
| Value Table B |        |           |               | 0.54          | 0.69          |
| Value Table C |        |           |               |               | 0.95          |

# System Requirements

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- Annual testing at consecutive grade levels
  - Ability to track students across years
  - Articulated standards across grades (consistent meaning of performance levels)
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# Using Policy Makers to Set Values

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- What outcomes are valued more than others?
    - E.g., moving a student from Proficient to Advanced?
    - More than moving a student from Basic to Proficient?
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# One Method

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- Create sets of cards, with 25 cards in each set
  - Each card represents one cell in the matrix, and is labeled as such
  - Process similar to standard setting
    - Divide into small groups
    - Sort cards from most desirable outcome to least
    - Discuss and review judgments
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# Observations

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- One method was to sort into diagonals first—decisions within diagonals are the toughest
  - Could have used Thurston scaling
  - Issue: value cells that are harder to accomplish or those that are most desirable outcomes?
  - Issue: Policy makers think in terms of true scores
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# Setting Goals

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- How good is “good enough?”
  - Two approaches
    - Standards-based
    - Goals-based (Betebenner)
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# Example Value Table

| Year 1 Level | Year 2 Level |     |     |     |
|--------------|--------------|-----|-----|-----|
|              | I            | II  | III | IV  |
| I            | 0            | 120 | 160 | 200 |
| II           | 0            | 80  | 140 | 160 |
| III          | 0            | 40  | 120 | 140 |
| IV           | 0            | 0   | 100 | 120 |

# Terms

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- Transition matrix
    - Conditional probabilities of obtaining each performance level in Year 2, given performance level in Year 1
  - Initial state
  - Final state
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# Example

$$\begin{bmatrix} 0.25 \\ 0.25 \\ 0.25 \\ 0.25 \end{bmatrix}^T \begin{bmatrix} .66 & .34 & .00 & .00 \\ .10 & .59 & .31 & .00 \\ .00 & .09 & .82 & .09 \\ .00 & .00 & .36 & .64 \end{bmatrix} = \begin{bmatrix} 0.19 \\ 0.26 \\ 0.37 \\ 0.18 \end{bmatrix}^T$$

Initial  
State

X

Transition Matrix

=

Final  
State

# Seven Year Example

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$$\begin{bmatrix} 0.25 \\ 0.25 \\ 0.25 \\ 0.25 \end{bmatrix}^T \begin{bmatrix} .66 & .34 & .00 & .00 \\ .10 & .59 & .31 & .00 \\ .00 & .09 & .82 & .09 \\ .00 & .00 & .36 & .64 \end{bmatrix}^7 = \begin{bmatrix} 0.075 \\ 0.204 \\ 0.582 \\ 0.138 \end{bmatrix}^T$$

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# Annual Goal

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- Apply required Transition Matrix to Value Table
  - $.34 \times 120 = 40.8$   
 $.10 \times 0 + .59 \times 80 + .31 \times 140 = 90.6$   
 $.09 \times 40 + .82 \times 120 + .09 \times 140 = 114.6$   
 $.36 \times 100 + .64 \times 120 = 112.8$
  - If 25% in each category, average is 89.7
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# NCLB Value Table--Status

| Year 1 Level | Year 2 Level |       |            |          |
|--------------|--------------|-------|------------|----------|
|              | Below Basic  | Basic | Proficient | Advanced |
| Below Basic  | 0            | 0     | 100        | 100      |
| Basic        | 0            | 0     | 100        | 100      |
| Proficient   | 0            | 0     | 100        | 100      |
| Advanced     | 0            | 0     | 100        | 100      |

# NCLB Value Table—Safe Harbor

| Year 1 Level | Year 2 Level |       |            |          |
|--------------|--------------|-------|------------|----------|
|              | Below Basic  | Basic | Proficient | Advanced |
| Below Basic  | 0            | 0     | 100        | 100      |
| Basic        | 0            | 0     | 100        | 100      |
| Proficient   | -90          | -90   | 10         | 10       |
| Advanced     | -90          | -90   | 10         | 10       |

# Example

| Year 1 Level           | Year 2 Level         |                        |
|------------------------|----------------------|------------------------|
|                        | Below Basic or Basic | Proficient or Advanced |
| Below Basic or Basic   | 40                   | 10                     |
| Proficient or Advanced | 5                    | 45                     |

# Example

| Year 1 Level           | Year 2 Level         |                        |
|------------------------|----------------------|------------------------|
|                        | Below Basic or Basic | Proficient or Advanced |
| Below Basic or Basic   | 40                   | 10                     |
| Proficient or Advanced | 5                    | 45                     |

$$(40*0 + 10*100 + 5 * -90 + 45 * 10) / 100 = 10$$

# Concern

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- Higher status groups get higher growth scores than lower status scores, even when both are maintaining stasis
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# Group 1

| Year 1 Level | % Initially | Year 2 Level |      |      |      |      |
|--------------|-------------|--------------|------|------|------|------|
|              |             | I            | II   | III  | IV   | V    |
| I            | 8           | 0.46         | 0.34 | 0.19 | 0.01 | 0.00 |
| II           | 14          | 0.18         | 0.38 | 0.42 | 0.02 | 0.00 |
| III          | 49          | 0.03         | 0.15 | 0.65 | 0.16 | 0.01 |
| IV           | 23          | 0.00         | 0.01 | 0.39 | 0.49 | 0.11 |
| V            | 6           | 0.00         | 0.00 | 0.10 | 0.50 | 0.39 |

# Group 2

| Year 1 Level | % Initially | Year 2 Level |      |      |      |      |
|--------------|-------------|--------------|------|------|------|------|
|              |             | I            | II   | III  | IV   | V    |
| I            | 31          | 0.59         | 0.29 | 0.12 | 0.00 | 0.00 |
| II           | 26          | 0.28         | 0.41 | 0.30 | 0.01 | 0.00 |
| III          | 37          | 0.08         | 0.24 | 0.60 | 0.08 | 0.00 |
| IV           | 6           | 0.01         | 0.05 | 0.50 | 0.39 | 0.05 |
| V            | 1           | 0.00         | 0.02 | 0.17 | 0.57 | 0.25 |

# Concern

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- Group 1 outgrows Group 2 for every performance level
  - Growth score for Group 1 = 97.3; Growth score for Group 2 = 79.5
  - But final state for Group 1 equals initial state; final state for Group 2 equals initial state
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# Related Concern

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- Suppose two schools have different initial states but same desired final state; thus, different rates of progress required
  - Suppose further that both make that required progress
  - Should both schools get the same score, or should the school that had further to go get a higher score?
  - If the latter, how do we interpret growth score relative to state goals?
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# Summary

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## ■ Plusses

- Simple, with focus on performance levels
- Clear, student-level goal-setting
- Well-correlated with other measures of school growth, depending on Value Table chosen
- Makes values for growth explicit

## ■ Concerns

- Makes values for growth explicit
  - Not clear how to take regression into account
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