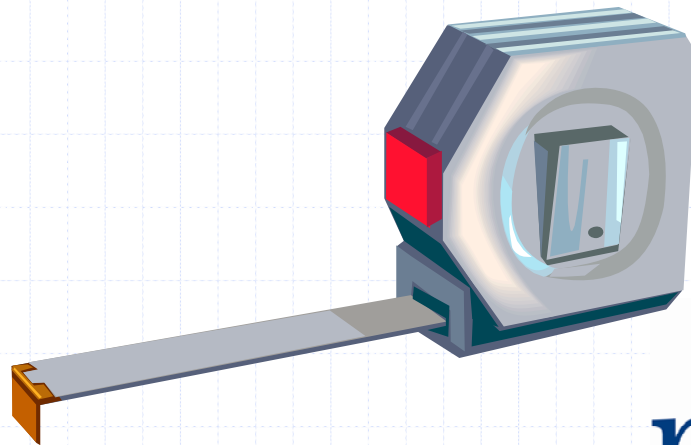
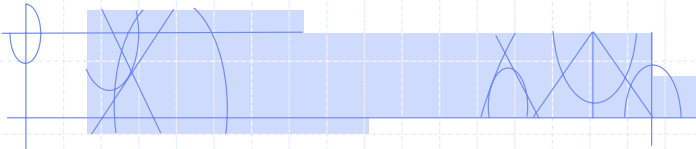


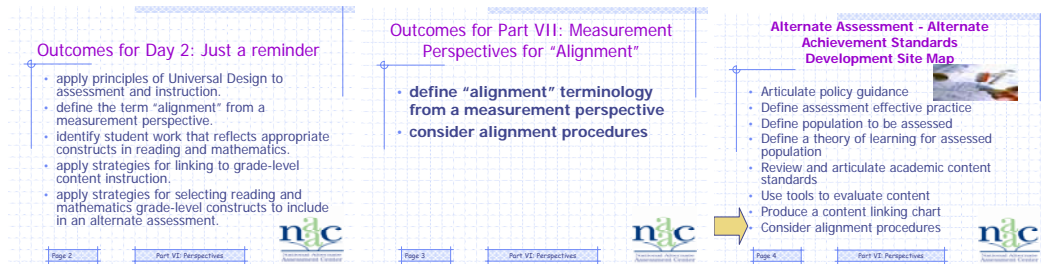
Part VII: Measurement Perspectives for "Alignment"



Part VII: Measurement Perspectives for “Alignment”

Purpose of Part VII

The purpose of Part VII is to define “alignment” terminology from a measurement perspective, consider a variety of alignment procedures, and apply strategies for linking to grade-level content instruction.



Trainer’s Note: This presentation is designed to stand alone. Therefore, you will find elements of Part I: Overview, Terminology, Theory, and Research in this presentation.

This section deals approximately equally between both the observation and cognition vertices. It may connect slightly heavier in terms of the observation vertex as it deals with measuring student performance(s) but also strongly connects with the cognition vertex by identifying just what it is that students should know and be able to do.

The Importance of Alignment

We sometimes assume that instructional systems are driven by academic content standards, which are translated into assessment, curriculum materials, instruction, and professional development. Research has shown that teachers may understand what content is wanted and believe they are teaching that content, when in fact they are not (Cohen, 1990; Porter, 2002). Improvements in student learning will depend on how well assessment, curriculum, and instruction are *aligned* and reinforce a common set of learning goals, and on whether instruction shifts in response to the information gained from assessments (National Research Council, 2001).

Accurate inferences about student achievement and growth over time can only be made when there is alignment between the standards (expectations) and assessments; from this perspective, alignment has both content and consequential validity implications (Bhola, Impara, & Buckendahl, 2003).

Why Alignment?

- Improvement in student learning
- Improvement in teacher instruction
- Accurate information about students and schools
- No Child Left Behind

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Alignment has great potential to improve the education of all students. Students with significant disabilities who receive instruction that is aligned to state content standards may have an opportunity to demonstrate learning academic content. Students who are assessed with items that are aligned to state content standards can demonstrate measurable levels of growth. Finally, students who receive instruction that is aligned to the assessment have a greater chance of demonstrating proficiency.

Improvements in Student Learning

- Assessments, Curriculum, and Instruction
 - Must be aligned
 - Reinforce a common set of learning goals
 - Instruction shifts in response to the information gained from assessments

(National Research Council, 1999)

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Standards-based educational reform aims to focus educational resources, efforts, and energy towards students' achievement. Improvements in student learning will depend on how well assessment, curriculum, and instruction are aligned and reinforce a common set of learning goals, and on whether instruction shifts in response to the information gained from assessments (National Research Council, 1999).

Improvement of Teacher Instruction

- Teachers may understand what content is wanted and believe they are teaching that content, when in fact they are not (Cohen, 1990)
- Information about the alignment between standards and instruction provides instructional information about academic content and complexity of instruction
- Giving students every opportunity to demonstrate proficiency

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There is great potential for teachers to provide access to the general curriculum when they align their instruction to the content standards. Earlier modules described how teachers can best foster this access and opportunities. If instruction and assessments are aligned, the data provided from the assessments can inform teaching and support student growth.

Accurate Information about Student Achievement

- Technical Quality of Assessments
 - Alignment tied to evidence of construct validity
- Ethical Issues
 - Fairness to students and schools

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Examining the alignment between standards and assessments provides one avenue for examining evidence for score interpretation. Evidence of content representativeness of an assessment provides test users with information about the inferences that can be made from an assessment. It would be a disservice to students and schools to make judgments about achievement of academic expectations based on assessments that were not aligned to content standards.

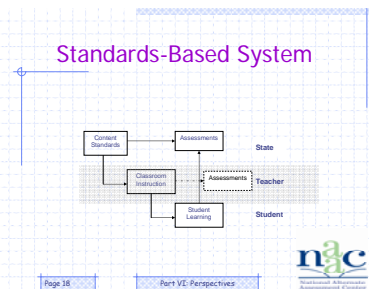
NCLB mandates

- Must be alignment between the academic standards and assessments
- Alternate achievement standards should be defined in a way that supports individual growth because of their **linkage** to different content across grades
- Requires reporting AYP in reading, math, and science for all students

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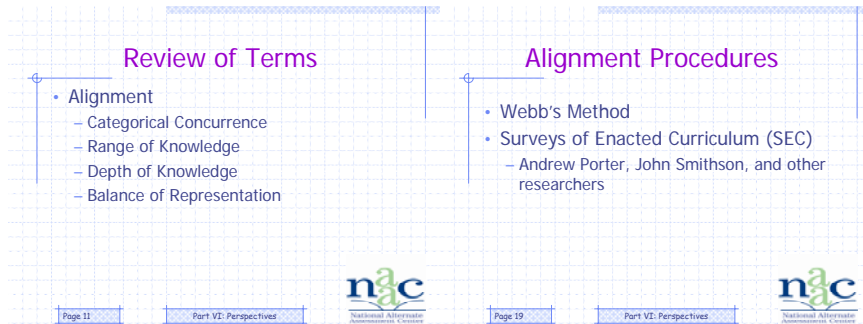
No Child Left Behind has mandated that states demonstrate alignment between the state academic standards and all assessments, including alternate assessments. Because alignment between the standards and assessments must be clearly described and documented, teachers need to track the links between the content, instruction, and the assessment. For example, teachers of students with significant disabilities have to identify each student’s needs based on the student’s grade level content standards. From these and potentially other needs, the student’s IEP is written and instruction is designed. Students are then assessed based on the instruction they receive in the selected grade level standards in an alternate assessment. Assessments are then scored and student performance is then judged against alternate achievement standards. It is critical that alignment occurs between the three areas.

Standards-Based System



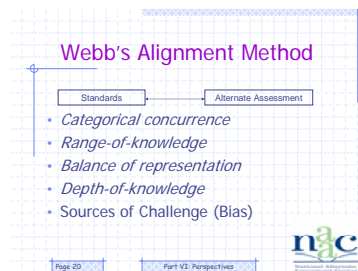
The ultimate goal of standards-based reform is to improve student learning and teacher instruction. For this to occur, there needs to be a high degree of alignment between the academic content standards, assessments, and ongoing classroom instruction.

Alignment Procedures



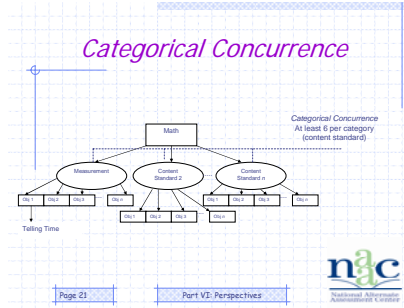
Procedures for evaluating the alignment of standards, instruction, and assessments and research into the effectiveness of these alignment procedures are still emerging, and four of the more promising alignment methods can be found at the Council of Chief State School Officers website (<http://www.ccsso.org/>). We will briefly present two of the four alignment methods today, one by Norman Webb and the second developed by Andrew Porter, John Smithson, and other researchers called Surveys of Enacted Curriculum (SEC). Webb's alignment procedure examines the alignment between standards and assessments and SEC examines the alignment among standards, assessments, and instruction.

Webb's Alignment Method



First we will start with Webb's alignment method. Norman Webb provides a systematic procedure for quantifying the degree of alignment of content standards and assessments. Qualitative expert judgments and quantified coding produce a set of statistics that examine different dimensions of alignment. Webb (1997) recommends several criteria for examining alignment between content standards and assessments, which not only examines the link between the two components, but provides information about the breadth and depth of the alignment.

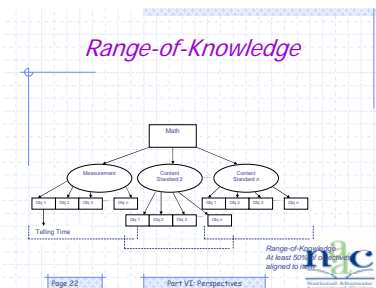
Categorical Concurrence



Categorical concurrence is the consistency of categories of content in the standards and assessments. The criterion of categorical concurrence between standards and assessment is met if the same or consistent categories of content appear in both the assessment and the standards. For example, if a content standard is *measurement* (2nd level down on the pyramid) in mathematics (1st level of the pyramid) does the assessment have items that target *measurement*? It is possible for an assessment item to align to more than one content standard. For example, if an assessment item requires students to calculate surface area, which is aligned to the content standard of *measurement*, to successfully answer the question the student needs to be able to multiply numbers, which is aligned to the content standard of *operations*. In this case the item is aligned to both content standards.

To produce an acceptable level of reliability for assessment scores, Webb recommends at least six items per content standard. In other words, there should be at least six assessment items related to the topic of measurement. Most states have multiple content standards or topics that are defined in their academic standards. If a state included five content standards under mathematics for 3rd graders (e.g., measurement, operations, etc.), there should be at least six items that align to each content standard. The more content standards expected by educational agencies, the more assessment items will be needed to align to those standards.

Range of Knowledge

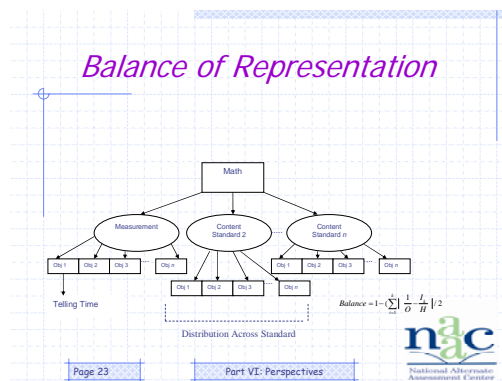


While categorical concurrence is the most obvious alignment criteria, additional alignment dimensions are needed to fully capture the complex knowledge and skills that are often emphasized in academic standards. For example, all the assessment items could

be aligned to only a few of the many academic content standards. Examining the range of standards an assessment covers and the balance of assessment items across the standards provides additional evidence about how well the assessment is capturing the breadth of the standards.

Range-of-knowledge correspondence criterion examines the alignment of assessment items to the multiple objectives (3rd level of the pyramid) within the content standards. Range-of-knowledge correspondence is used to judge whether a comparable span of knowledge expected of students by a standard is the same as, or corresponds to, the span of knowledge that students need in order to correctly answer assessment items. The range-of-knowledge numeric value is the percentage of content standards (2nd level of the pyramid) with at least 50% of the objectives (3rd level of the pyramid) having one or more hits. For example, if there are five objectives (e.g., length, area, volume, telling time, and mass) included in the content standard of measurement, a minimum expectation is at least one assessment item is related to at least three of the objectives.

Balance of Representation

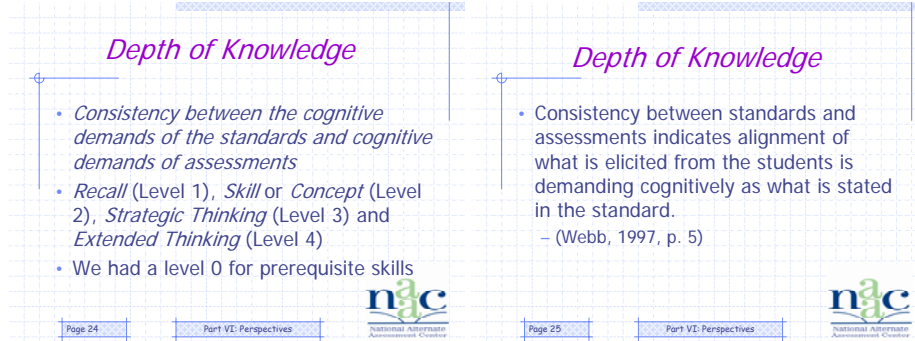


The *balance of representation* criterion is used to indicate the extent to which items are evenly distributed across the content standards and the objectives under the content standards. In our measurement content standard with five objectives, we would expect items would be evenly distributed across the five objectives. In practice educational agencies may place greater emphasis on specific objectives and content standards. In this case the assumption of an even distribution would be replaced with the expected proportion, or emphasis, as specified by the educational agency. The formula used to compute the balance of representation index is the following

$$Balance = 1 - \left(\sum_{i=1}^k \left| \frac{1}{O} - \frac{I_k}{H} \right| \right) / 2,$$

where O is the total number of objectives hit (i.e., item has been judged to be aligned) for the content standard, I_k is the number of items hit corresponding to objective k , and H is the total number of items hit for the content standard. The balance index can range from 0 (indicating unbalanced representation) to 1.0 (indicating balance representation) with values from .6 to .7 considered a weak acceptable balance and values .7 or greater considered acceptable.

Depth of Knowledge



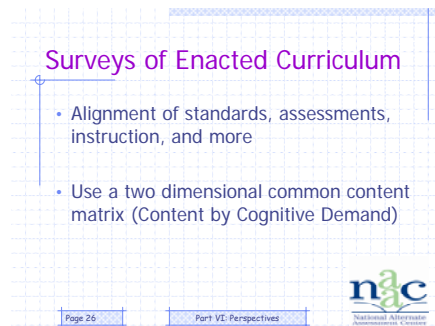
Depth-of-knowledge (DOK) examines the consistency between the cognitive demands of the standards and cognitive demands of assessments. Important aspects of learning go beyond academic topics and include students’ organization of knowledge, problem representations, use of strategies, and self-monitoring skills (Glaser, Linn, & Bohrnstedt, 1997). Completely aligned standards and assessments requires an assessment system designed to measure in some way the full range of cognitive complexity within each specified content standard. Webb identified four levels for assessing the DOK of content standards and assessment items. DOK levels are *Recall* (Level 1), *Skill or Concept* (Level 2), *Strategic Thinking* (Level 3) and *Extended Thinking* (Level 4). Of course to accurately evaluate the DOK level, each level needs to be behaviorally defined and examples given of types of student behaviors. A more descriptive example of DOK can be found in Table 1. This example was taken from an alignment study we conducted for assessments given to students with significant cognitive disabilities.

To examine the DOK, all item on the assessment and all academic content standards are rated for DOK. We expect assessments to have items that are below the expected DOK, but there should be items at or above the expected DOK. According to Webb, an acceptable level for the DOK is 50% or more of the assessment items are at or above the content standard DOK level. A weakly met criterion for DOK level would be between 40% and 50%.

Table 1
Mathematics Description of Depth-of-Knowledge Levels

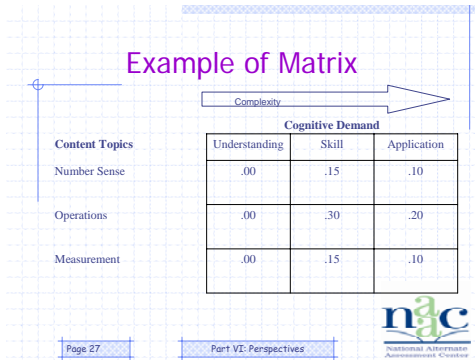
Level 1	Level 2	Level 3	Level 4
Requires students to recall or observe facts, definitions, terms. Involves simple one-step procedures. Involves computing simple algorithms (e.g., sum, quotient).	Requires students to make decisions on how to approach a problem. Requires students to compare, classify, organize, estimate or order data. Typically involves two-step procedures. Level 2 items include word problems with simple one-step solutions, graphing and regrouping.	Requires reasoning, planning, or use of evidence to solve problem or algorithm. May involve activity with more than one possible answer. Requires conjecture or restructuring of problems. Involves drawing conclusions from observations, citing evidence and developing logical arguments for concepts. Uses concepts to solve non-routine problems. Level 3 items include open-ended word problems where the operation is not given.	Requires complex reasoning, planning, developing and thinking. Typically requires extended time to complete problem, but time spent not on repetitive tasks. Requires students to make several connections and apply one approach among many to solve the problem. Involves complex restructuring of data, establishing and evaluating criteria to solve problems. Level 4 items are project-based, involve explanation & justification.

Surveys of Enacted Curriculum



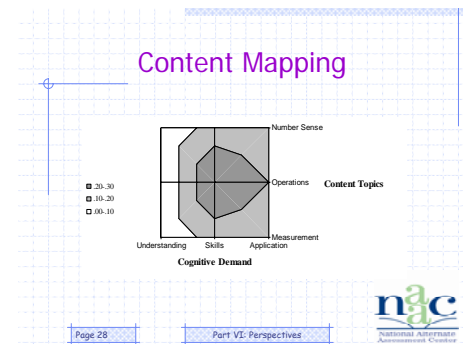
The second alignment method we will discuss is the Surveys of Enacted Curriculum (SEC). The SEC alignment approach analyzes standards, assessments, and instruction using a common content matrix, which consists of two dimensions for categorizing subject content, which include content topics and cognitive demands (Porter & Smithson, 2001). Using this approach, content matrixes for standards, assessments, and instruction are created and the relationships between these matrices are examined. In addition to

alignment statistics that can be calculated from the two-dimensional matrix, content maps and graphs can be produced to visually illustrate differences and similarities between standards, assessments, and instruction.

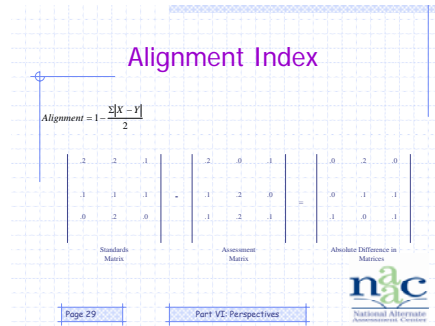


For illustrative purposes we will present all data using only three content areas and three categories for cognitive demand, producing a three by three matrix. In practice there are usually five or more content areas and six or more categories for cognitive demand.

To analyze assessments and standards, a panel of content experts conducts a content analysis and codes the assessment and/or standards by topic and cognitive demand. Results from the panel are then placed in a topic by cognitive demand matrix, with values in the cells representing the proportion of the overall content description. Each cell is the proportion of assessment items coded in each content topic by the cognitive demand. The cell with .30 indicates that 30% of the items were coded into the content topic area of *operations* and cognitive demand category of *skill*. The remaining cells indicate the proportion of assessment items that align to specific content topic and level of cognitive demand. The same procedure would be used to code academic content standards.



Porter (2002) reported that practitioners prefer visual representations of the matrix. The information in the matrix could be visually represented using content maps or surface area. The darker shades represent higher proportion or percentages of items. Most of the assessment items are in the content topic area of *operations* and at the cognitive demand categories of *skills* and *application*. The figure on the slide was produced using a simple spreadsheet program, but Porter and Smithson use software that produce much more sophisticated and detailed content maps.



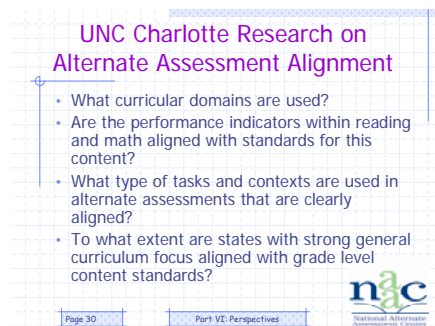
Indices of alignment are created by a cell by cell comparison between matrices. The formula for calculated the alignment index is

$$Alignment = 1 - \frac{\sum |X - Y|}{2},$$

where **X** is the matrix of assessment cell proportion and **Y** is matrix of standards cell proportions. Table 3 demonstrates the calculation of the alignment index. In this example the alignment between standards and an assessment is being calculated. After subtracting the corresponding cells of the standards and assessment matrix and taking the absolute value, the elements in the new matrix are summed across all the cells. In this example, the sum of the elements in the absolute difference between the two matrices is .6. This value is divided by 2 and then subtracted from 1, which results in an alignment index of .7.

$$Alignment = 1 - ((.0+.2+.0+.0+.1+.1+.1+.0+.1)/2) = .7$$

Research Review



At the University of North Carolina at Charlotte, we have been conducting research on alternate assessment and general curriculum access for the last five years. In this segment, we will briefly review our research findings on alignment and the evidence for teaching academic content to students with significant cognitive disabilities from our current review of the literature.

Alignment Research: What curricular domains are present in states' alternate assessments?

Alignment Research
What curricular domains are present in states' alternate assessments?

- Method
 - Obtained alternate assessment information and materials from 41 states in 2001
 - Used 31 states' materials that included information on "performance indicators" (assessment items; sample tasks for standards; extended standards)
 - Coded information to find patterns

(Browder, D., Ahlgrim-Delzell, L., Flowers, C., Karvonen, M., Spooner, F., & Algozzine, R. (2005). How states define alternate assessments. *Research and Policy in Developmental Disabilities, 15* (4), 209-220.)

FINDINGS
Prior to NCLB, most states' alternate assessments included academic domains

Domain	Percentage
Math	~75%
Living Area	~70%
Science	~40%
Soc. Stud.	~35%
Career	~30%
Home	~20%
Leisure	~15%
Community	~10%

We first asked, What curricular domains are present in states' alternate assessments? When we began our work, there was some confusion about whether to align alternate assessments with the general curriculum or a separate functional curriculum. Our method was to collect information on alternate assessments from as many states as possible. We obtained information from 42 states; 31 of these had enough information in their materials to be coded for patterns. Our first finding was that even prior to No Child Left Behind, most states included academic content domains. Please note that while this study is in press for 2005, it was submitted in 2002 and is now a bit dated.

Alignment Research: Do the performance indicators in states' alternate assessments align with reading and mathematics standards?

Alignment Research
Do the performance indicators in states' AA align with reading and math standards?

- Method
 - Selected a representative sample of performance indicators from each of the 31 states
 - Reviewed by researchers in reading and math education (general education)

(Browder, D., Flowers, C., Ahlgrim-Delzell, L., Karvonen, M., Spooner, F., & Algozzine, R. (2004). The alignment of alternate assessment content to academic and functional curricula. *Journal of Special Education, 37*, 211-224.)

Findings Mixed: Some states had strong alignment to academic content; some weak alignment

- Examples from strongly aligned states
 - Math
 - Compare volumes of more and less
 - Use strategies such as counting, measuring, to determine possible outcomes in problem solving
 - Reading
 - Answer questions related to story
 - Identify pattern in familiar story

- Examples from weakly aligned states
 - Math
 - Replace rollers in beauty parlor
 - Measure growth of fingernails
 - Reading
 - Show anticipation on roller coaster
 - Attend to visual stimuli

Next, we asked, do the performance indicators in states' alternate assessment align with reading and math standards? We used the term "performance indicators" to refer to the many variations states used to describe what the alternate assessments targeted. Some

states provided sample assessment items; others sampled teaching tasks or curricular frameworks for their standards; others used the term “extended standards” for specific performance tasks like using a daily schedule. We wanted to learn if the performance indicators used in alternate assessments were really reading and math. I called this our “Emperor’s New Clothes” study based on the children’s fable in which the king’s court pretends to see clothes that are not visible. We wanted to be sure the items were really reading and math; that they were visibly related to academic content when viewed by math and reading researchers from general education. Our findings, the new Emperor does indeed have clothes- sometimes. These content experts found that some states’ performance indicators had clear alignment with reading and math, some states reflected weak links, and others had both strong and weak links. We listed some of examples from the states’ performance indicators in the slide above to illustrate the difference.

Alignment Research: What type of curriculum is reflected in states’ alternate assessments?

The image shows three presentation slides from a research report. The first slide, titled "Alignment Research: What type of curriculum is reflected in states' alternate assessments?", describes the methodology, including content analysis of 31 states from 2001 and a comparison of states with clear alignment to academic content versus weak alignment. The second slide, "Frequency of Each Philosophy", lists the distribution of curriculum philosophies across all 6 states for TASK (54% academic, 18% functional, 11% social, 4% early childhood) and CONTEXTS (63% functional, 25% academic, 9% social, 1% early childhood). The third slide, "Findings: States with clear alignment used more academic tasks and contexts", features a bar chart comparing the percentage of academic tasks and contexts between states with strong versus weak alignment. The chart shows that states with strong alignment use significantly more academic tasks and contexts across all categories.

We decided to contrast the states with strong and weak alignment to ask, What type of curriculum is reflected in states’ alternate assessments? To answer this question, we coded each of the indicators for the type of curricular focus reflected in both its task and context. Our findings revealed a significant difference between states the curriculum experts had identified as having strong and weak links. While many indicators from both types of states included a blend of functional and academic tasks and contexts, the states with clearly aligned indicators used many more academic ones

Alignment Research: To what extent do alternate assessments align with grade level content standards?

The image shows two presentation slides. The first slide, "Alignment Research: To what extent do alternate assessments align with grade level content standards?", details the method, which involved obtaining sample alternate assessments from three states with strong links to academic content and applying criteria developed by Norman Webb for general education assessments. The second slide, "Findings: Strong match with grade level standards, but selective use of standards", reports that overall alignment was strong, with 78-94% of alternate assessment items in three states being directly linked to grade level academic content standards for reading and math. However, it notes that there was less breadth and depth than recommended for general education assessments, with fewer objectives sampled and a less balanced use of standards.

This led to evaluating states with clear alignment to academic content in more depth. We wanted to know to what extent do alternate assessments align with grade level content

standards? We asked researchers in alternate assessment to nominate states who had alternate assessments with strong alignment to general curriculum. Three states were identified and all agreed to supply copies of their alternate assessments and their states' academic content standards for this research. Two of these states used portfolio models and one used a performance assessment. We applied Norman Webb's criteria for alignment which looks at categorical concurrence, depth-of-knowledge consistency, range of knowledge correspondence, and balance of representation for each state using the state's grade level academic content standards. Our findings confirmed that these were states with overall strong alignment. Most of the assessment items could be directly linked to grade level academic content standards. In contrast, there was some narrowing of the breadth and depth of standards addressed in the alternate assessments. Fewer objectives were sampled; there were fewer items per standards; and less balance across objectives. The states' standards each had a normal distribution for depth of knowledge—that is most standards were geared to the middle level and fewer sampled more basic or complex levels. In contrast, the alternate assessments were negatively skewed for depth of knowledge with more items at the basic level. In a follow up conversation with the states, all emphasized the importance of sampling the entire range of depth of knowledge which all three states had done. For example, we found items that required more complex demonstrations of knowledge like synthesis and evaluation. They also emphasized the importance of stretching towards broader and deeper alignment with their state standards.

Research Conclusions

- Most states are focused on aligning their alternate assessments with academic content standards
- Some of these alternate assessments have clear alignment with academic content; others weak alignment
- Even states with strong alignment with grade level content standards face challenges in determining breadth and depth of the state standards to sample

Checkpoint

- What are the dimensions of alignment?
- Are any dimensions more important than others?
- Who should be invited to examine the alignment of assessments and content standards?

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Notes

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