Alignment Content Analysis of NAEP 2009 Reading Assessment
Analysis based on method of
Surveys of Enacted Curriculum

Council of Chief State School Officers, Washington, DC

The Council of Chief State School Officers

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Council of Chief State School Officers
Attn: Publications
One Massachusetts Ave., NW, Suite 700
Washington, DC 20001
202-336-7016
Fax: 202-408-8072
www.ccsso.org

Alignment Content Analysis of NAEP 2009 Science Assessments with the methodology of Surveys of Enacted Curriculum

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Division of Assessment/NAEP

Rolf K. Blank
CCSSO

John Smithson
Wisconsin Center for Education Research
University of Wisconsin-Madison

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The Council of Chief State School Officers (CCSSO) conducted an alignment content analysis of the 2009 National Assessment of Educational Progress Reading and Science Assessments administered in 2009 for students at grades 4 and 8. The analysis was conducted using the methodology of the Surveys of Enacted Curriculum (SEC). The study of NAEP Reading and Science Assessments was supported by the National Center for Education Statistics through the Assessment Division. This report on the findings of the analysis was prepared by staff of the Council of Chief State School Officers, led by the project director Rolf K. Blank.

Executive Summary

Beginning in summer 2009, the complete set of NAEP student assessment items for grades 4 and 8 Science and Reading 2009 assessments were analyzed for comparison to the NAEP Item Specifications which are based on the NAEP Assessment Frameworks for these subjects (National Assessment Governing Board, 2009). The data produced from the Assessment analysis can be used for multiple comparisons to other assessments or to state or national standards for learning. The review and analysis of NAEP Assessment items was led by CCSSO and the arrangements for item access were made through the National Center for Education Statistics, Assessment Division. The analysis was conducted with the SEC methodology developed by Porter and Smithson (2001) which has been used in analyses of many state, national and international assessments through the SEC State Collaborative managed by CCSSO (see www.SECsurvey.org).

The most general summary measure of alignment between two documents analyzed with the SEC method (either assessment or standards) reported is the alignment index (AI), a scale value that ranges from 0.00 to 1.00, with 1.00 indicating perfect alignment between the two documents being compared. In this report on the alignment of NAEP assessments, three types of criteria are utilized to adjudicate the sufficiency of the alignment results: (1) the national average of alignment indices for state assessments to state standards, based on results available from the SEC database www.SEConline.org, (2) the alignment index for assessment instruments that were previously analyzed through NCES, and (3) an expected state alignment threshold level that is consistent across all subjects and grade levels, based on our prior data and experience with alignment analyses across states and including national and international documents. The standard baseline criterion for the overall alignment index (AI) is 0.25, and the criterion is 0.50 for each of three sub-measures of alignment (Balance of Representation, Categorical Concurrence, and Cognitive Complexity).

Results: Alignment of NAEP Assessments to Item Specifications

Science. Two NAEP assessment grades, 4 & 8, were analyzed for science. Alignment results for both science assessment grades indicate good alignment between the NAEP assessment instruments and the Item Specifications (*Grade 4 alignment index = 0.37, Grade 8 alignment index = 0.42*). The NAEP science alignment index compares favorably across alignment criteria, i.e., whether compared to the standard baseline

alignment (AI = 0.25), or previous NAEP assessments alignment analysis (e.g., NAEP Gr. 4 Math AI = 0.40, Gr.8 Math AI = 0.36).

Analysis Methodology and Procedures

The SEC alignment analyses for NAEP science and reading assessments were conducted with procedures developed by Andrew C. Porter and John L. Smithson for describing and examining relationships between documents related to subject-matter content and/or reports of instructional practice (Porter & Smithson, 2001; Smithson & Porter, 2004). The basic steps in the SEC method are as follows. First, content review and coding to the SEC frameworks are carried out for each of the documents being analyzed (generally, standards (or specifications) and assessments). The content review and coding is generally done by four content analysts who all have strong experience in their subject and teaching the subject, and have been trained in the SEC content analysis procedures (Smithson, 2007). In general, the process asks analysts to describe and code references to subject matter content in terms of two dimensions-- *topics* (what students should know), and *expectations* for student performance (what students should be able to do). All measurements are made at the intersection of these two dimensions. That is, every reference to topic is paired with a category of student performance expectation. This paired description is referred to as a content code. The observed topics and expectations are coded into the SEC framework for the subject. For assessments, the unit of analysis is an assessment item. Content analysts are permitted to use up to three content codes to describe the instructional content assessed by a test item. For content standards the unit of analysis is either a standard strand or sub-strand. Content analysts are permitted to use up to six content codes to describe a content standard strand.

Analysts all have subject matter content expertise, and are typically drawn from assessment or curriculum specialists at the state or regional level as well as university faculty. Analysts undergo a four-hour training process, which includes sample coding items and group discussion about coding rationales and convention. Coding teams consist of 3-5 members. All analysts make independent decisions and submit independent data collection reports. A consensus model is not employed. The strategy instead is to collect a comprehensive description of content from multiple perspectives. Analysts discuss assessment items and standards text as determined necessary by the team in order to discuss the rationale and options for content descriptions used to describe a specific unit. While members discuss their coding rationales and decisions, and analysts are free to make changes in their coding selections as the result of team discussion, analysts are instructed to make independent decisions based on their own individual professional judgment. Findings from generalizability studies previously conducted indicate that to obtain reliable analysis results a minimum of three content analysts are needed for each team, and four members are preferred (see, Smithson, 2007, for a description of content analysis procedures).

Content codes are processed and averaged across analyst teams to construct a content description of each document. These content analysis results can be arrayed into a two

dimensional matrix, with columns to represent each of the five categories of student performance, and rows to match the number of topics for the given content language. The content language matrix used for the analysis and coding is from the Surveys of Enacted Curriculum instruments (Blank, Porter, & Smithson, 2001). Currently a K-12 taxonomy is employed in four subject areas; mathematics, science, English language arts & reading, and social studies. This report presents results for mathematics, science and language arts & reading only.

Alignment analysis results are reported using four distinct summary measures: *Categorical concurrence, Balance of representation, Cognitive complexity, Alignment index*. Each document pair is summarized using each of these four measures at an overall level (i.e., across the entirety of both documents), and at more detailed, 'sub-levels' (based on curriculum content areas). The definition and purpose of each of these four measures are described below.

Alignment Measures and Criteria

Categorical Concurrence
The most straightforward criterion in measuring alignment is the criterion which Webb (1997) calls "categorical concurrence". Here, the operational question is, "Does this assessment item fit one of the categories identifiable in the standards being employed?" If yes, we can say the item is "aligned". If we can say yes to every such assessment item, we could say that the assessment is aligned to the standards on the topic dimension.

While the descriptive data collected during the content analysis process is reported at the intersection of topic and cognitive demand, analyses can be conducted on each dimension separately. These marginal measures yield descriptions of relative emphases for topic coverage and categories of cognitive demand that can then be compared in order to examine alignment strength in terms of one dimension or the other. Categorical concurrence is the summary measure that focuses on topic coverage. (The table below provides an example of a statistical table format for reporting the alignment measures.)

Categorical concurrence reports on the extent to which topics emphasized in the relevant state content standards are similarly emphasized in the state assessment. Results are reported for each content area, as well across the entire set of standards and assessment instrument. Categorical concurrence measures serve to identify areas where there is a mismatch between topics tested and those emphasized in the standards.

Balance of Representation

Categorical concurrence as a sole criterion has significant shortcomings in using it as a measure of alignment. An assessment that focused exclusively on say, one standard to the exclusion of all the rest, would be equally well aligned as an assessment that provided equal representation for each standard. A measure based on categorical congruence alone could not distinguish between the two, though the two tests would be dramatically different in the range of content assessed.

This leads to balance of representation as a second criterion for judging alignment: a sense of range, or breadth of coverage. An assessment can only test a portion of the subject matter that is presented to students. It is important then that assessments used for accountability purposes present some balance of representation across the range of topics that students are expected to be proficient in. An alignment measure that speaks to this balance of representation allows investigation into the relationship between the subject matter range identified in the content standards and the range of topics represented by a particular test.

Balance of Representation measures the relative emphasis of standards and assessments by content area. [Science The mathematics content language consists of 7 content areas (see Table 4) while English Language Arts & Reading is made up of 14 content areas (see Table 3).] The balance of representation measure reported for each content area is simply the difference between the relative proportions of emphasis focused on a given content area when comparing the standards to the test. A positive number represents over-emphasis on the test, while a negative number indicates under-emphasis of tested content. The overall balance of representation measure is based on the aggregate of these content area measures and is converted to report the total proportion of content held in common across the two documents.

Cognitive Complexity

While balance of representation is an improvement over simple categorical congruence, it is becoming increasingly clear that the depth of coverage, or cognitive complexity of the content provided to students in one or another subject area represents an important ingredient to their success on a given assessment (Gamoran, et.al, 1997). Cognitive complexity refers to the performance goals or cognitive expectations of instruction, and provides a third criteria or dimension to include in calculating an alignment measure.

Cognitive complexity examines the level of alignment between standards and assessments on the dimension of cognitive demand, or expectations for student performance. As with the other alignment measures, results are reported at the level of

content area, as well as an overall measure. A low measure on cognitive complexity indicates a mismatch between the state content standards and the state assessment on the distribution of emphasis across the five categories of cognitive demand.

Alignment Index

The alignment index incorporates elements of all the previous measures into a single index for describing the alignment between two content descriptions. This measure is based on cell-by-cell comparisons across all cells used for the measure. In the case of the 'overall' alignment index, this value is based on comparisons across 520 cells for K-8 Mathematics, and 575 cells for English Language Arts & Reading. As a result, the alignment index is the most sensitive of the alignment measures, taking into consideration both topic coverage and the configuration of cognitive demand, or student performance in determining the level of agreement between two content descriptions. It is typically the smallest value when compared to the other alignment measures. The alignment index is reported at an overall level, as well as by individual content area.

Each SEC reporting display comparing two documents, either as a contour map or tile chart format, has an alignment index (AI) statistic reported, and the initial chart including all main topics has a "coarse grain" index reporting the consistency between the main topics.

All alignment summary measures have a range of 0.00 to 1.00. For each measure, a result of 1.00 would indicate perfect alignment between the two documents on the construct of the measure being reported. Each measure reports a proportion of content held in common between two content descriptions (i.e., content standards or assessments). The phrase 'held in common' here has specific meaning, referring to a process of comparing two values and selecting the smaller of the two for placement into a counter that aggregates across comparisons. Each alignment measure involves some number of such comparisons, with the resulting summary measure calculated by sum of all intersects (smaller of the two values) across the comparisons employed for a particular measure.

Determining Acceptable Levels of Alignment

The procedures utilized for this analysis provide a systematic, quantitative, reliable and replicable methodology for describing and analyzing relationships between content descriptions. What the methodology has not previously offered are clear criteria for determining what constitutes "good" alignment. Today, with results available across several years from more than two-dozen states, three criteria can be reasonably established.

An important and unique feature of the content analysis procedures used for these analyses is that the resulting content descriptions allow comparisons of alignment across states (see www.SEConline.org). With content analyses having been conducted on standards and assessment documents in more than two dozen states (many through the

SEC State Collaborative), it is possible to examine alignment measures in order to establish an average measure of alignment between content standards and assessments for a given subject, across several states. Summary alignment measures can thus be described as being above, at, or below the average alignment for a particular subject across all states for which relevant data are available.

Another strategy for establishing alignment criteria would be to simply set a threshold value that can be considered to represent a minimally acceptable level of alignment consistent for all grades and subjects based in part on alignment results seen across states, grade levels and subject areas. For example, for this and previous alignment reports, balance-of-representation measures reported for each content area are highlighted if the measure exceeds an absolute value of 0.05. A content area with a difference in the level of emphasis between the standard and the assessment that exceeds 0.05 suggests an imbalance in the breadth of content assessed by the test. The actual threshold value selected (0.05) is itself somewhat arbitrary, and is therefore primarily intended as a diagnostic indicator useful for identifying areas that state assessment and standards developers may wish to examine in order to inform any future adjustments in either the assessment instrument or standards document.

Additionally, now that a significant number of documents have been analyzed across many states and subjects for several years, it seems reasonable to set specific values for each of the four summary alignment measures that indicate a minimal threshold for 'good' alignment. For the purposes of this report, these threshold criteria have been set at 0.25 for the alignment index, and 0.50 for each of the other three summary alignment measures (balance of representation, categorical concurrence and cognitive complexity). These values are very close to current national average alignment index across states in mathematics (avg.: 0.26, range 0.1 to 0.55) and science (avg.: 0.22, range 0.1 to 0.5), but are noticeably higher than the national average for English Language Arts & Reading (avg. 0.17; range 0.08 to 0.35).

A third criterion against which to compare the current set of alignment results comes from the alignment results for previous state assessments, NAEP assessments or other assessments including TIMSS and PISA. Several of these comparisons with other studies are reported below.

SEC Content Analysis process with NAEP

The SEC instruments include a two-dimensional content framework for each subject that was designed to collect, analyze and report data on curriculum that has been taught and analyze curriculum content in relation to standards (intended curriculum) as well as assessments that determine what has been learned. During the summer 2009, CCSSO arranged for science and reading content coding teams to use the SEC method and content framework to analyze the NAEP science and reading assessment items for 2009. A four-person specialist coding team was assigned each grade level for science and reading. Additionally, reading and science specialist teams analyzed and coded the NAEP item specifications documents which are based on the NAEP assessment frameworks (National Assessment Governing Board, *Assessment and Item Specifications*

for the 2009 Reading National Assessment of Educational Progress; Assessment and Item Specifications for the 2009 Science National Assessment of Educational Progress http://www.nagb.org/publications/frameworks.htm).
CCSSO together with our research contractor Wisconsin Center for Education Research (WCER) carried out alignment analyses using the coding results and this report presents the results of the analysis regarding the alignment of NAEP Reading and Science to the Item Specifications, and the alignment of NAEP assessment to state standards for these subjects.

The Surveys were developed by CCSSO and the Wisconsin Center for Education Research through a collaborative project involving educators, researchers, and subject area specialists (see Blank, Porter, & Smithson, 2001; Smithson & Porter, 2004). The SEC analysis method has been used previously to analyze standards and assessments in mathematics, science, English language arts reading, and social studies in over 30 states (see www.SEConline.org for further description of the methodology, details about the SEC content frameworks, and state content analysis results). CCSSO conducted an alignment analysis of NAEP Mathematics assessments (Blank & Smithson, 2008). The SEConline.org website also provides data for previous analyses of international assessments (such as TIMSS and PISA), and analysis of standards and assessment from other countries. These data and analyses are open to the public.

The alignment analysis data and alignment statistics (including alignment index) are presented through graphic displays using Content Maps (see results below) and Marginals summary charts. Also available for review are the content analysis data for each of the analysts and the averages used in producing the alignment results. Statistics of alignment are also computed for each of the three criteria of alignment, categorical concurrence, balance of representation, and cognitive complexity, and these tables are available in appendices from CCSSO.

Inter-rater Reliability
The SEC inter-rater reliability for the 4-person teams which produced the SEC content analyses are well above average. Inter-rater reliability provides a good indication of how well analysts agreed in their content review and coding results. The average inter-rater reliability for *science grades 4 and 8 is 0.7.*

Method for NAEP Item Specifications Analysis
The content analysis work conducted on the NAEP Item Specifications required some departure from the normal content analysis procedures as a result of the item specifications not specifying content at the intersection of science topic and cognitive demand. In the NAEP Item Specifications documents (National Assessment Governing Board, 2009) webpage, we found that these two dimensions are specified in separation from one another. To accommodate translation into the SEC content language a computational algorithm was employed to distribute emphases across categories of cognitive demand based on the text of Chapter 3 in the Item Specifications, and Exhibit 13 in the Science Framework. Since no declarative statement could be found in either document regarding the desired distribution of emphasis across cognitive demand

categories, the specific values employed is somewhat arbitrary. For the purposes of reporting the content analysis results here, the values used for distributing emphasis across the five categories of cognitive demand were as follows: 10% Recall, 20% Procedural, 30% Communicating Understanding, 30% Analyzing Information, and 10% Evaluate/Critique.

Review of NAEP analyses

Following the initial reporting of content analysis charts and data by WCER, CCSSO contracted with an independent specialist in each subject, science and reading, to conduct a review of the analysis results and the consistency of the data. The reviewers have excellent knowledge and experience with the NAEP frameworks and the assessments, and also had experience with the SEC methodology and frameworks. The reviews were submitted to NCES to provide an independent view of the process and data, and they provided strong endorsement of the SEC methods and results.

Findings: Results of Alignment Analysis

Science. Two NAEP assessment grades, 4 & 8, were analyzed for science. Alignment results for both science assessment grades indicate good alignment between the NAEP assessment instruments and the Item Specifications (*Grade 4 alignment index = 0.37, Grade 8 alignment index = 0.42*). The NAEP science alignment index compares favorably across alignment criteria, i.e., whether compared to the standard baseline alignment (AI = 0.25), or previous NAEP assessments alignment analysis (e.g., NAEP Gr. 4 Math AI = 0.40, Gr.8 Math AI = 0.36).

Readers Guide: Two types of alignment analysis results are reported in the charts: "content maps" and "content marginals". Both provide descriptive information about content analysis results based upon data collected through the analysis of NAEP assessments and specifications. Content maps display results of content analyses with surface area maps using a systematic taxonomy for describing subject-matter content. The darker colors represent greater concentration at the intersection of topic and expectations (or cognitive demand). Content marginals report the results for degree of emphasis on each topic and expectations (cognitive demand) across all content areas. Content marginal results are displayed using simple bar charts. A content map of one main topic is reported at the fine grain level.

The "coarse grain" alignment statistic is the degree of alignment between the two maps shown using only the main topics. The "alignment index" is the degree of overall alignment at the fine grain and coarse grain levels.

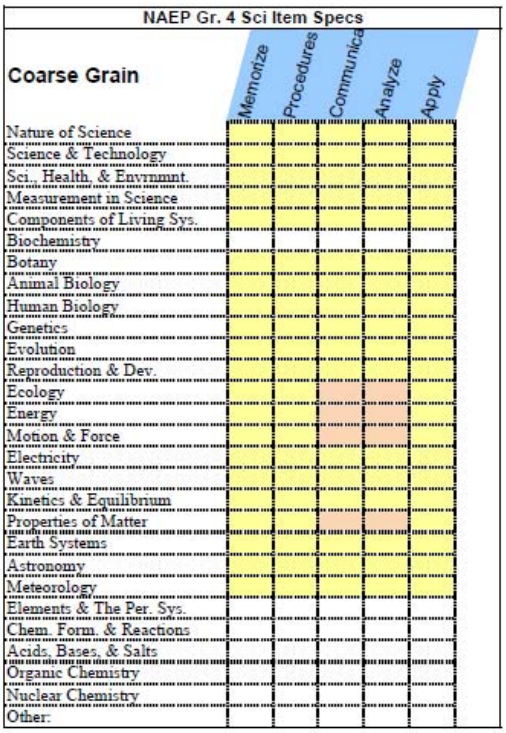
Science Grade 4 Alignment analysis results

- Alignment index = 0.37, Coarse grain alignment (main topics) – 0.54
- Topics in NAEP assessment grade 4 (right content map) emphasized are: Nature of science, Measurement, Botany, Properties of Matter

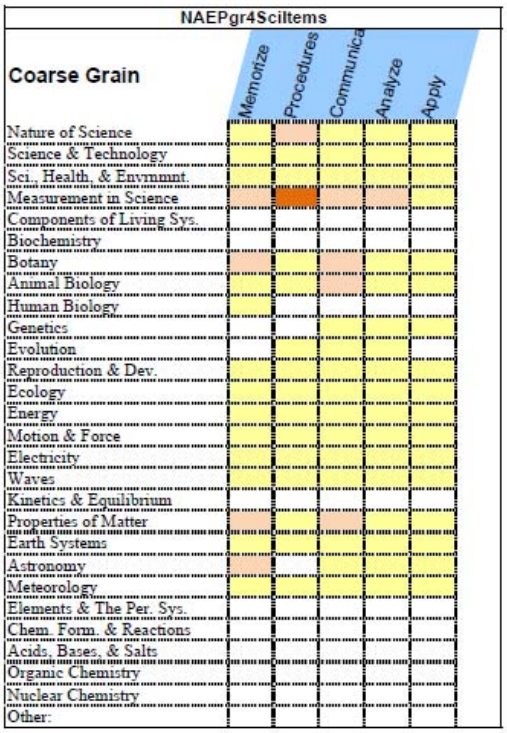
- The NAEP assessments include items assessing all 5 levels of expectations, with greater emphasis on Procedures/conduct investigations in science and Communicating Understanding of science knowledge.
- The science topic Measurement is highlighted, and the SEC analysis shows the sub-topic Data Displays are emphasized in grade 4 NAEP assessment.

Science Grade 4 Alignment analysis

Alignment Index: 0.37



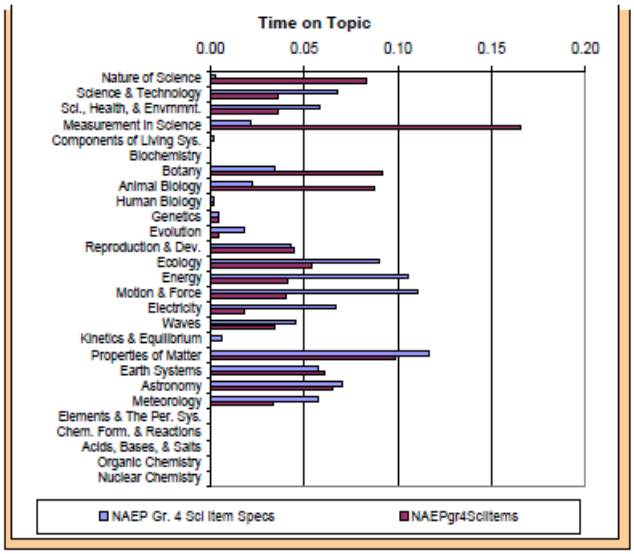
Coarse Grain Alignment: 0.54



Marginals analysis Grade 4 Science

Topic Coverage and Cognitive Engagement

Time on Topic	Document NAEP Gr. 4 Sci Item Specs	Document NAEPgr4SciItems
Nature of Science	0.00	0.08
Science & Technology	0.07	0.04
Sci., Health, & Envmmnt.	0.06	0.04
Measurement in Science	0.02	0.17
Components of Living Sys.	0.00	0.00
Biochemistry	0.00	0.00
Botany	0.03	0.09
Animal Biology	0.02	0.09
Human Biology	0.00	0.00
Genetics	0.00	0.00
Evolution	0.02	0.00
Reproduction & Dev.	0.04	0.04
Ecology	0.09	0.05
Energy	0.11	0.04
Motion & Force	0.11	0.04
Electricity	0.07	0.02
Waves	0.05	0.03
Kinetics & Equilibrium	0.01	0.00
Properties of Matter	0.12	0.10
Earth Systems	0.06	0.06
Astronomy	0.07	0.07
Meteorology	0.06	0.03
Elements & The Per. Sys.	0.00	0.00
Chem. Form. & Reactions	0.00	0.00
Acids, Bases, & Salts	0.00	0.00
Organic Chemistry	0.00	0.00
Nuclear Chemistry	0.00	0.00

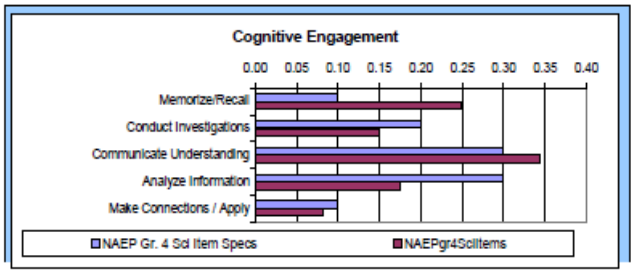


Alignment Table

View Content Maps

Select New

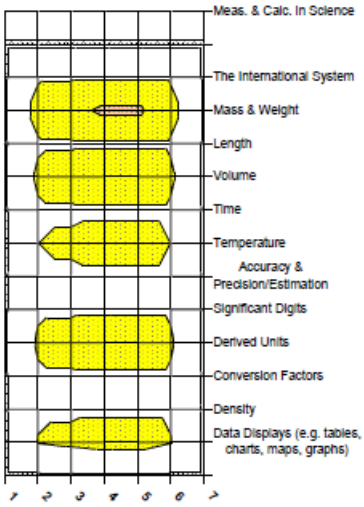
Cognitive Engagement	Document NAEP Gr. 4 Sci Item Specs	Document NAEPgr4SciItems
Memorize/Recall	0.10	0.25
Conduct Investigations	0.20	0.15
Communicate Understanding	0.30	0.34
Analyze Information	0.30	0.18
Make Connections / Apply	0.10	0.08

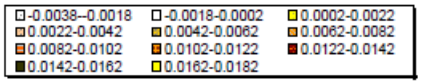


Alignment Index: **0.37**

NAEP Gr. 4 Sci Item Specs
Document

Measurement in Science





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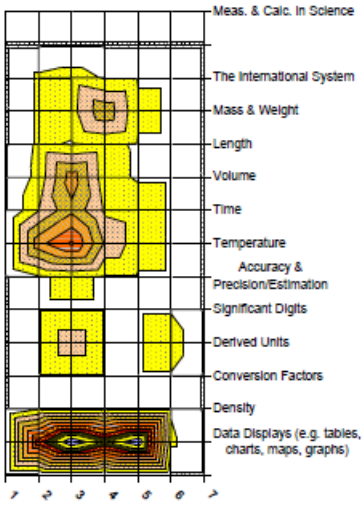
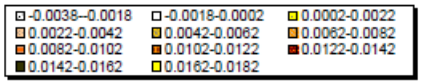
NAEPgr4SciItems
Document

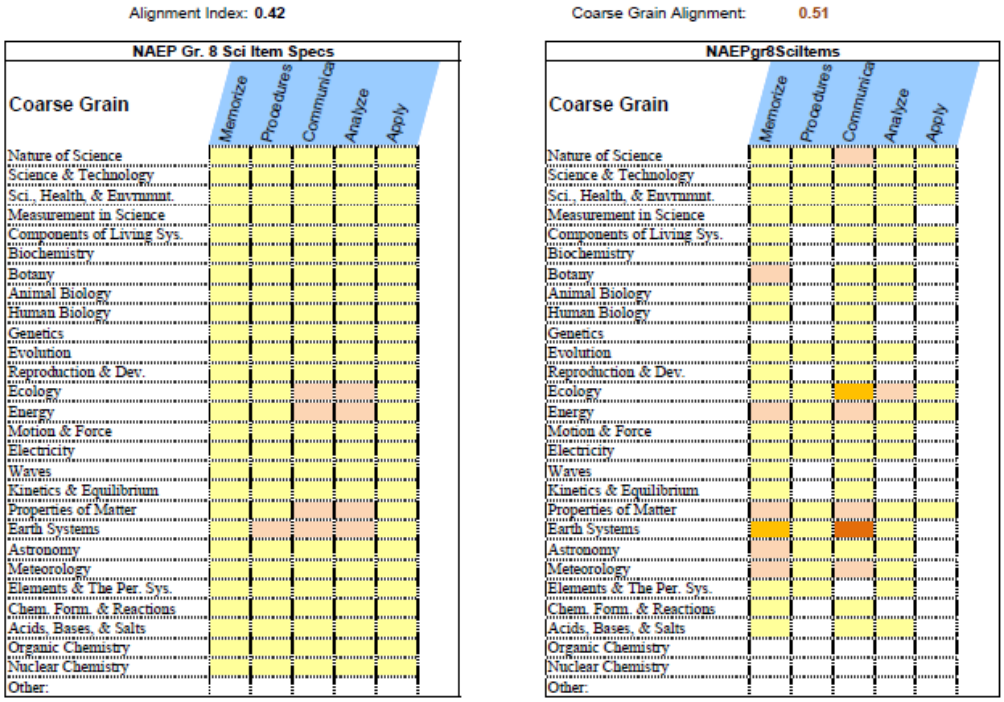
Measurement in Science





Science Grade 8 Alignment analysis results

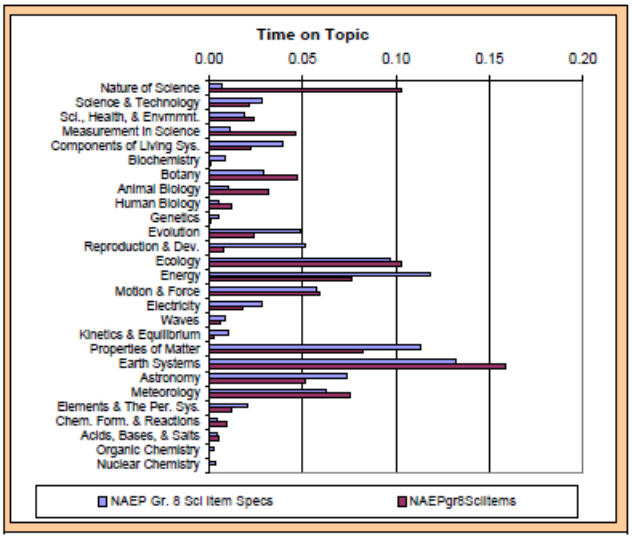
- Alignment index = 0.42, Coarse grain alignment (main topics) = 0.51
- Topics in NAEP assessment grade 8 (right content map) emphasized are: Ecology, Earth Systems, Meteorology
- The NAEP assessments include items assessing all 5 levels of expectations, with greater emphasis on Memorize/Recall and Communicating Understanding of science knowledge.
- The science topic Earth Systems is highlighted, and the SEC analysis shows the sub-topics Mineral/rock formation and Plate tectonics are emphasized in grade 8 NAEP assessment.



Marginals analysis Grade 8 Science

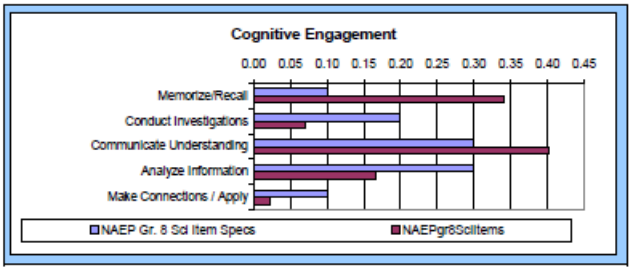
Topic Coverage and Cognitive Engagement

Time on Topic	Document NAEP Gr. 8 Sci Item Specs	Document NAEPgr8SciItems
Nature of Science	0.01	0.10
Science & Technology	0.03	0.02
Sci., Health, & Envmmnt.	0.02	0.02
Measurement in Science	0.01	0.05
Components of Living Sys.	0.04	0.02
Biochemistry	0.01	0.00
Botany	0.03	0.05
Animal Biology	0.01	0.03
Human Biology	0.00	0.01
Genetics	0.00	0.00
Evolution	0.05	0.02
Reproduction & Dev.	0.05	0.01
Ecology	0.10	0.10
Energy	0.12	0.08
Motion & Force	0.06	0.06
Electricity	0.03	0.02
Waves	0.01	0.01
Kinetics & Equilibrium	0.01	0.00
Properties of Matter	0.11	0.08
Earth Systems	0.13	0.16
Astronomy	0.07	0.05
Meteorology	0.06	0.08
Elements & The Per. Sys.	0.02	0.01
Chem. Form. & Reactions	0.00	0.01
Acids, Bases, & Salts	0.00	0.01
Organic Chemistry	0.00	0.00
Nuclear Chemistry	0.00	0.00



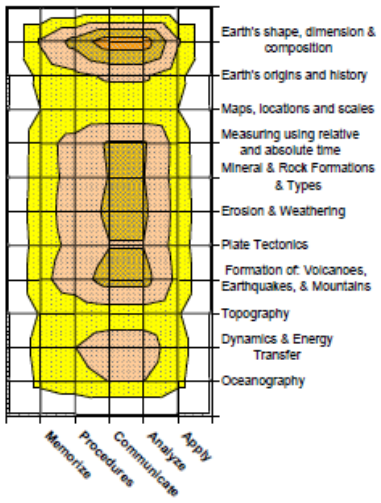
Alignment Table | View Content Maps | Select New

Cognitive Engagement	Document NAEP Gr. 8 Sci Item Specs	Document NAEPgr8SciItems
Memorize/Recall	0.10	0.34
Conduct Investigations	0.20	0.07
Communicate Understanding	0.30	0.40
Analyze Information	0.30	0.17
Make Connections / Apply	0.10	0.02



NAEP Gr. 8 Sci Item Specs
Document

Earth Systems



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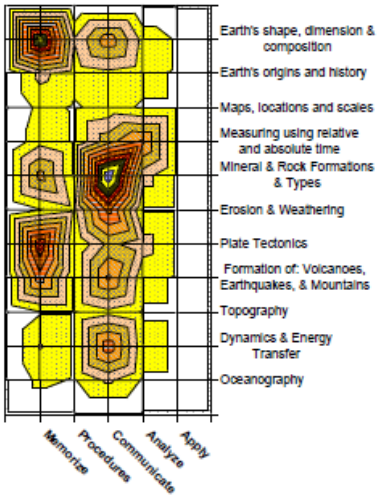
NAEPgr8Sciltems
Document

Earth Systems



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0.0082-0.0102	0.0102-0.0122	0.0122-0.0142
0.0142-0.0162	0.0162-0.0182	

Alignment Analysis with States

For the purpose of comparing NAEP content analysis to states standards, CCSSO is reporting content maps and alignment to NAEP with the states that have used the SEC methodology. We are reporting the alignment analyses according to three categories: a) states with high NAEP achievement scores than the national average, b) states not significantly different from the average, and c) states below the national average. The content maps demonstrate the degree of alignment of NAEP assessments with state standards. These examples highlight the kind of analyses that are possible for state level standards and assessments with the NAEP assessments.

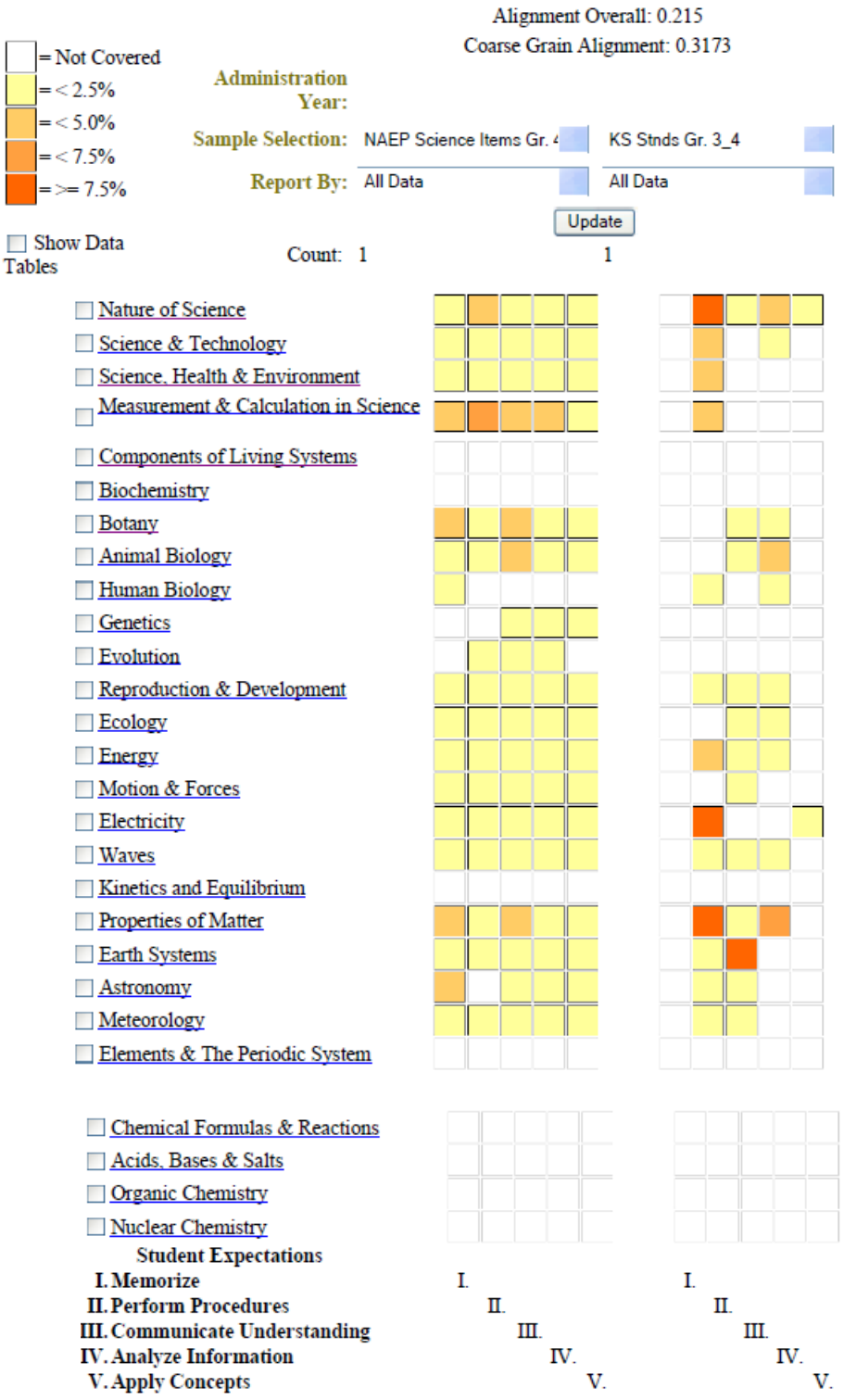
On the attached charts, the "alignment overall index" refers to the degree of consistency or match between the content (2 dimensions) for the document on the left side with the content of the document on the right side. The "coarse grain" statistic refers to the alignment or consistency of the main topics and expectations for the two documents shown in a chart.

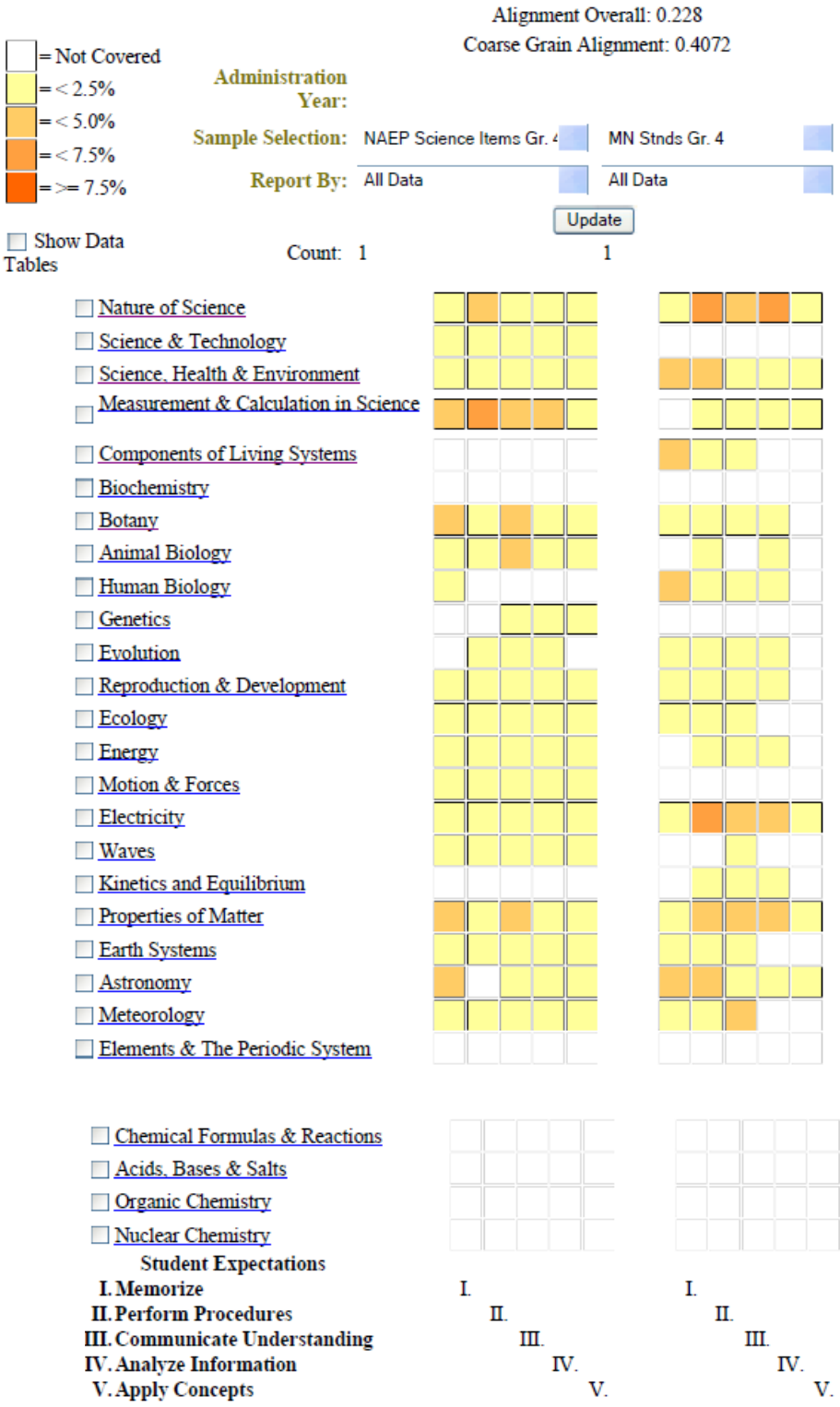
Patterns of alignment of State Standards to NAEP Assessments

- The Alignment Index for relationship of State standards to NAEP varies from 0.2 to 0.3; The Coarse Grain alignment from varies 0.35 to 0.45
- NAEP assessments were found to include more science content topics and the assessments covered more of the five types of expectations for students than the State standards at both grades 4 and 8
- State standards generally place more emphasis on Nature of Science and Science and Technology at grades 4 and 8 than the NAEP assessment
- The NAEP assessment places more emphasis on Measurement at grade 4 than states, and more emphasis on Earth Systems and Meteorology at grade 8 than states.

State	Science Standards
State achievement Above National average (based on NAEP Math 2009)	**Year of SEC Analysis**
Kansas	2006
Minnesota	2009
Montana	2007
Massachusetts	2005
Maine	2004
Missouri	2007
North Carolina	2004
Ohio	2008
Pennsylvania	2008
Vermont	2007
Wisconsin	2008
Below National average	
Florida	2003
Oklahoma	2005
Rhode Island	2003

Science Grade 4 NAEP by State Standards




Alignment Overall: 0.228
Coarse Grain Alignment: 0.4072
= Not Covered
= < 2.5%
= < 5.0%
= < 7.5%
= >= 7.5%
Administration Year:
Sample Selection:
NAEP Science Items Gr. 4
MN Stnds Gr. 4
Report By:
All Data
All Data
Update
Show Data Tables
Count: 1
1
Nature of Science
Science & Technology
Science, Health & Environment
Measurement & Calculation in Science
Components of Living Systems
Biochemistry
Botany
Animal Biology
Human Biology
Genetics
Evolution
Reproduction & Development
Ecology
Energy
Motion & Forces
Electricity
Waves
Kinetics and Equilibrium
Properties of Matter
Earth Systems
Astronomy
Meteorology
Elements & The Periodic System
Chemical Formulas & Reactions
Acids, Bases & Salts
Organic Chemistry
Nuclear Chemistry
Student Expectations
I. Memorize
II. Perform Procedures
III. Communicate Understanding
IV. Analyze Information
V. Apply Concepts
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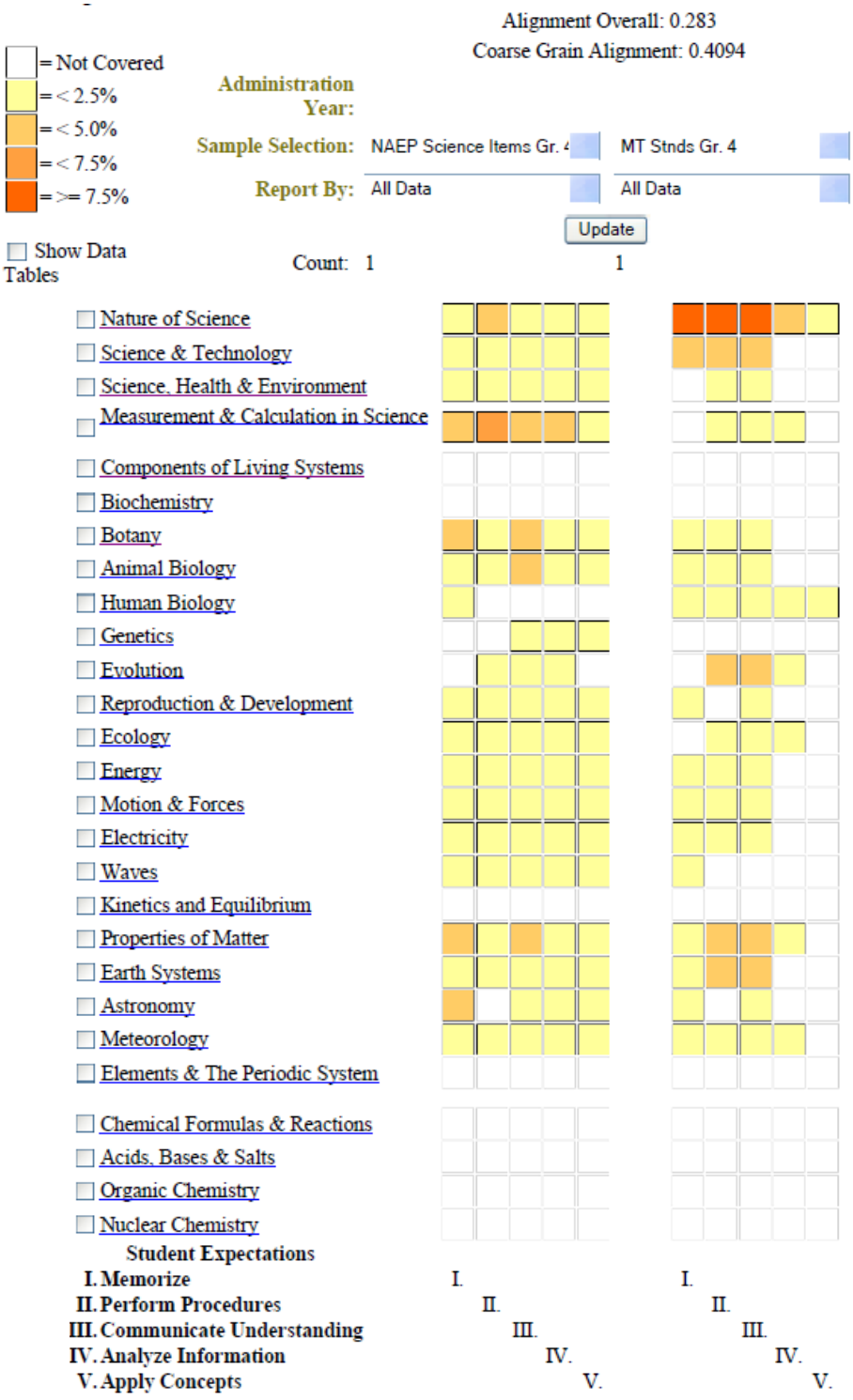
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= < 2.5%
= < 5.0%
= < 7.5%
= >= 7.5%
Administration Year:
Sample Selection:
NAEP Science Items Gr. 4
MT Stnds Gr. 4
Report By:
All Data
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Count: 1
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Nature of Science
Science & Technology
Science, Health & Environment
Measurement & Calculation in Science
Components of Living Systems
Biochemistry
Botany
Animal Biology
Human Biology
Genetics
Evolution
Reproduction & Development
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Waves
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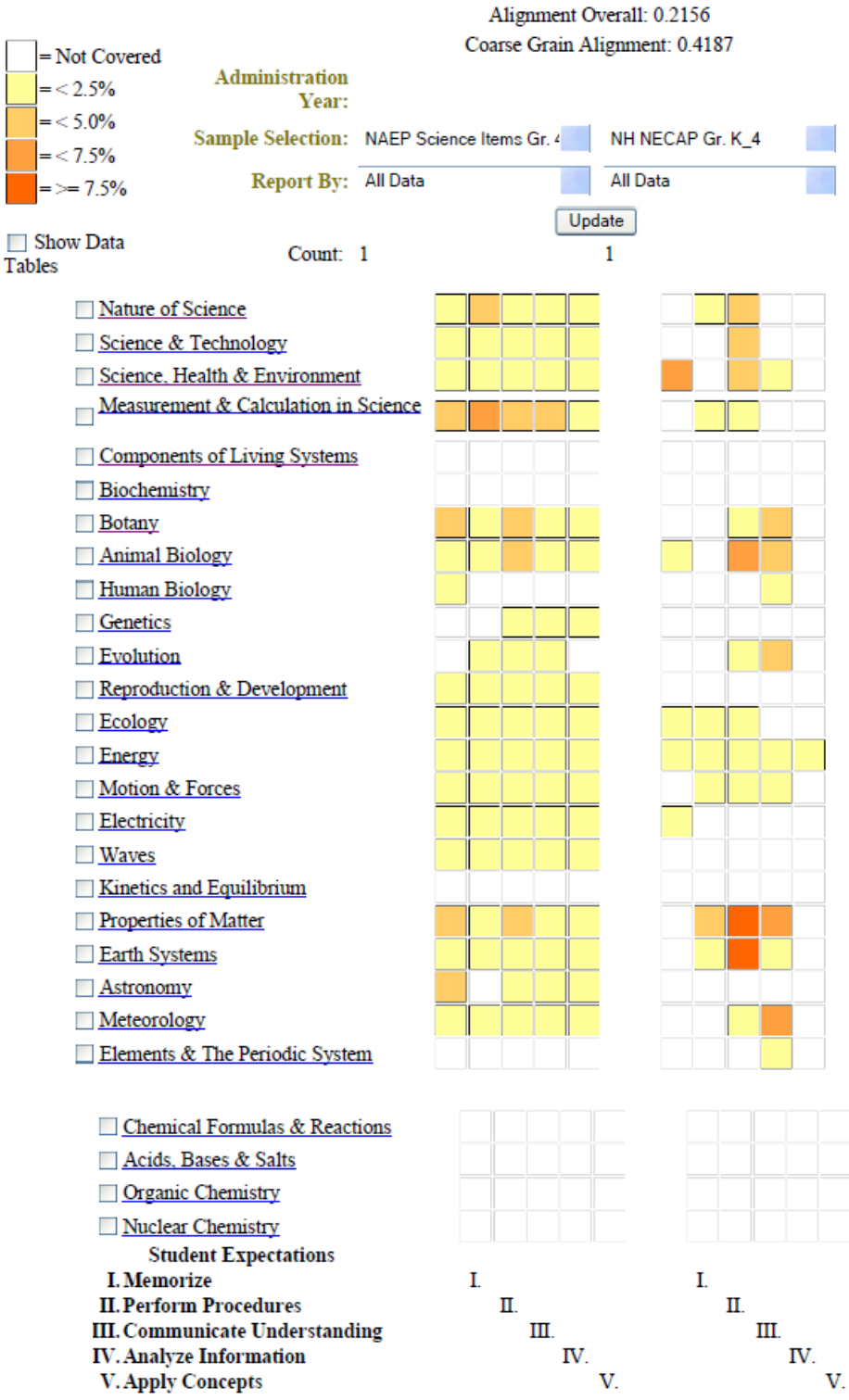
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= >= 7.5%
Administration Year:
Sample Selection:
NAEP Science Items Gr. 4
NH NECAP Gr. K_4
Report By:
All Data
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Show Data Tables
Count: 1
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Nature of Science
Science & Technology
Science, Health & Environment
Measurement & Calculation in Science
Components of Living Systems
Biochemistry
Botany
Animal Biology
Human Biology
Genetics
Evolution
Reproduction & Development
Ecology
Energy
Motion & Forces
Electricity
Waves
Kinetics and Equilibrium
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Meteorology
Elements & The Periodic System
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Acids, Bases & Salts
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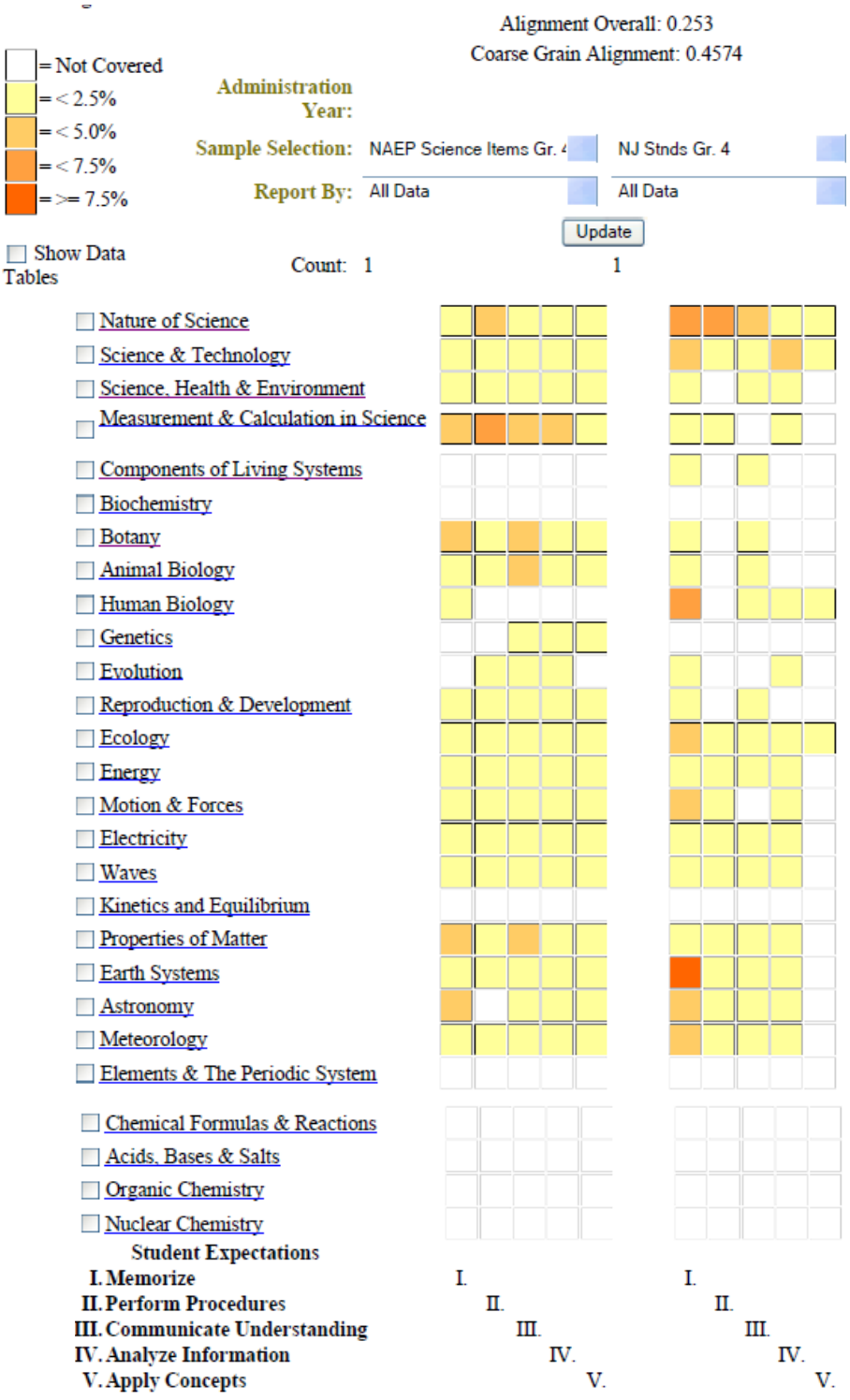
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= < 5.0%
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= >= 7.5%
Administration Year:
Sample Selection:
NAEP Science Items Gr. 4
NJ Stnds Gr. 4
Report By:
All Data
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Update
Show Data Tables
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Nature of Science
Science & Technology
Science, Health & Environment
Measurement & Calculation in Science
Components of Living Systems
Biochemistry
Botany
Animal Biology
Human Biology
Genetics
Evolution
Reproduction & Development
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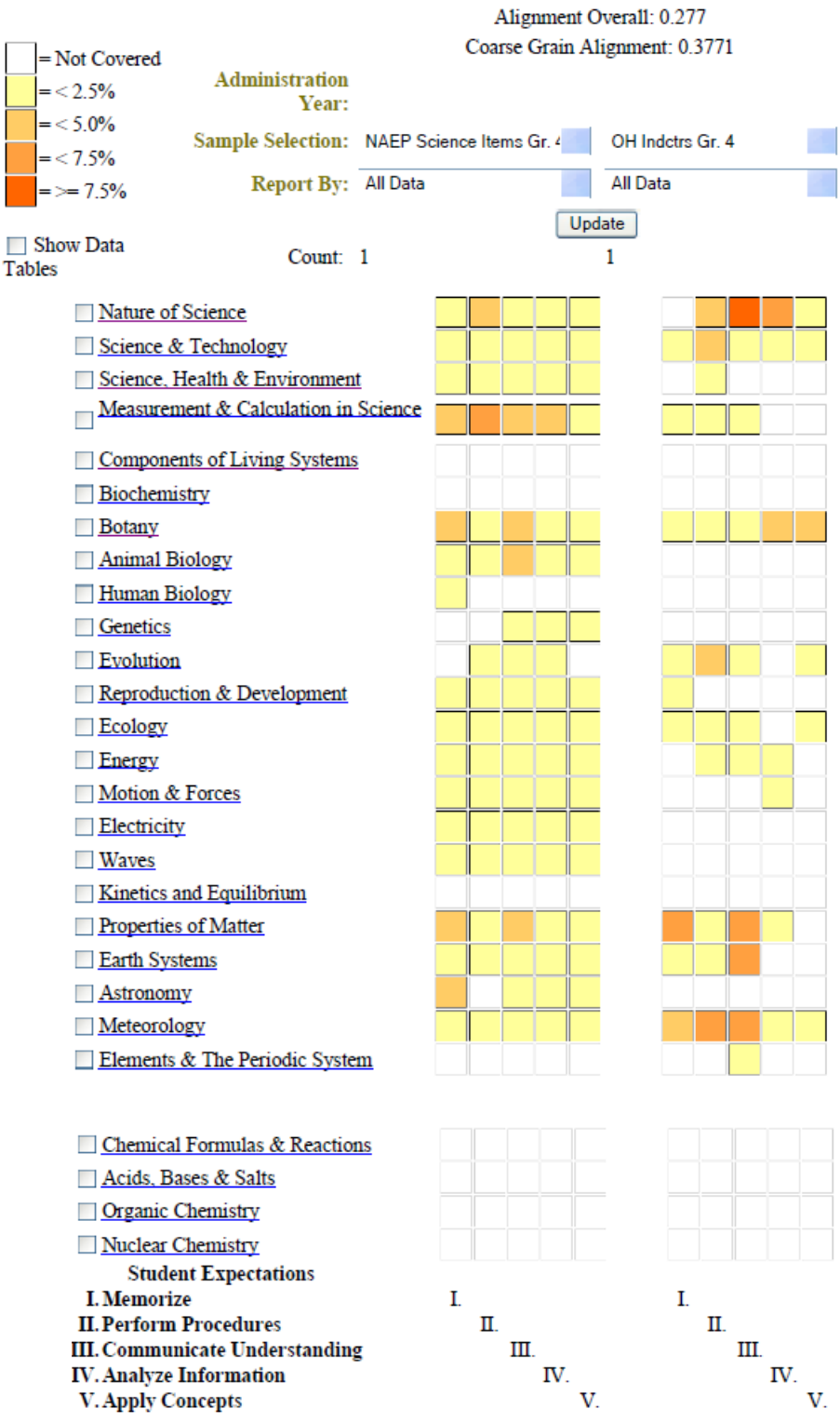
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= < 2.5%
= < 5.0%
= < 7.5%
= >= 7.5%
Administration Year:
Sample Selection:
NAEP Science Items Gr. 4
OH Indctrs Gr. 4
Report By:
All Data
All Data
Update
Show Data Tables
Count: 1
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Nature of Science
Science & Technology
Science, Health & Environment
Measurement & Calculation in Science
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Biochemistry
Botany
Animal Biology
Human Biology
Genetics
Evolution
Reproduction & Development
Ecology
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Acids, Bases & Salts
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Nuclear Chemistry
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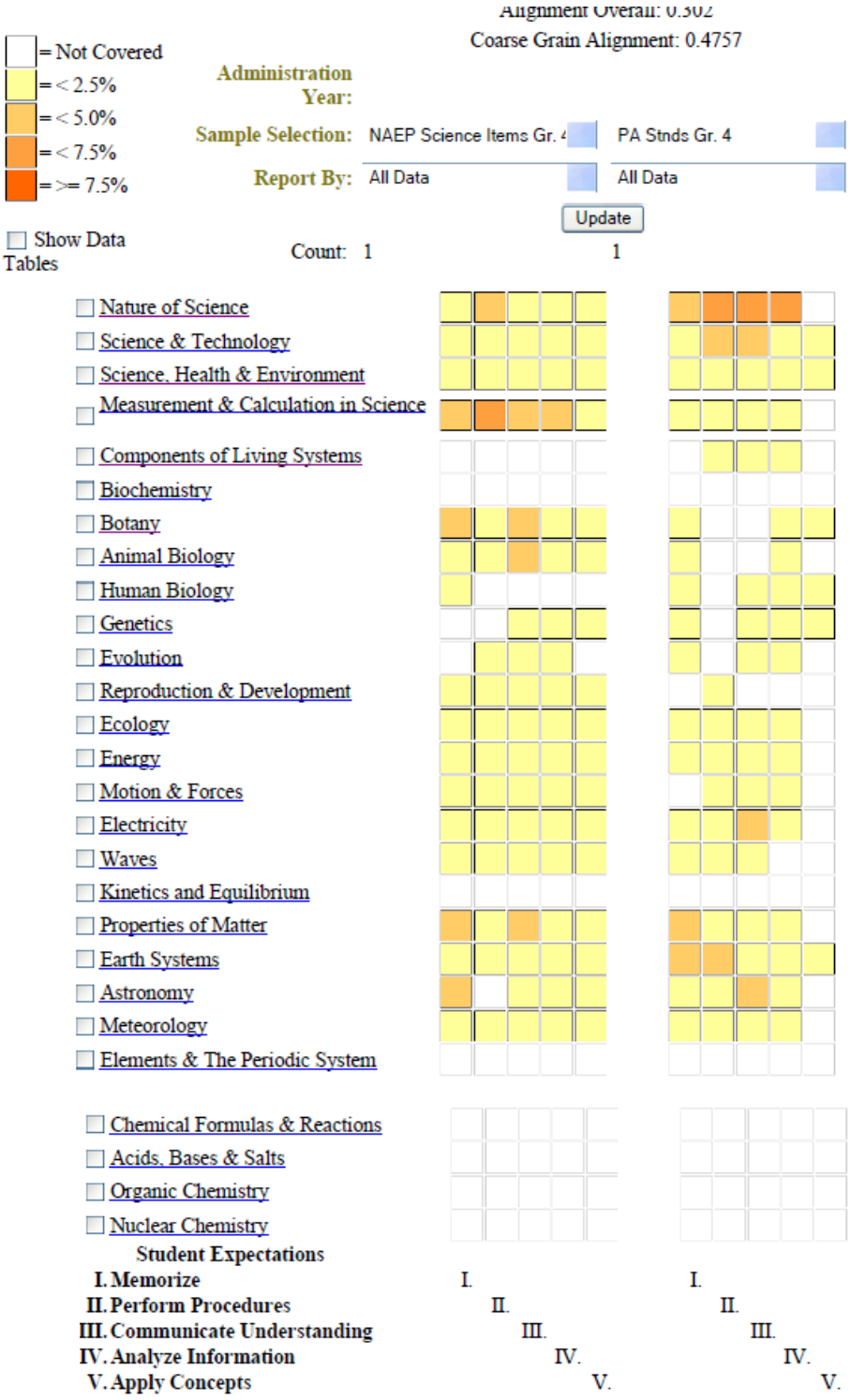
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Coarse Grain Alignment: 0.4757
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= < 2.5%
= < 5.0%
= < 7.5%
= >= 7.5%
Administration Year:
Sample Selection:
NAEP Science Items Gr. 4
PA Stnds Gr. 4
Report By:
All Data
All Data
Update
Show Data Tables
Count: 1
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Nature of Science
Science & Technology
Science, Health & Environment
Measurement & Calculation in Science
Components of Living Systems
Biochemistry
Botany
Animal Biology
Human Biology
Genetics
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Acids, Bases & Salts
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Nuclear Chemistry
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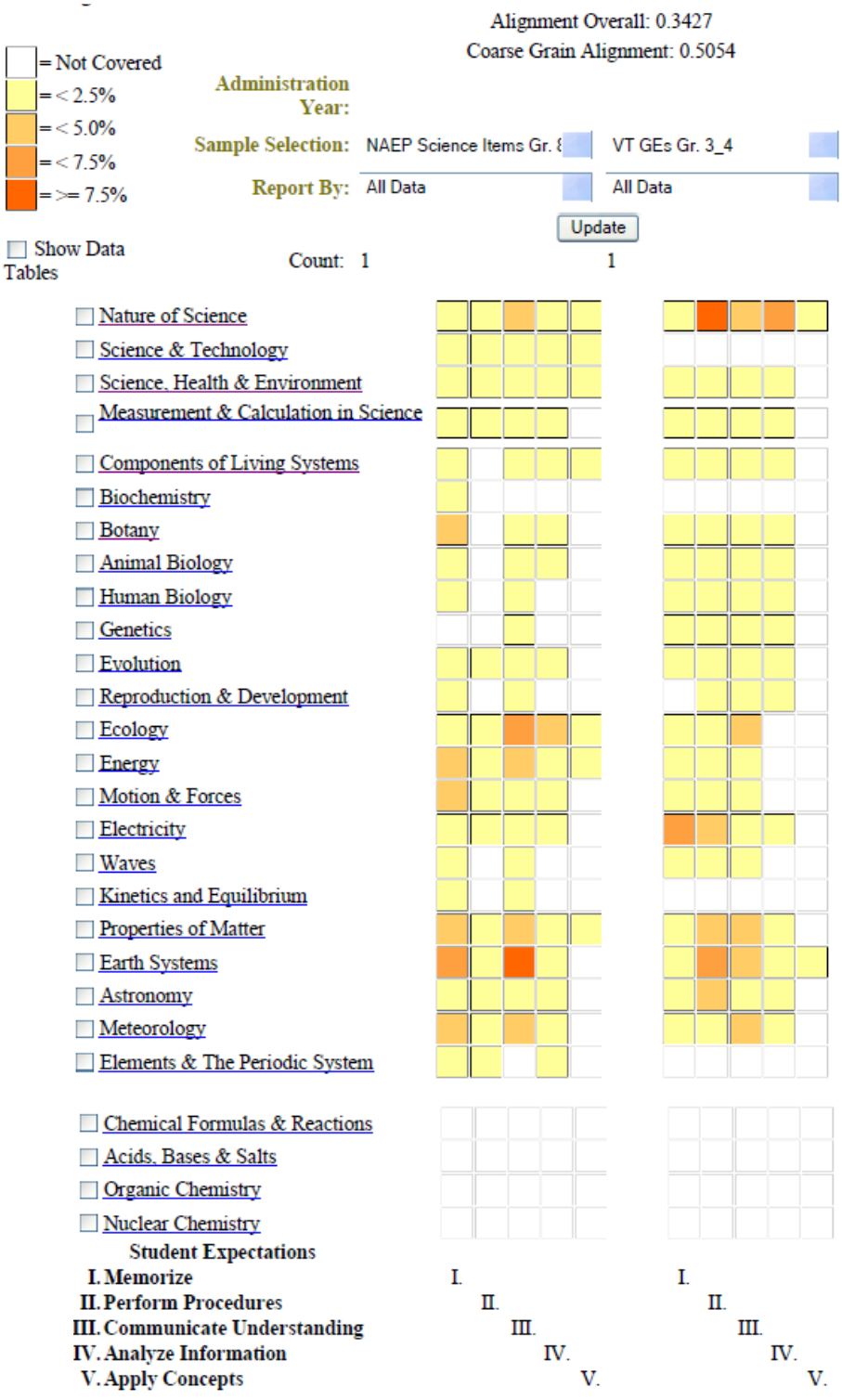
Alignment Overall: 0.3427
Coarse Grain Alignment: 0.5054
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= < 5.0%
= < 7.5%
= >= 7.5%
Administration Year:
Sample Selection:
NAEP Science Items Gr. 8
VT GEs Gr. 3_4
Report By:
All Data
All Data
Update
Show Data Tables
Count: 1
1
Nature of Science
Science & Technology
Science, Health & Environment
Measurement & Calculation in Science
Components of Living Systems
Biochemistry
Botany
Animal Biology
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Genetics
Evolution
Reproduction & Development
Ecology
Energy
Motion & Forces
Electricity
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Organic Chemistry
Nuclear Chemistry
Student Expectations
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V. Apply Concepts
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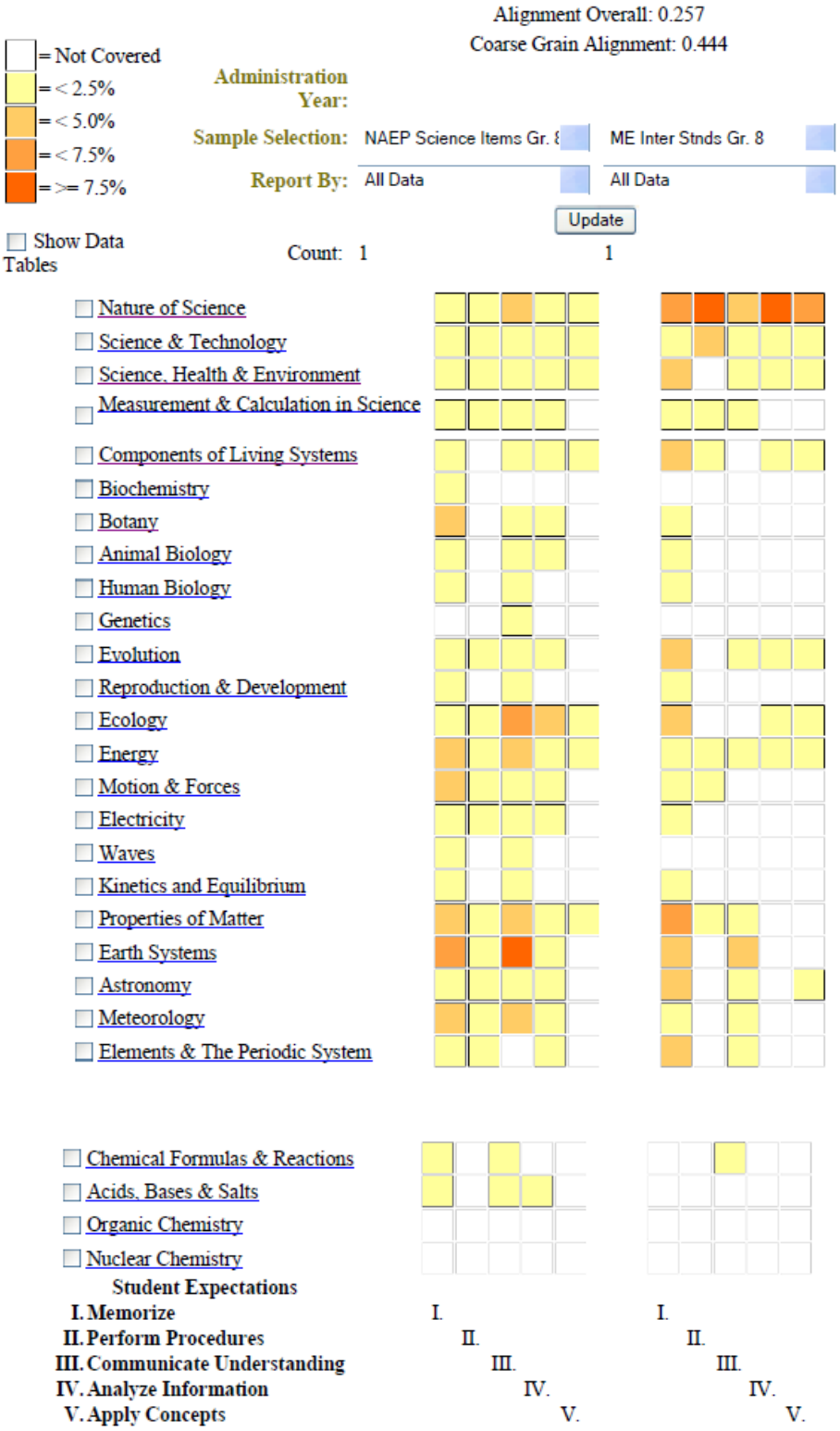
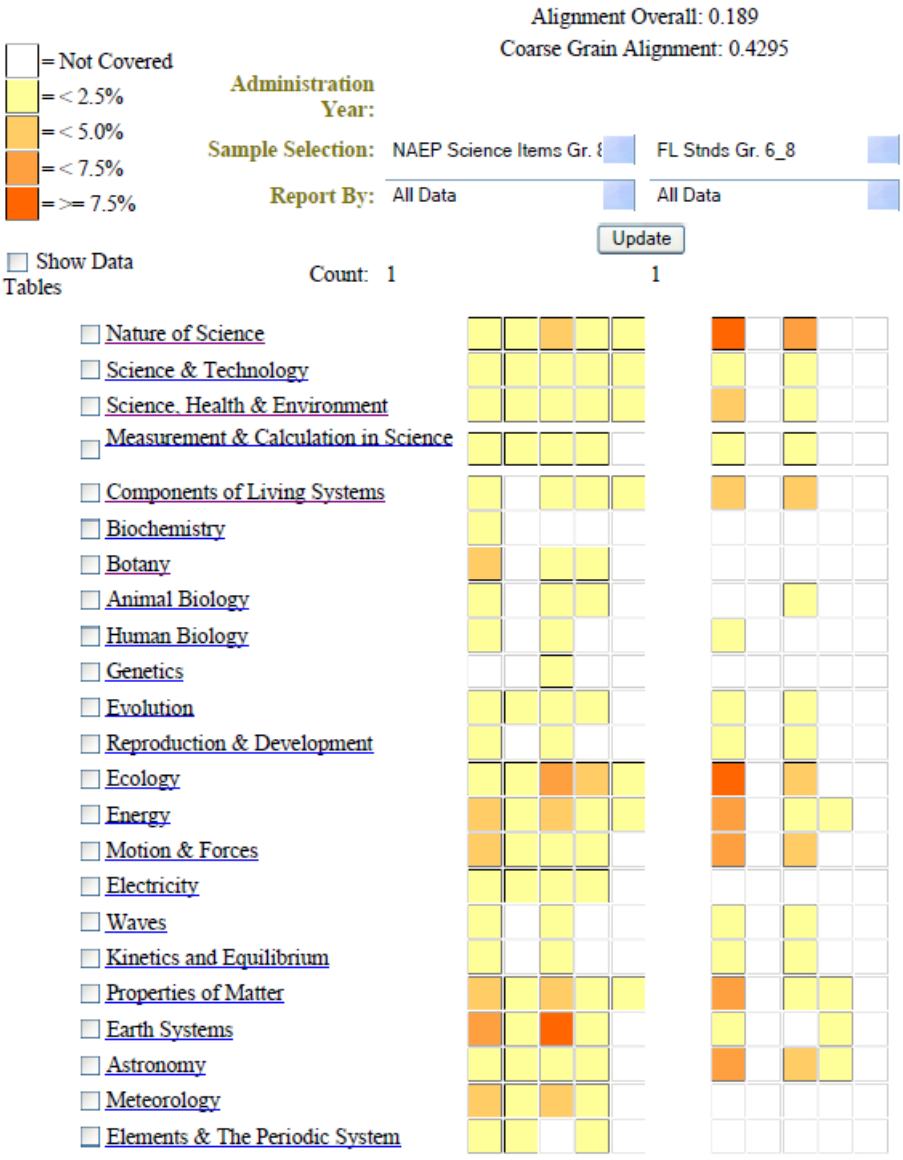
Science Grade 8 NAEP by State Standards




Alignment Overall: 0.189
Coarse Grain Alignment: 0.4295
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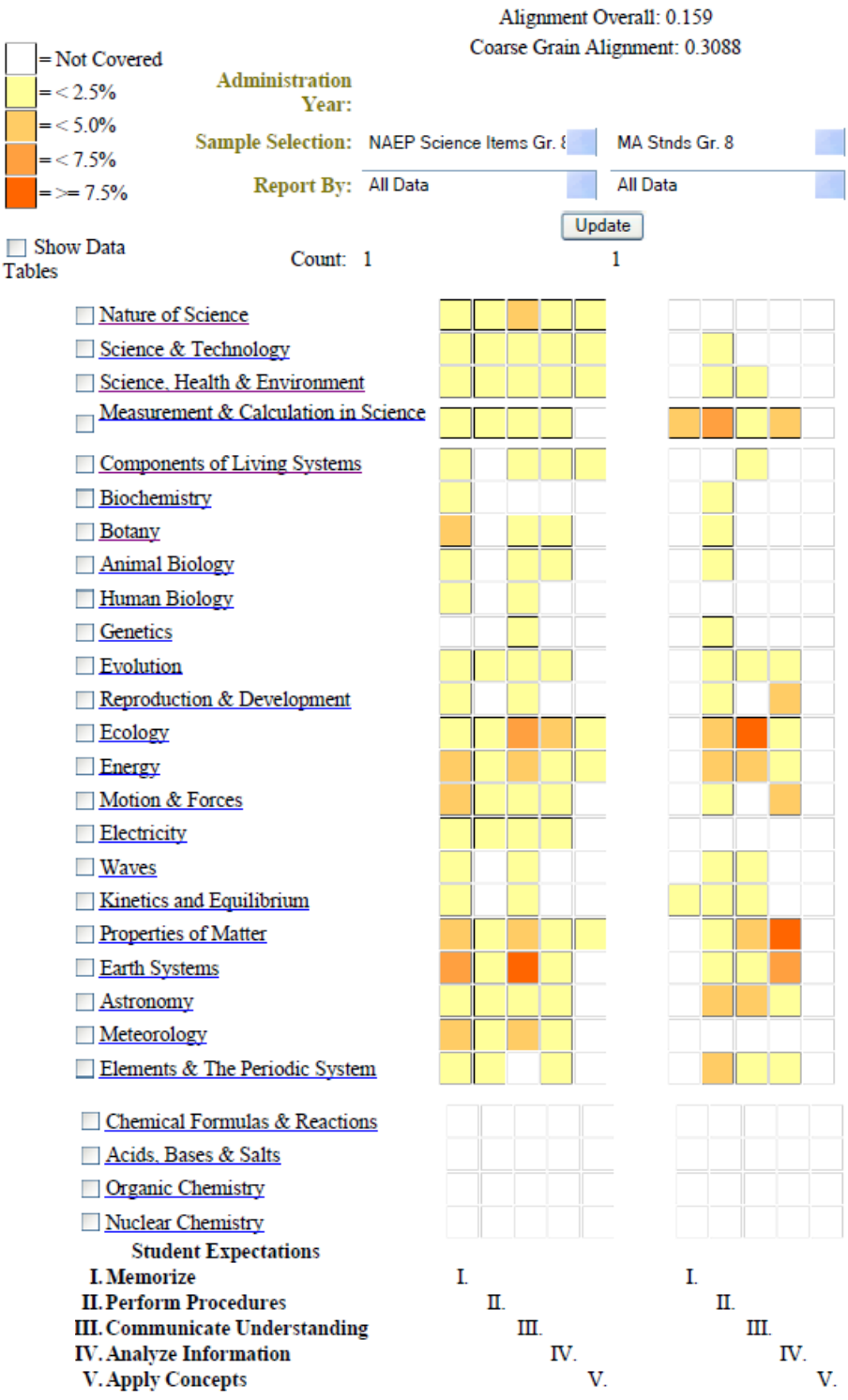
= < 5.0%
= < 7.5%
= >= 7.5%
Administration Year:
Sample Selection:
NAEP Science Items Gr. 8
FL Stnds Gr. 6_8
Report By:
All Data
All Data
Update
Show Data Tables
Count: 1 1
Nature of Science
Science & Technology
Science, Health & Environment
Measurement & Calculation in Science
Components of Living Systems
Biochemistry
Botany
Animal Biology
Human Biology
Genetics
Evolution
Reproduction & Development
Ecology
Energy
Motion & Forces
Electricity
Waves
Kinetics and Equilibrium
Properties of Matter
Earth Systems
Astronomy
Meteorology
Elements & The Periodic System


Alignment Overall: 0.159
Coarse Grain Alignment: 0.3088
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= < 5.0%
= < 7.5%
= >= 7.5%
Administration Year:
Sample Selection:
NAEP Science Items Gr. 8
MA Stnds Gr. 8
Report By:
All Data
All Data
Update
Show Data Tables
Count: 1
1
Nature of Science
Science & Technology
Science, Health & Environment
Measurement & Calculation in Science
Components of Living Systems
Biochemistry
Botany
Animal Biology
Human Biology
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Evolution
Reproduction & Development
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Elements & The Periodic System
Chemical Formulas & Reactions
Acids, Bases & Salts
Organic Chemistry
Nuclear Chemistry
Student Expectations
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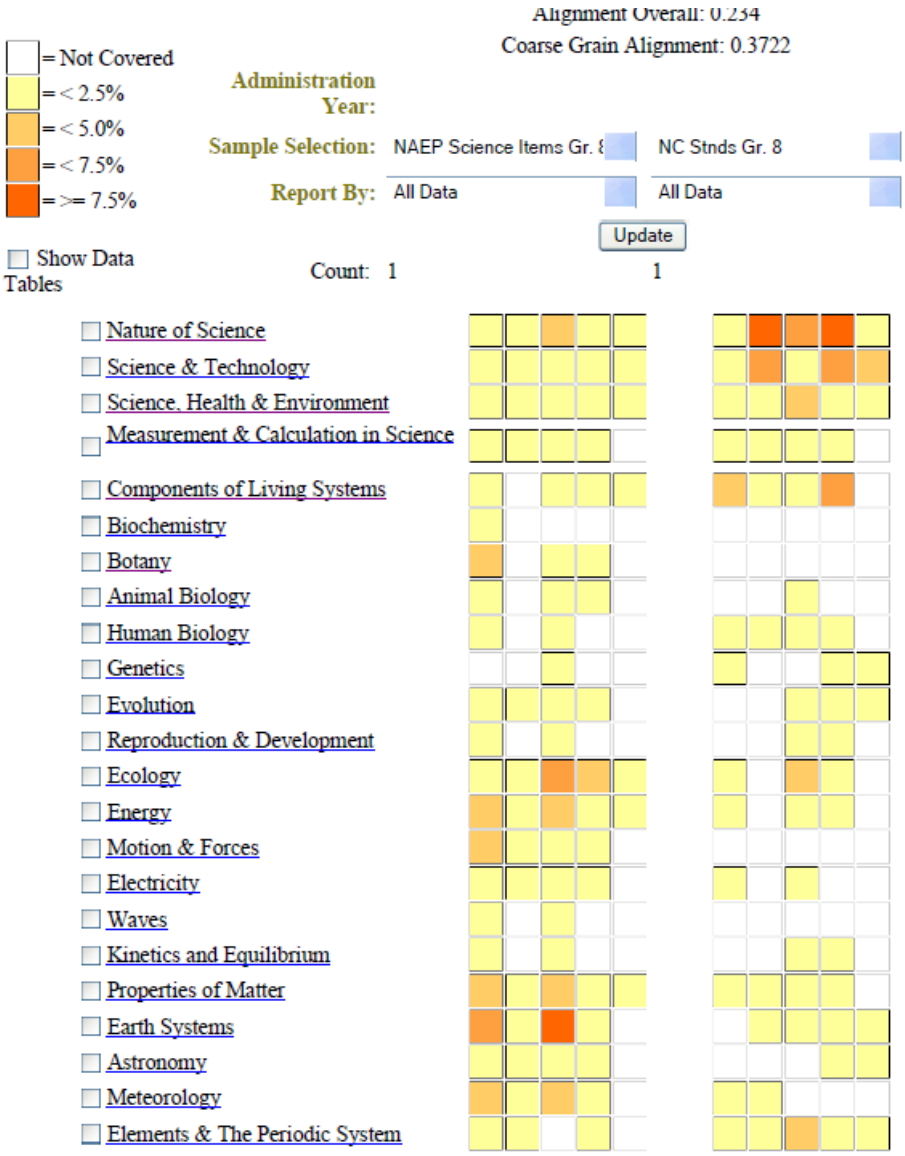
V.

☐ Chemical Formulas & Reactions		
☐ Acids, Bases & Salts		
☐ Organic Chemistry		
☐ Nuclear Chemistry		
Student Expectations		
I. Memorize	I.	I.
II. Perform Procedures	II.	II.
III. Communicate Understanding	III.	III.
IV. Analyze Information	IV.	IV.
V. Apply Concepts	V.	V.


Alignment Overall: 0.254
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= < 5.0%
= < 7.5%
= >= 7.5%
Administration Year:
Sample Selection:
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NC Stnds Gr. 8
Report By:
All Data
All Data
Update
Show Data Tables
Count: 1
1
Nature of Science
Science & Technology
Science, Health & Environment
Measurement & Calculation in Science
Components of Living Systems
Biochemistry
Botany
Animal Biology
Human Biology
Genetics
Evolution
Reproduction & Development
Ecology
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Motion & Forces
Electricity
Waves
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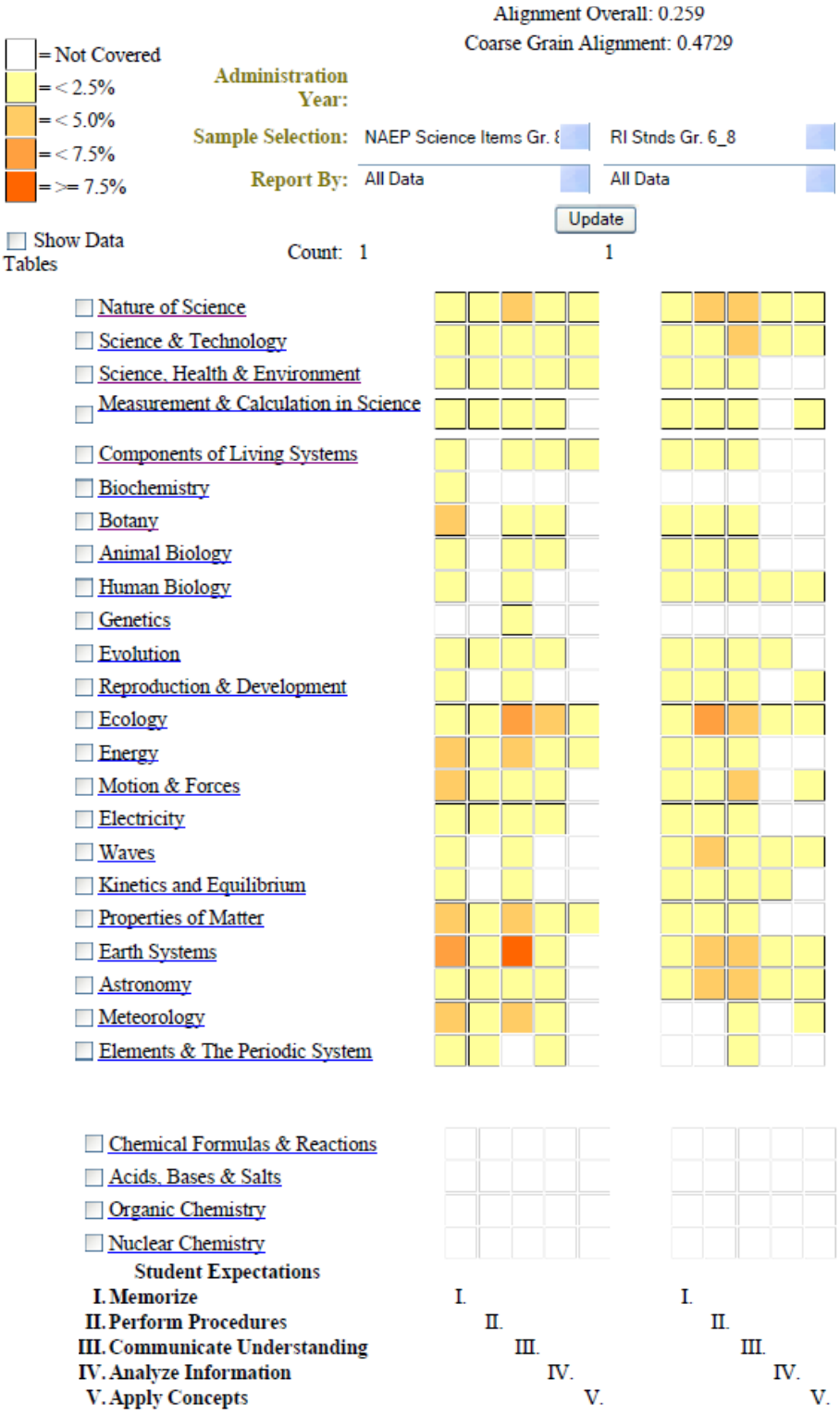
Properties of Matter
Earth Systems
Astronomy
Meteorology
Elements & The Periodic System


Alignment Overall: 0.259
Coarse Grain Alignment: 0.4729
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= < 2.5%
= < 5.0%
= < 7.5%
= >= 7.5%
Administration Year:
Sample Selection:
NAEP Science Items Gr. 8
RI Stnds Gr. 6_8
Report By:
All Data
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Update
Show Data Tables
Count: 1
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Nature of Science
Science & Technology
Science, Health & Environment
Measurement & Calculation in Science
Components of Living Systems
Biochemistry
Botany
Animal Biology
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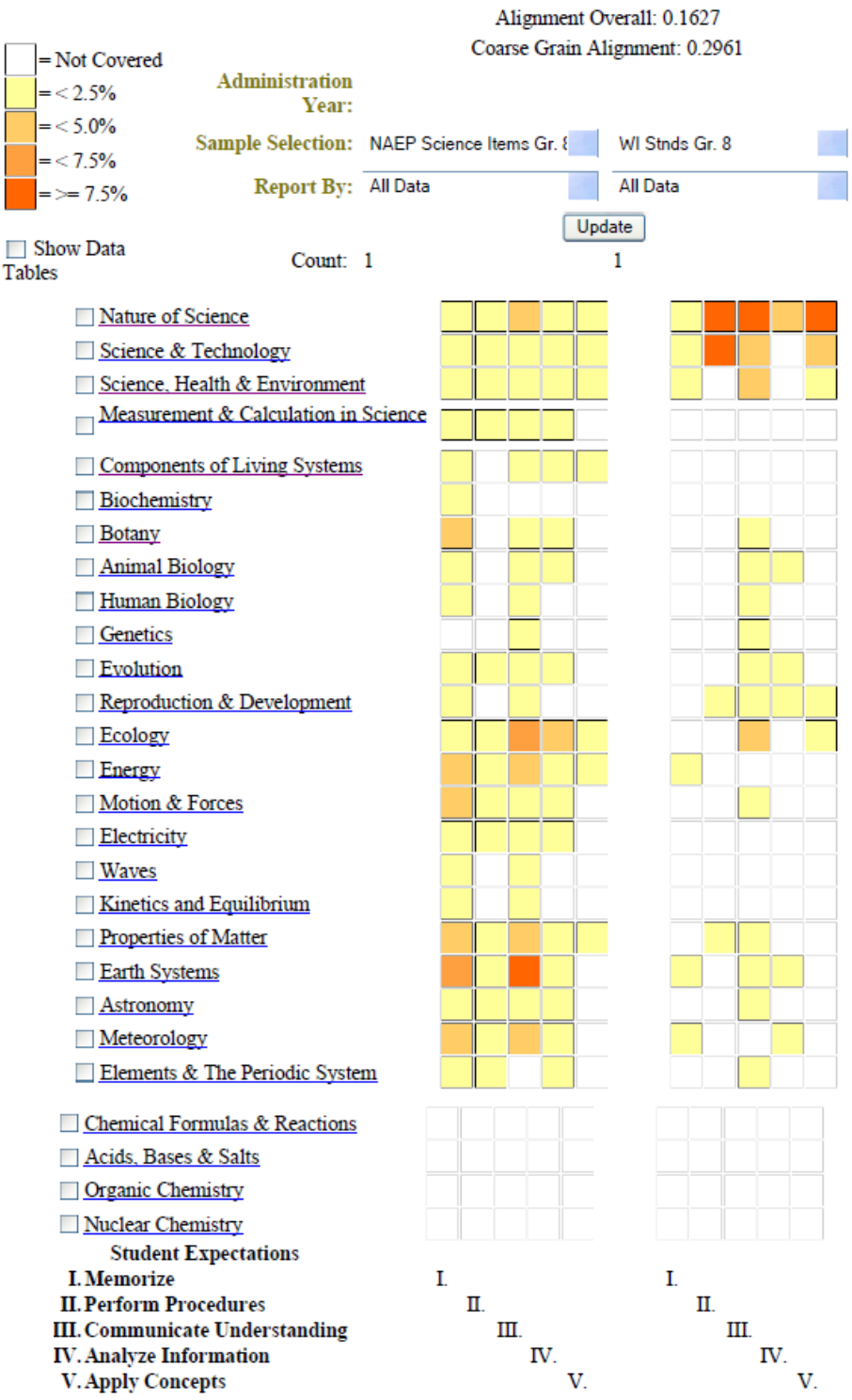
Alignment Overall: 0.1627
Coarse Grain Alignment: 0.2961
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= < 5.0%
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= >= 7.5%
Administration Year:
Sample Selection:
NAEP Science Items Gr. 8
WI Stnds Gr. 8
Report By:
All Data
All Data
Update
Show Data Tables
Count: 1 1
Nature of Science
Science & Technology
Science, Health & Environment
Measurement & Calculation in Science
Components of Living Systems
Biochemistry
Botany
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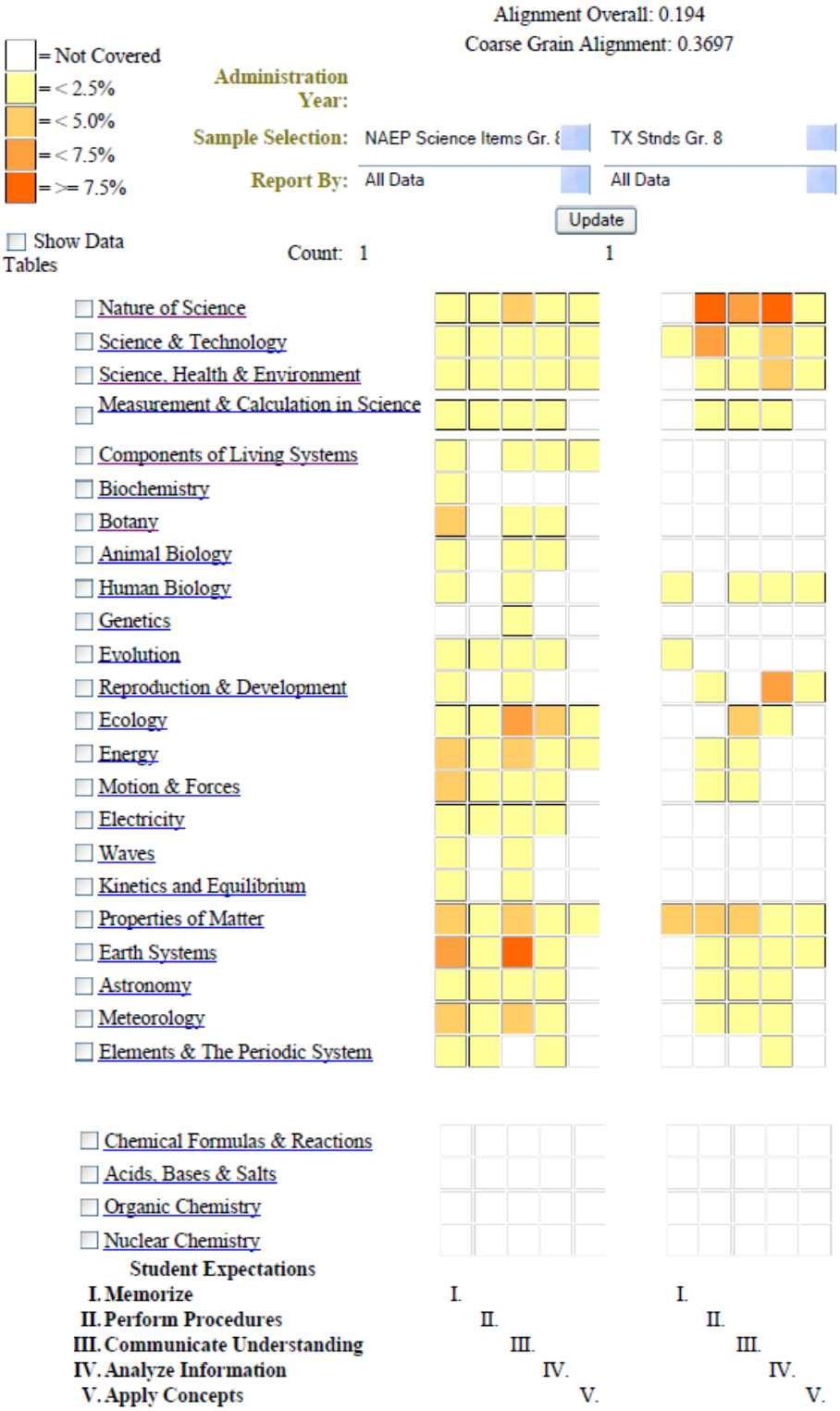
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= < 5.0%
= < 7.5%
= >= 7.5%
Administration Year:
Sample Selection:
NAEP Science Items Gr. 8
TX Stnds Gr. 8
Report By:
All Data
All Data
Update
Show Data Tables
Count: 1
1
Nature of Science
Science & Technology
Science, Health & Environment
Measurement & Calculation in Science
Components of Living Systems
Biochemistry
Botany
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Summary

Using the SEC analysis methods and content frameworks, CCSSO has been able to report on the degree of alignment of NAEP assessments to the NAEP item specifications. We are confident the results of the CCSSO analysis provide a valid description of the content assessed by the NAEP assessments and a valid method for comparing NAEP to state standards for student learning. The results of the NAEP content analysis will be posted on the SEC website, and they will be available for use by educators, leaders, and researchers to conduct further studies or comparisons of NAEP assessments to other standards and assessments. The data and results of this study can address several kinds of questions:

- What is the extent of content knowledge and skills a student needs to do well on NAEP assessment as compared to the knowledge and skills needed for an assessment based on state standards?
- What are the different content topics covered by NAEP assessments at grades 4 and 8, as compared to standards of states?
- What are the expectations, or cognitive demands, required for students to perform well on NAEP as compared to assessments based on state standards?
- If states or others want to revise their curriculum and instruction towards improved performance on NAEP, what are the specific content areas and methods of teaching and learning that will need to receive focus?

Access Online

The results of the NAEP Science and Reading Assessments content analysis are available on the SEC online system at
http://seconline.wceruw.org/secWebHome.htm
Directions: at this site, click on **Content Analysis**; then,
"For access to content maps of Standards and Assessments analyzed thus far**,"** click here; then **Select Science (or ELA), K-12, and Submit.**
Select: NAEP 2009 Grade 4 or Grade 8 using pull-down menu in left column and the data can be compared to any state standards or national or international standards or assessment in the right column.

External reviewers:

Science: Brett Moulding, *former science supervisor and State curriculum director, Utah State Department of Education*, Experience: NAEP Science Assessment review committee (ETS), NAEP Science Frameworks development steering committee and state review (2005), SEC content analysis and coding for states and international assessments.

Reading: Julie Harper, Delaware state department of education ELA and reading specialist, NAEP Reading assessment review committee, SEC experience in content analysis ELAR K-12

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Smithson, J. (2007). *SEC content coding procedures*. Madison, WI: University of Wisconsin, Wisconsin Center for Education Research.

Webb, N.L. (1997). *Criteria for Alignment of Expectations and Assessments in Mathematics and Science Education*. Research Monograph No.6. Washington, DC: Council of Chief State School Officers.