Vertically-Articulated Content Standards

Laureen Wise
Human Resources Research Organization (HumRRO)

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Presentation outline

- So you want to measure student growth?
- You should know about CCSSO/TILSA work on vertical alignment!
- Let’s do a sample exercise.
- Further work is needed.
Measuring Student Growth

- Current pressure to build vertical scales!
  - Report “growth” for individual students.
  - Assess each school’s “value added”
    - Gains versus status
    - Are students learning (not have they learned)
- But what does the vertical scale measure?
  - Combined curriculum content across grades?
  - How can scale points be described in terms of content standards for different grades?
What Is Vertical Alignment?

Vertical alignment asks:

- How are content standards/objectives related from one grade to the next?
  - Knowledge or skills extended to **wider range** of content
  - **Deeper** understanding (cognitive processes) for the same content
  - **New** content and/or skills
**TILSA Work on Vertical Alignment**

- Initial focus on supporting vertical scales
  - Is content alignment sufficient to justify a vertical scale?
  - How to label points along the vertical scale?
- Changed to focus on quality of vertical articulation
  - Concerns about misuse of vertical scales
    - Inferences about mastery of content not tested
    - Scales will vary by content of items used in linking
  - Other important needs for clarifying content standards and their relationship across grades
    - Helping teachers talk “across grades”
    - Clarifying test specifications within each grade
    - Supporting the development of curriculum materials
Nature of Content Alignment

Applying Webb’s Alignment constructs

1. Categorical Concurrence
   - What content is new? What content is continued?

2. Range of Content
   - Broadening or generalizing knowledge/skills

3. Depth of Knowledge (DOK)
   - Webb DOK ratings are somewhat grade-specific.

4. Balance of Representation
   - How does content emphasis vary across grades?

5. Source of Challenge
   - What needs to be clarified about the standards?
Quality of Content Alignment

- Content standards are *not* clearly articulated across grades if:
  - Related standards are not clearly differentiated.
    - What new knowledge or skill is required?
    - One or both standards may not be described in sufficient detailed.
  - Differences in terminology are not explained.
    - Different words for the same skill?
  - Terminology drifts.
    - The meaning of terms appears to be expanded.
  - Specific objectives are omitted at some grade.
Gathering Content Alignment Data

- Who should judge?
  - Same experts who developed the content frameworks.

- What are judges asked to do?
  - Make judgments about individual standards.
    - Grade-to-grade comparisons (summed up later)
    - Within specific content areas or subscales
      - To limit search for similar standards
  - Identify related prior-grade standard(s)
  - Describe relationship
    - Qualitative description of what is new or added.
    - Code relationship type (Extend, Deeper, New, Same, Prerequisite)
  - Identify quality issues
    - Source(s) of challenge
Reporting Vertical Alignment

- Detailed reports
  - Content Maps
  - List of specific challenges (articulation quality concerns)

- Summary indicators
  - Concurrence - % new content
  - Range - % of skills broadened
  - Depth - % of skills deepened
  - Balance - % of standards with few/many objectives
  - Challenge – Average rating; % flagged with comments
## Simplified Content Map

<table>
<thead>
<tr>
<th>Grade 1</th>
<th>Grade 2</th>
<th>Grade 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Add and subtract integers</td>
<td>2.1 Add and subtract decimals. (E)</td>
<td>3.1 Apply arithmetic operations to solve</td>
</tr>
<tr>
<td></td>
<td></td>
<td>problems (D)</td>
</tr>
<tr>
<td>1.2 Multiply and divide integers</td>
<td>2.2 Multiply and divide decimals (E)</td>
<td>3.2 Apply arithmetic operations to fractions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(E, D)</td>
</tr>
<tr>
<td></td>
<td>2.3. Recognize negative numbers. (N)</td>
<td>3.3 Define rational and irrational numbers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(E)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.4 Understand basic rules of exponents (N)</td>
</tr>
</tbody>
</table>
Sample Exercise

➢ To be distributed at the conference (time permitting).
Next Steps

- Complete concept paper for the current project.
- Identify opportunities for further pilot work.
  - Improve data collection protocols.
  - Develop/improve rater training.
  - Build detailed examples of reports.
  - Begin to talk about more specific standards for good vertical alignment.
Checking Your Vertical Alignment

- Do your standards need an alignment checkup?
  - Identify needs for revision.
  - Add explanatory text.
  - Define common or evolving content for a vertical scale.
  - Suggest labels for points on the vertical scale.
  - Satisfy NCLB requirements for coherent grade level expectations!

- If so, volunteer for further pilot testing!
To Scale or Not To Scale?

- If standards cover different content from one grade to the next, vertical scaling may not be advisable!
  - Inferences based on the assessment at one grade may not generalize well to achievement of the next grade’s content.
  - It may still be reasonable to ask whether students are making progress getting closer to (or further above) expectations for each grade.

- If vertical content is well-articulated across grades, it may be reasonable to develop a vertical scale.
**Vertical Scaling 101**

- **What is a Vertical Scale?**
  - A numerical scale that links or spans multiple levels (frequently grade levels) of a test

- **Potential Scale Properties (Scale is usually arbitrary)**
  - Ordinal (greater is greater and less is less)
    - Sally’s score on the 3rd grade assessment is higher than Henry’s score on the 4th grade assessment
  - Interval (can compare differences at different scale points)
    - Henry scored 31 in the 3rd grade and 42 in the 4th grade
    - Sally scored 43 in the 3rd grade and 49 in the 4th grade
    - Henry’s score increased more from 3rd to 4th grade than Sally’s
  - Ratio (Ratio’s have meaning)
    - Henry knew only about 3/4 as much in the 3rd grade as he did in the 4th grade.
Example of a Vertical Scale
(Displayed Horizontally)

Score Frequencies on Vertical Scale

Vertical Scale

Frequency

Grade 3
Grade 4
Grade 5
Grade 10
What are Vertical Scales Good For?

Among many possible uses are:

- Charting individual student growth across grades
  - Identify students whose growth is below expectation and help them
  - Growth versus level perspectives

- Evaluating specific programs
  - Vertical Scales may be a poor substitute for pre- and post-test designs (where both tests measure the same thing)

- Assessing “Value-Added” at a particular grade
  - Generally defined in terms of average “growth” across students
  - May provide fairer comparison of schools serving students at different levels of readiness
How are Vertical Scales Constructed?

- By fiat (Definition): “Grade Equivalent Scales”
  - Scales for each grade are normalized (Normal Curve Equivalents)
  - Means are scaled to be 1 unit (grade) apart
  - So 3.3 could mean 3/10th standard deviation above the grade 3 mean or 7/10th standard deviation below the grade 4 mean
  - No checks that the scales measure the same thing
    - Betsy was below grade-level for reading in the 3rd grade, but above grade level for throwing a football in grade 4.

- By “Equating” the scales used for different grades
  - Some students take both assessments
  - Students at each grade take a common set of (anchor) items
  - Can provide evidence of the extent to which the assessments being linked measure the same thing.
Sample Design for Vertical Equating

Sample Configuration of Items on Vertical Scaling Test Forms

- **Grade 4**: 16 Items from Grade 3 Core
  - 4-1, 4-2, 4-3, 4-4, 4-5

- **Grade 5**: 8 Items
  - 5-1, 5-2, 5-3, 5-4, 5-5
  - 8 Items from Grade 7 Core
  - 6-1, 6-2, 6-3, 6-4, 6-5

- **Grade 6**: 8 Items
  - 6-1, 6-2, 6-3, 6-4, 6-5

Core Items Sections

Vertical Scaling Sections
Useful References for Vertical Scaling

Specific to Vertical Scaling


More General References on Equating