



Math-Science Partnership Workshop

Washington, DC

February 2, 2005

Use of Online, Web-based Data Tools for Improving MSP Evaluations

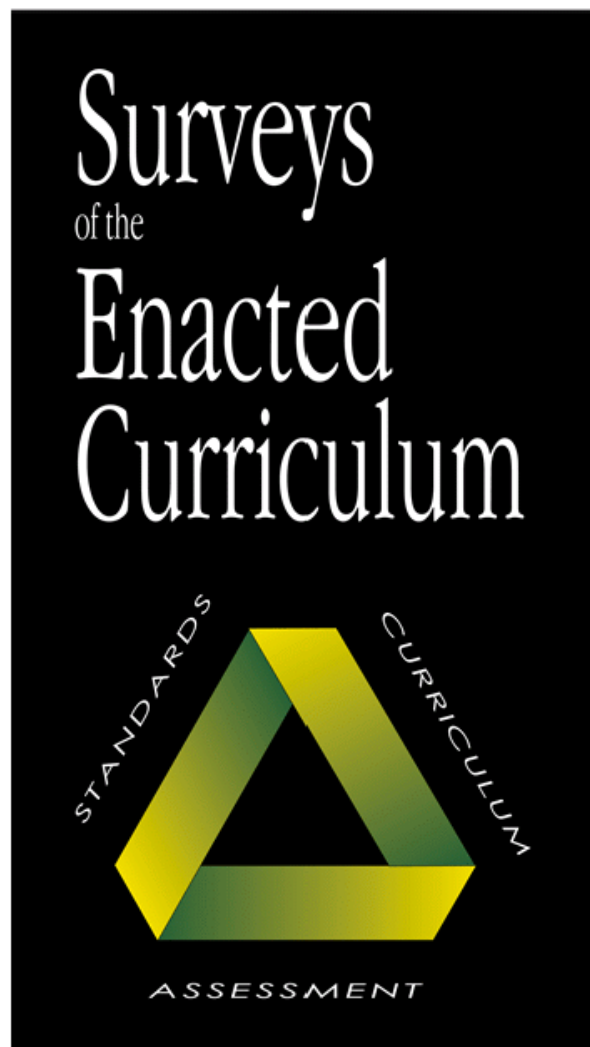
Describing, Analyzing, & Reporting Curriculum Data

The SEC Toolbox

*John L. Smithson, Ph.D.
University of Wisconsin-Madison*

SEC Overview

Assessment	Memorize	Perform	Communicate	Conjecture	Non-routine
Nbr Sense	0.048	0.116	0.007	0.008	0.001
Operations	0.019	0.441	0.007	0	0
	0.022	0.056	0.001	0.003	0.002
	0.014	0.05	0.019	0.004	0
	0.016	0.007	0.002	0.001	0.002
Data Analysis	0.006	0.118	0.014	0.008	0.004
Instr. Tech. & Planning		0	0	0	0
Reasoning	0.003	0.111	0.001	0	0



The Surveys of Enacted Curriculum (SEC) provide teachers and others a comprehensive set of indicators to facilitate teacher reflection, curriculum planning and program evaluation.

Surveys are offered in both paper- and web-based formats. Results from either format can be posted on-line and/or provided as raw data files for in-depth analyses.



Survey Sections

Assessment	Memorize	Perform	Communicate	Conjecture	Non-routine
Dir Sense	0.048	0.116	0.007	0.008	0.001
Numbers	0.019	0.441	0.007	0	0
Geometry	0.022	0.056	0.001	0.003	0.002
Algebra	0.014	0.05	0.019	0.004	0
Calculus	0.016	0.007	0.002	0.001	0.002
Data Analysis	0.006	0.118	0.014	0.008	0.004
Instr. Tech. & Learning	0	0	0	0	0
Statistics	0.003	0.111	0.008	0	0

- School & Class Description
- Use of Homework
- Instructional Activities
 - *General*
 - *Problem Solving Activities*
 - *Pairs & Small Group Work*
 - *Use of Hands-on Materials*
 - *Use of Calculators/Computers & other Ed. Tech.*
- Assessment Use
- Instructional Influences
- Instructional Readiness
- Teacher Opinions
- Professional Development
 - *Types*
 - *Content Focus*
 - *Active Learning*
 - *Collegial Participation*
 - *Coherence*
 - *Time Span*
- Teacher Characteristics
- **Instructional Content**



The SEC Data - Sets

Assessment	Memorize	Perform	Communicate	Conjecture	Non-routine
Nbr Sense	0.048	0.116	0.007	0.008	0.001
Operations	0.019	0.441	0.007	0	0
Measurement	0.22	0.056	0.001	0.003	0.002
Algebra	0.14	0.05	0.019	0.004	0
Geometry	0.016	0.007	0.002	0.001	0.002
Data Analysis	0.006	0.118	0.014	0.008	0.004
Instr. Technology	0	0	0	0	0
Real-world	0.003	0.341	0.008	0	0

Distinctions

On-Line

Descriptive Data

Limited Reporting Options

Easy Access / Indiv. Results

Off-line

Analytic results

Unlimited reporting

Requires data manipulation



Conducting Inquiry Using SEC Data

Forms of Inquiry

Collaborative

or

Evaluative

Teacher Enrichment
School Improvement
Professional Lrng. Comm.

Program Evaluation
Indicator Reporting
Program Management



Online Survey Administration

Assessment	Memorize	Perform	Communicate	Conjecture	Non-routine
Nbr Sense	0.048	0.116	0.007	0.008	0.001
Operations	0.015	0.441	0.007	0	0
Data Analysis	0.006	0.118	0.014	0.008	0.004
Instr. Technology	0	0	0	0	0
Scale Score	0.003	0.311	0.006	0	0

- Approximately 60-90 minutes to complete
- May be completed in multiple sittings
- Data is saved as each section is completed



Surveys of Enacted Curriculum

State Collaborative on Assessment and Student Standards

[About SEC](#)

[SEC Quiz](#)

[SEC Reports](#)

[Content Analysis](#)

[Registrar](#)

[Contacts](#)

[Help](#)



Welcome to SEC On-Line

The Surveys of Enacted Curriculum website.

[Click here](#) or on the "Registrar" Button above to begin.

This is a test site for the SEC Collaborative Project of the State Collaborative on Assessments and Student Standards (SCASS), sponsored by the Council of Chief State School Officers (CCSSO), and under development at the Wisconsin Center for Education Research (WCER) at the University of Wisconsin - Madison.

The purpose of this site is to encourage teacher reflection and participation in conversations about classroom practice and instructional content. Using a survey data collection and reporting model, teachers are able to compare their own reports of practice and instructional content with response by other teachers from around the country as well as within their own school or district. Participating states, schools and districts are also able to make use of aggregated teacher reports (individual teacher responses are not released to any party other than the teacher) to develop a base-line of information about teacher practice in mathematics and science, or to inform professional development or school improvement planning efforts. The site is currently under development. Not all areas are functional at this time.

WCER - mecgroup@education.wisc.edu

[\(www.seconline.org\)](http://www.seconline.org)



Surveys of the Enacted Curriculum

State Collaborative on Assessment and Student Standards

[SEC Home](#)
[Survey Tool](#)
[Data Review](#)
[Workshop Setup](#)
[Registration](#)
[Discussion Area](#)

Total Number of Registrants: 110

Survey Names	Math	Science	ELA	Survey Names	Math	Science	ELA
School & Class Description	37	20	40	Educational Technology	36	19	36
Most Recent Unit	0	0	0	Use of Assessments	37	19	32
Use of Homework	37	21	40	Instructional Influences	37	20	32
Instructional Activities	37	20	38	Instructional Readiness	36	19	31
Problem-solving activities	36	20	39	Teacher Opinions & Beliefs	36	19	30
Small group work	37	20	39	Professional Development	34	17	30
Use of hands-on materials	37	19	36	Teacher Characteristics	33	17	30
Formal course preparation	32	16	30	Instructional Content	29	14	25

[Back to Top](#)

Administrative Functions:

Administration Set-up

Review Registrants, Completion Rates

Administrator Report Generator



Surveys of the Enacted Curriculum

State Collaborative on Assessment and Student Standards

[SEC Home](#)[Survey Tool](#)[Data Review](#)[Workshop Setup](#)[Registration](#)[Discussion Area](#)

ADMINISTRATOR REPORT GENERATOR

SELECT SUBJECT:

SELECT CHART TYPE:

LEFT CHART

RIGHT CHART

Sample Selection:

District Selection:

School Selection:

Reported By:

Sample Selection:

District Selection:

School Selection:

Reported By:

Sample Selection:

WI - SEC Madison

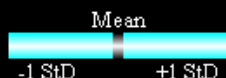
WISCONSIN SEC INITIATIVE

Report By:

Achiev Lvl

Prof Dev

Legend



Group - Achiev Lvl

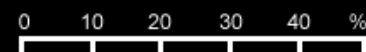
Mixed Levels	(77)
High	(34)
Average	(5)
Low	(32)

State - ProfDev

All Levels	(116)
High	(26)
Med	(16)
Low	(68)

Your Data

How much of the total mathematics instructional time do students in the target class:

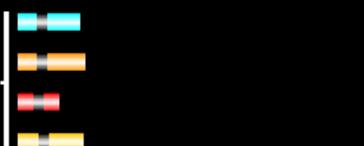
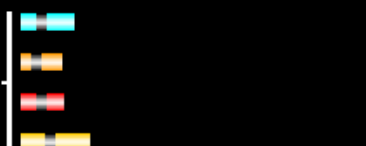


Watch the teacher demonstrate how to do a procedure or solve a problem.



0%

Read about mathematics in books, magazines, or articles (not textbooks).



0%

Take notes from lectures or the textbook.



0%

Complete *computational exercises* or *procedures* from a textbook or a worksheet.



0%

Present or demonstrate solutions to a math problem to the whole class



0%

Web-based Chart Print-out

Sample Selection:

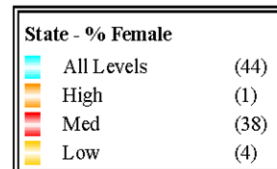
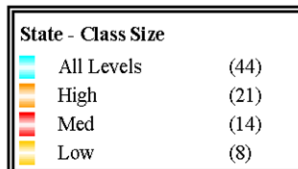
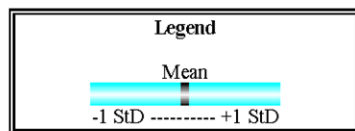
WISCONSIN SEC INITIATIVE

WISCONSIN SEC INITIATIVE

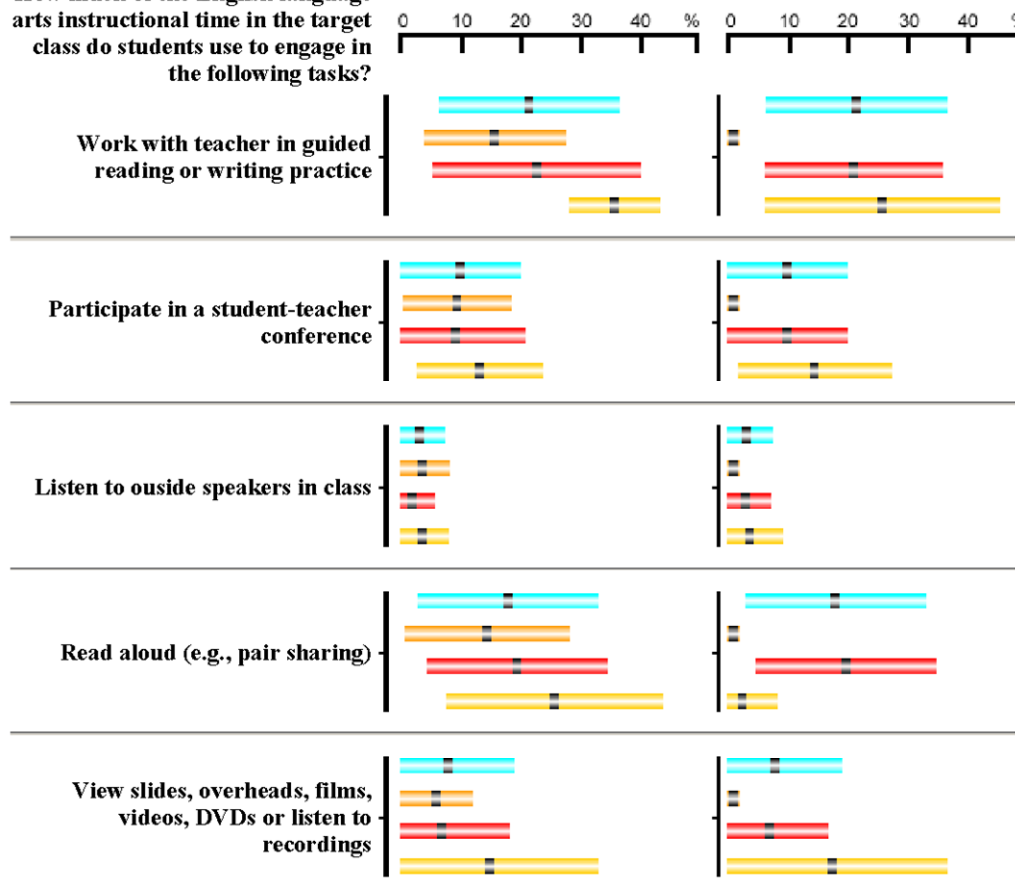
Report By:

Class Size

% Female



How much of the English language arts instructional time in the target class do students use to engage in the following tasks?

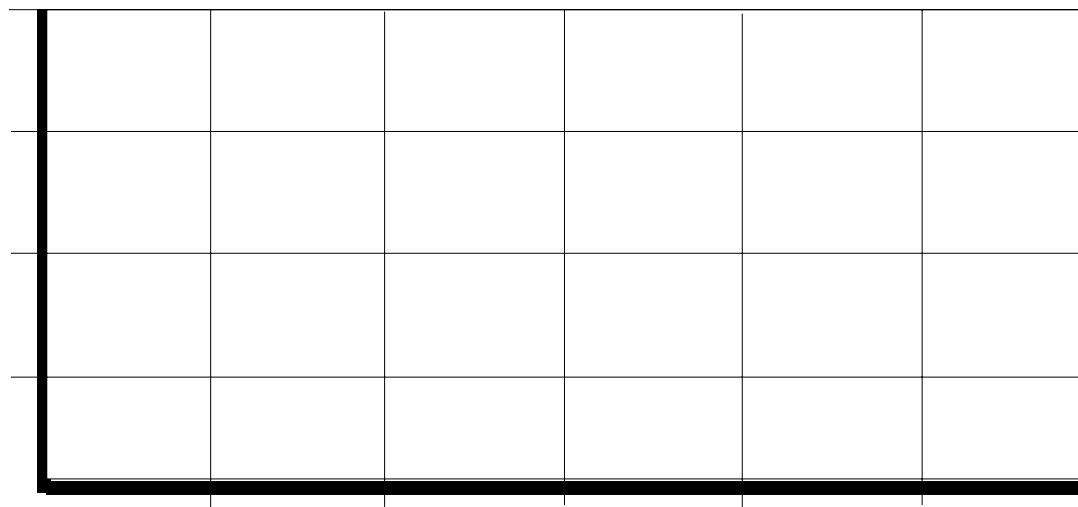


Assessment	Memorize	Perform	Communicate	Conjecture	Non-routine
Nbr Sense	0.048	0.116	0.007	0.008	0.001
Operations	0.019	0.441	0.007	0	0
Measurement	0.022	0.056	0.001	0.003	0.002
Algebra	0.014	0.007	0.019	0.004	0
Geometry	0.018	0.007	0.007	0.004	0.004
Statistics	0.003	0.003	0.003	0	0

Descriptions of Curricular Content

Use a multi-dimensional language for describing instructional content

Topics



by

Cognitive Demand
(Expectations for Student Learning)



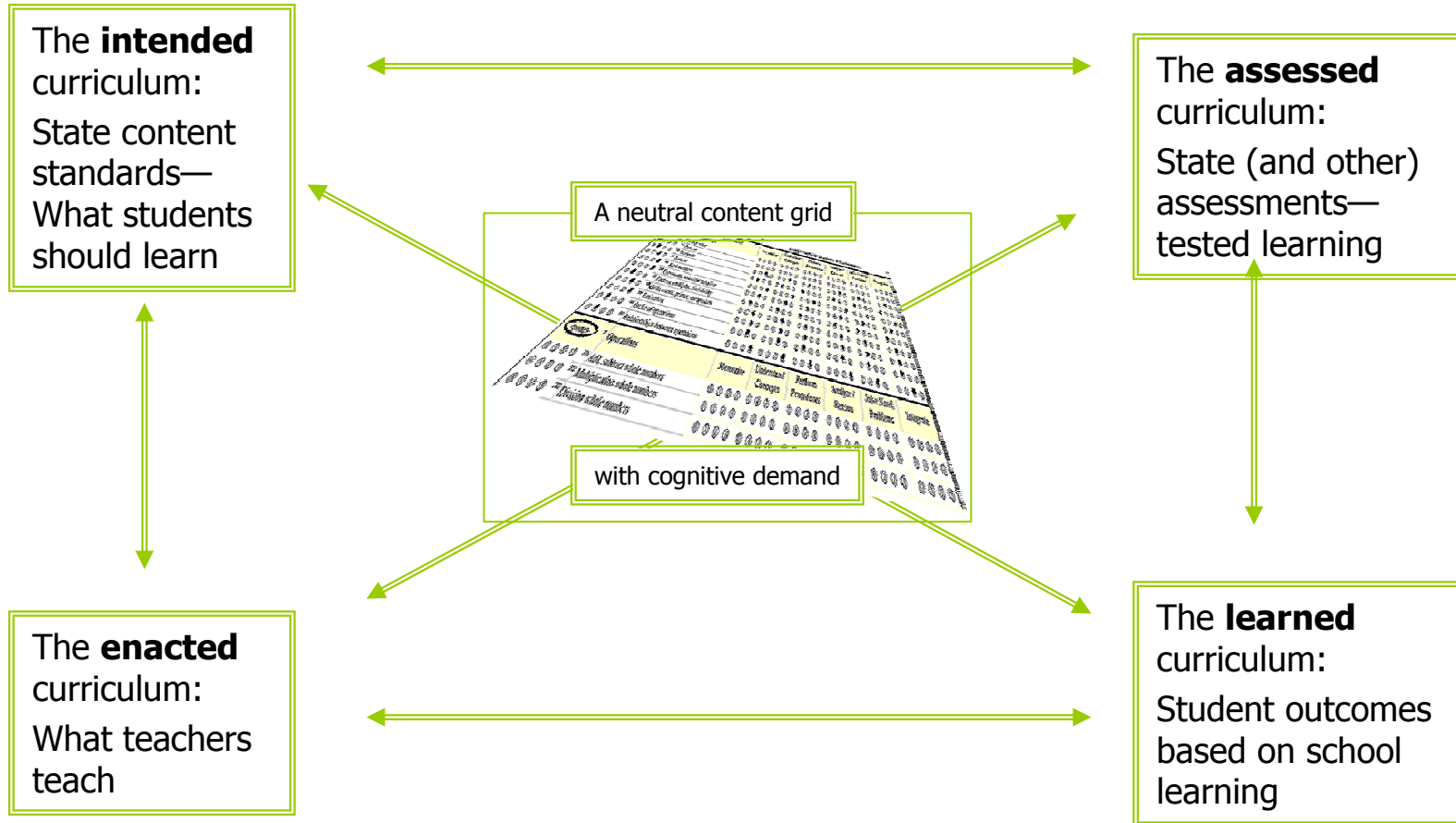
Content Matrix

Assessment	Memorize	Perform	Conjecture	Conjecture	Non-routine
Nbr Sense	0.048	0.116	0.007	0.008	0.001
Operations	0.019	0.441	0.007	0	0
Equations	0.022	0.056	0.001	0.003	0.002
Polynomials	0.014	0.05	0.019	0.004	0
Quadratics	0.016	0.007	0.002	0.001	0.002
Data Analysis	0.006	0.118	0.014	0.008	0.004
Instr. Tech. & Instructional Design	0	0	0	0	0
Stat. Sense	0.063	0.311	0.02	0	0

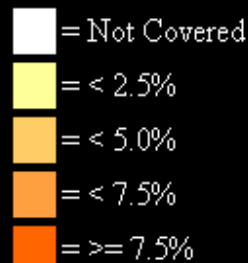
	Categories of Cognitive Demand				
Topics	Memorize	Perform Procedures	Demonstrate Understanding	Conjecture Generalize Prove	Solve Non-routine Problems
Multiple Step Equations					
Inequalities					
Literal Equations					
Lines / Slope and Intercept					
Operations on Polynomials					
Quadratic Equations					

Analyzing Curriculum Content

Assessment	Memorize	Perform	Communicate	Conjecture	Non-routine
Nbr Sense	0.048	0.116	0.007	0.008	0.001
Operations	0.113	0.441	0.007	0	0
Geometry	0.018	0.007	0.007	0.004	0
Data Analysis	0.006	0.118	0.014	0.008	0.004
Instr. Tech. & Learning	0	0	0	0	0
Self-Regulation	0.002	0.002	0.002	0	0



Percentage of Overall Mathematics Instructional Time



Group: WI - SEC Madison
 District: Madison
 School: Cherokee Heights
 Count: 77

WI - SEC
 Milwaukee
 Milwaukee
 Muir Middle
 105

Alignment Re-centered: 0.9703

☐ Show Data Tables

Data Cut

Madison Data

All Data

WISCONSIN SEC INITIATIVE Data

All Data

Update Charts

☐ Number Sense / Properties / Relationships

☐ Operations

☐ Measurement

☐ Algebraic Concepts

☐ Geometric Concepts

☐ Data Analysis / Probability / Statistics

☐ Instructional Technology

Student Expectations

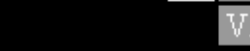
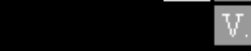
I. Memorize

II. Perform Procedures

III. Demonstrate Understanding

IV. Conjecture, Prove

V. Solve novel, non-routine problems



Mathematics Content

WISCONSIN SEC INITIATIVE

Percentage of Overall Mathematics Instructional Time

Alignment Re-centered: 0.8269

☐ = Not Covered

☐ = < 2.5%

☐ = < 5.0%

☐ = < 7.5%

☐ = >= 7.5%

Group: WI - SEC Madison

District: Madison

School: Cherokee Heights

Count: 5

Group: WI - SEC

Milwaukee

Milwaukee

Muir Middle

Count: 6

Data

Madison Data

Cut

Integrated Math

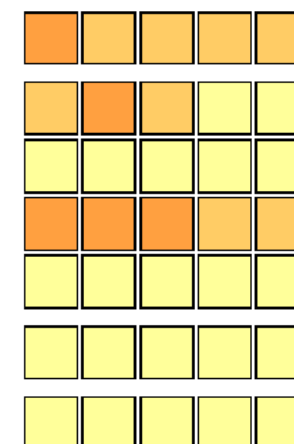
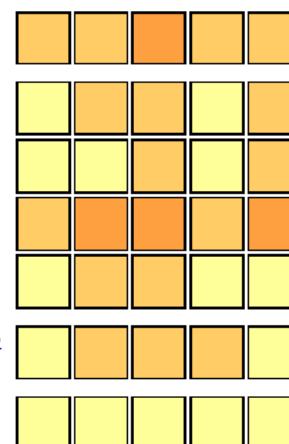
Milwaukee Data

Grade 8

☐ Show Data
Tables

Update Charts

- ☒ [Number Sense / Properties / Relationships](#)
- ☐ [Operations](#)
- ☐ [Measurement](#)
- ☒ [Algebraic Concepts](#)
- ☐ [Geometric Concepts](#)
- ☐ [Data Analysis / Probability / Statistics](#)
- ☐ [Instructional Technology](#)



Student Expectations

I. Memorize

II. Perform Procedures

III. Demonstrate Understanding

IV. Conjecture, Prove

V. Solve novel, non-routine problems

I.

II.

III.

IV.

V.

I.

II.

III.

IV.

V.

MathematicsContent:

Number Sense /

Properties /

Relationships

WISCONSIN SEC INITIATIVE

Percentage of Overall Mathematics Instructional Time

☐ = Not Covered

☐ ≤ 0.5%

☐ ≤ 1.0%

☐ ≤ 1.5%

☐ ≥ 1.5%

☐ Show Data
Tables

Group: 15002

District: Madison

School: Cherokee Heights

Count: 1

Data: Your Data

Cut: All Data

Alignment Re-centered: 0.3243

15002

Madison

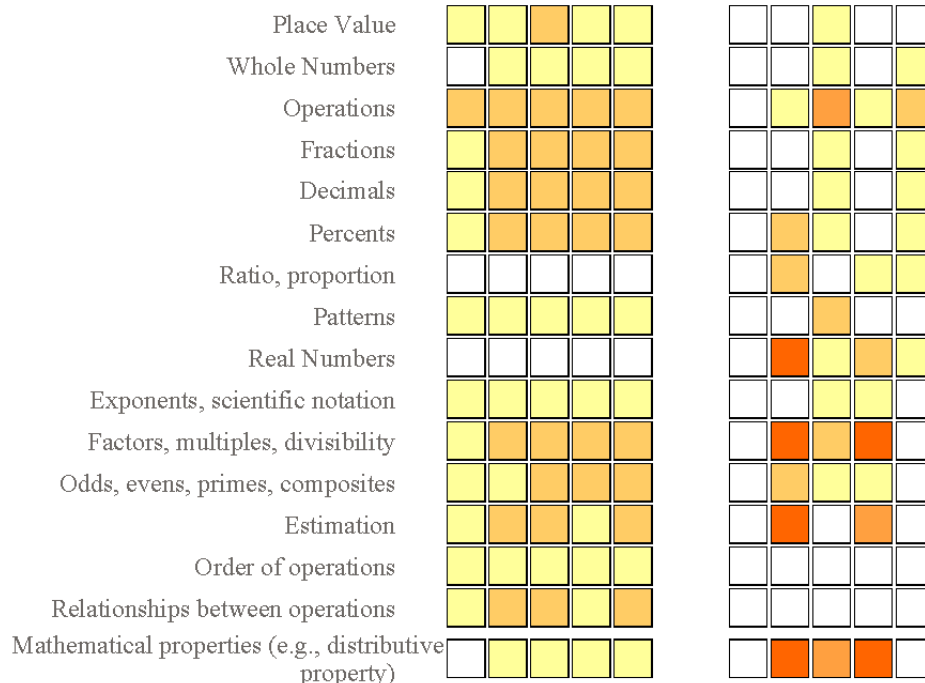
Cherokee Heights

1

WI gr 8 Benchmark (2004) Grade 8

All Data

Update Charts



Student Expectations

I. Memorize

II. Perform Procedures

III. Demonstrate Understanding

IV. Conjecture, Prove

V. Solve novel, non-routine problems

I.

II.

III.

IV.

V.

I.

II.

III.

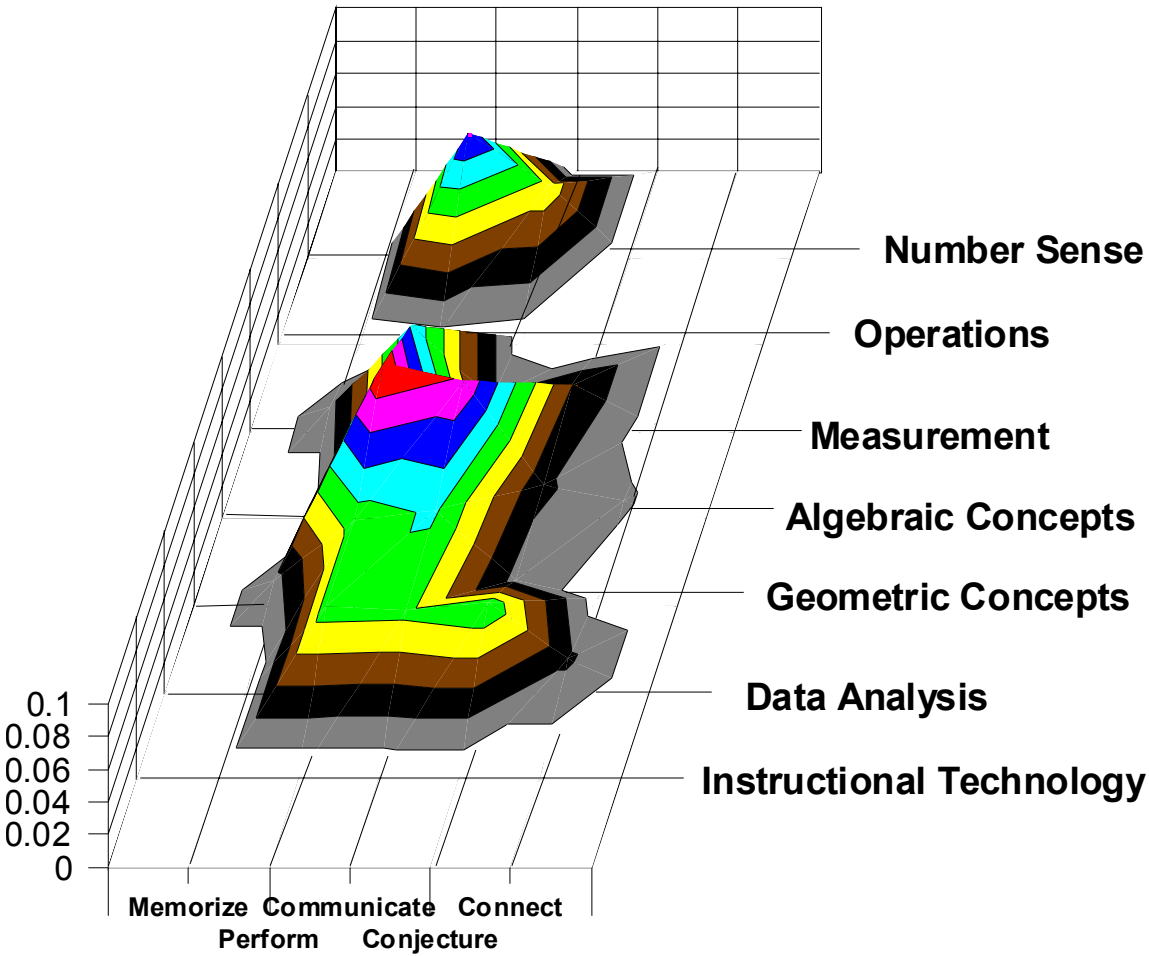
IV.

V.

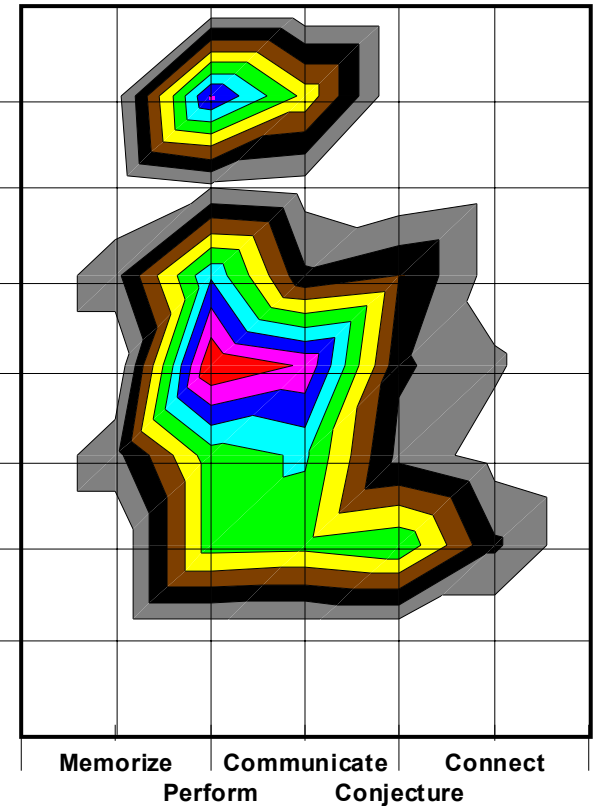


Content Maps

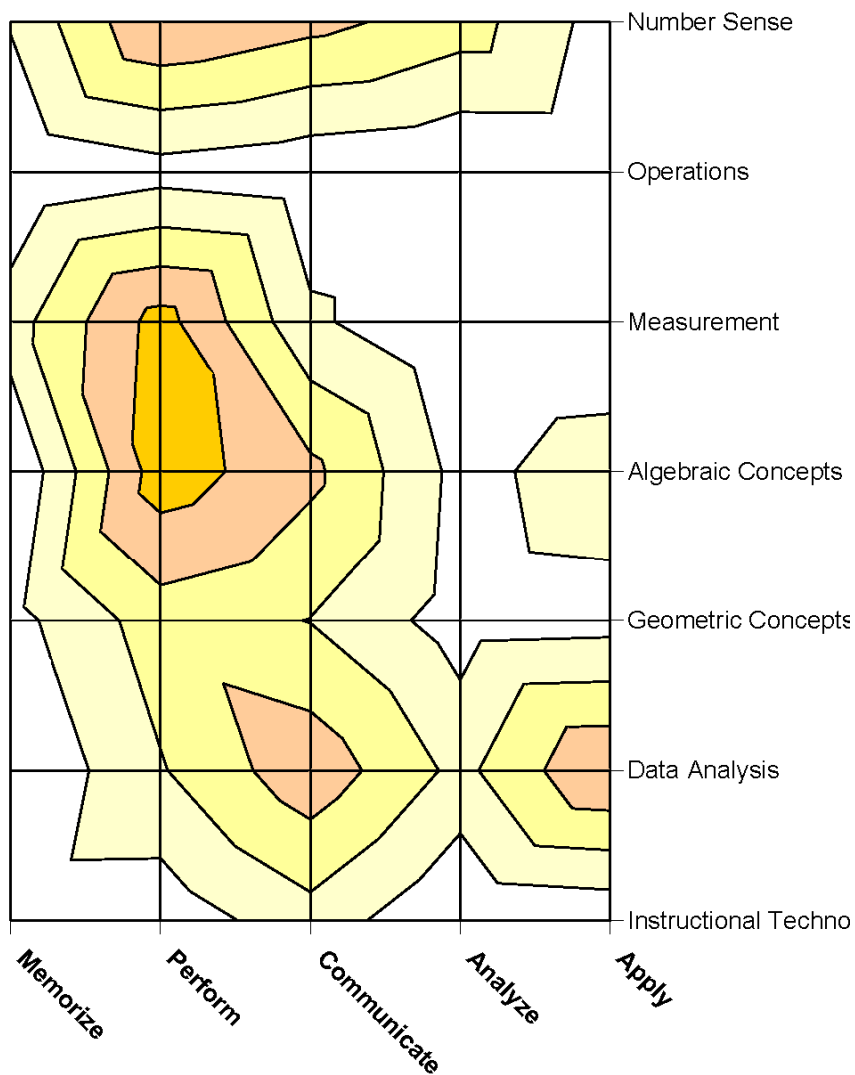
Assessment	Memorize	Perform	Communicate	Conjecture	Non-routine
Nbr Sense	0.048	0.116	0.007	0.008	0.001
Operations	0.019	0.441	0.007	0	0
	0.022	0.056	0.001	0.003	0.002
	0.014	0.05	0.019	0.004	0
	0.016	0.007	0.002	0.001	0.002
Data Analysis	0.006	0.118	0.014	0.008	0.004
Instr. Technology		0	0	0	0
Sum	0.092	0.841	0.038	0	0



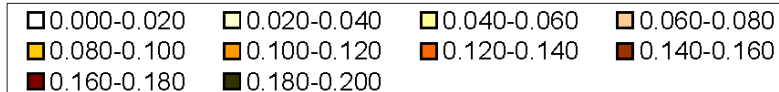
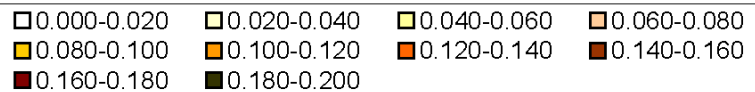
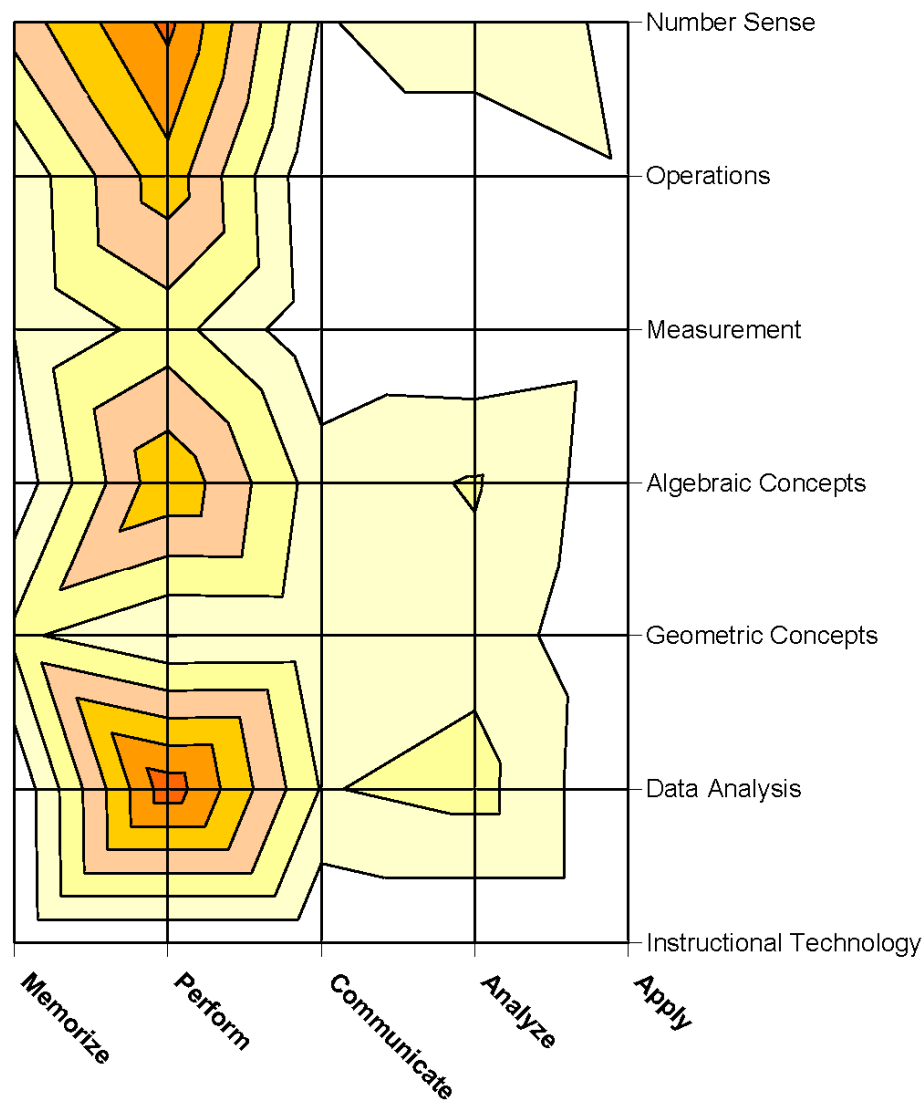
State J Grade 8
Mathematics Assessment



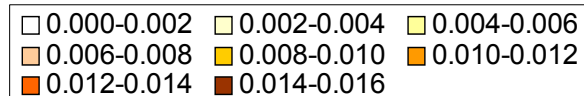
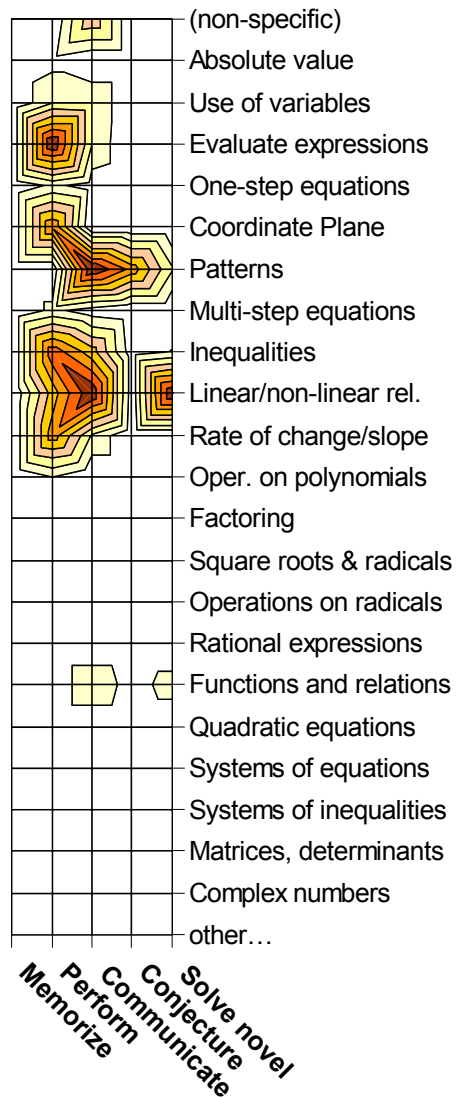
**State U Grade 8 Mathematics Standards
All Content Areas**



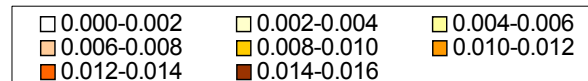
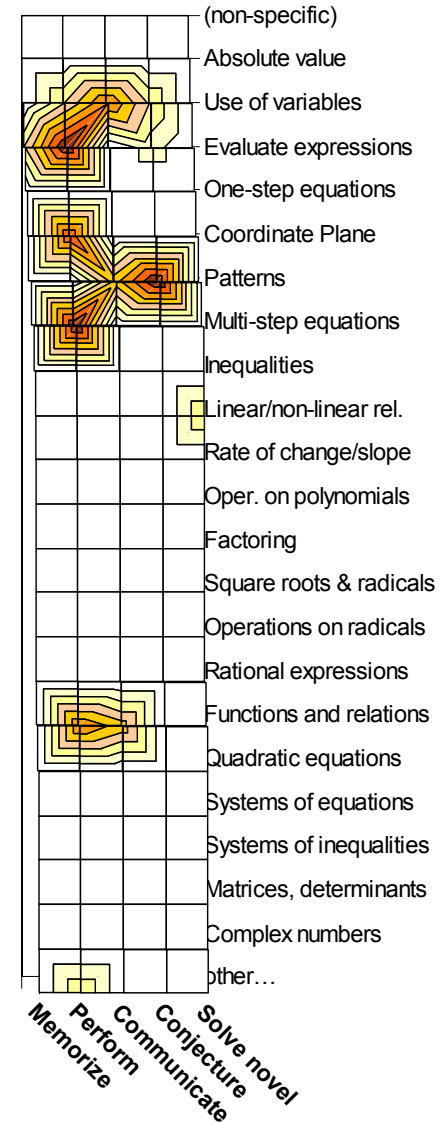
**State U Grade 8 Mathematics Assessment
All Content Areas**



State U Grade 8 Mathematics Standards Algebraic Concepts



State U Grade 8 Mathematics Assessment Algebraic Concepts





SEC Summary Measures

Assessment	Memorize	Perform	Communicate	Conjecture	Non-routine
Nbr Sense	0.048	0.116	0.007	0.008	0.001
Conjectures	0.019	0.441	0.007	0	0
Primary	0.019	0.001	0.001	0.003	0.002
Data Analysis	0.006	0.118	0.002	0.004	0
Instr. Tech. & Planning	0.006	0.001	0.002	0.001	0.002
Instr. Tech. & Planning	0.006	0.118	0.014	0.008	0.004
Instr. Tech. & Planning	0.006	0	0	0	0
Instr. Tech. & Planning	0.006	0.118	0.014	0.008	0.004

- Content Marginals
- PD Characteristics
- Standards & Collegiality
- Teacher Characteristics
- Instructional Practices
- Alignment Indices



Content Marginals

Assessment	Memorize	Perform	Communicate	Conjecture	Non-routine
Nbr Sense	0.048	0.116	0.007	0.008	0.001
Operations	0.019	0.441	0.007	0	0
Geometry	0.22	0.056	0.001	0.003	0.002
Algebra	0.14	0.05	0.019	0.004	0
Data Analysis	0.016	0.007	0.002	0.001	0.002
Measurement	0.006	0.118	0.014	0.008	0.004
Instr. Technology	0	0	0	0	0
Statistics	0.002	0.11	0.001	0	0

Topic Coverage

Math	—	MX1-MX7 / HMX1- HMX16
Science	—	SX1 - SX25 / HSX1-HSX25
ELAR	—	EX1 - EX14

Sum of A / Nbr. Topics / Depth

Cognitive Demand (Math/Science/ELAR)

cgdB	Memorize/Memorize//Recall
cgdC	Procedures/Investigate/Explain
cgdD	Demonstrate/Communicate/Analyze
cgdE	Conjecture/Analyze/Evaluate
cgdF	Non-routine/Apply/Create

Figure 6
Mathematics
Content Coverage

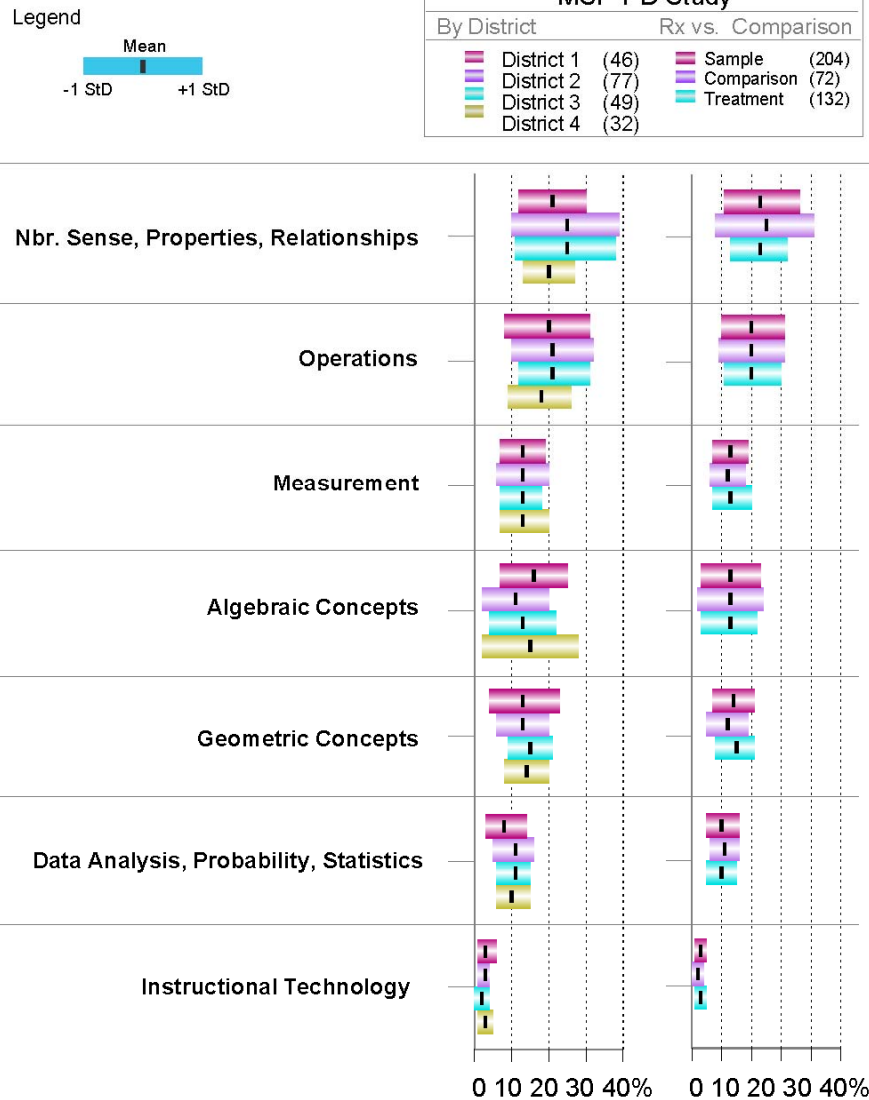
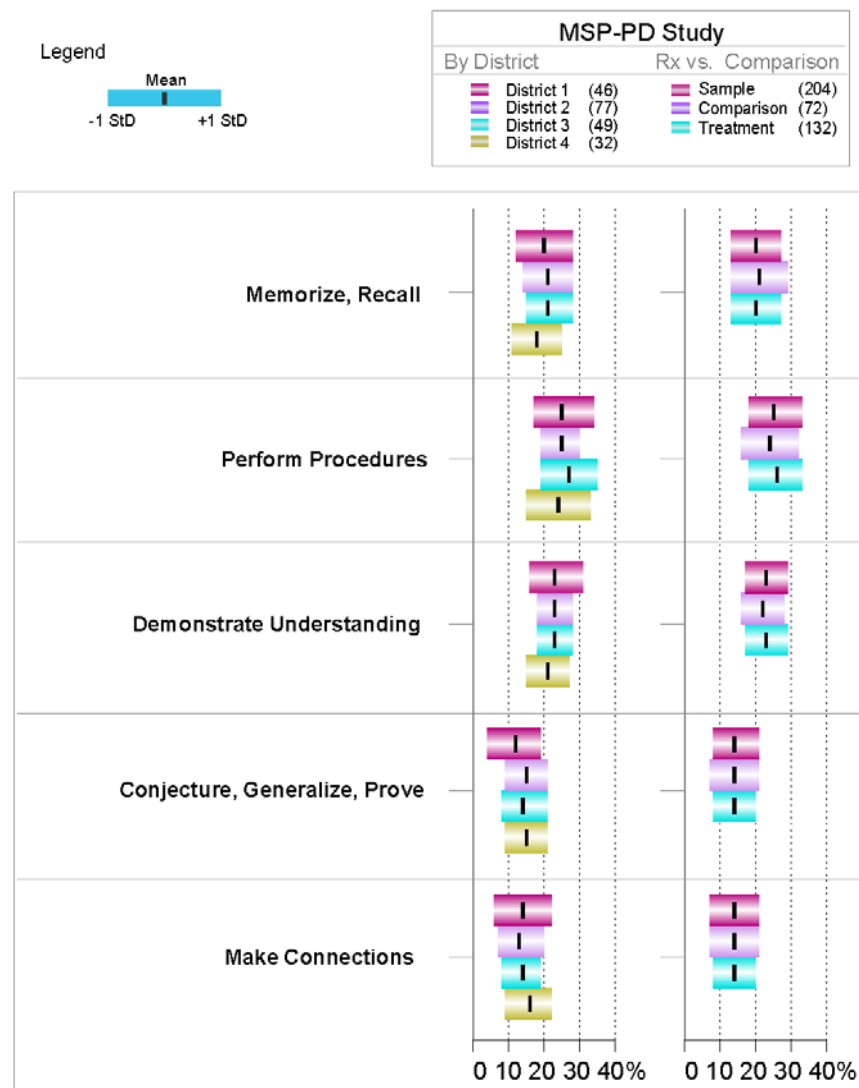


Figure 4
Mathematics
Instructional Content - Expectations for Student Performance
 By Site and Treatment vs. Comparison

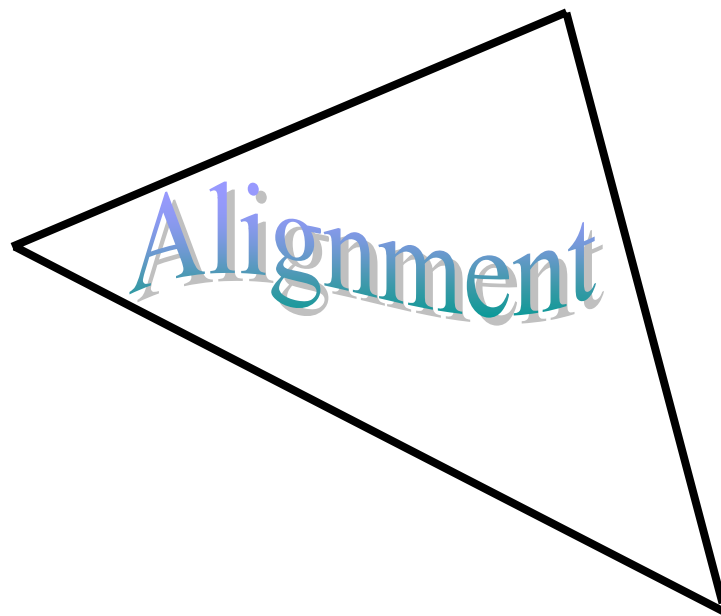


Assessment	Memorize	Perform	Communicate	Conjecture	Non-routine
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Operations	0.019	0.441	0.007	0	0
Measurement	0.022	0.056	0.001	0.003	0.002
Algebra	0.014	0.05	0.012	0.004	0
Geometry	0.007	0.004	0.001	0	0

Alignment Relationships in Standards-based Reform

Curriculum

Assessments

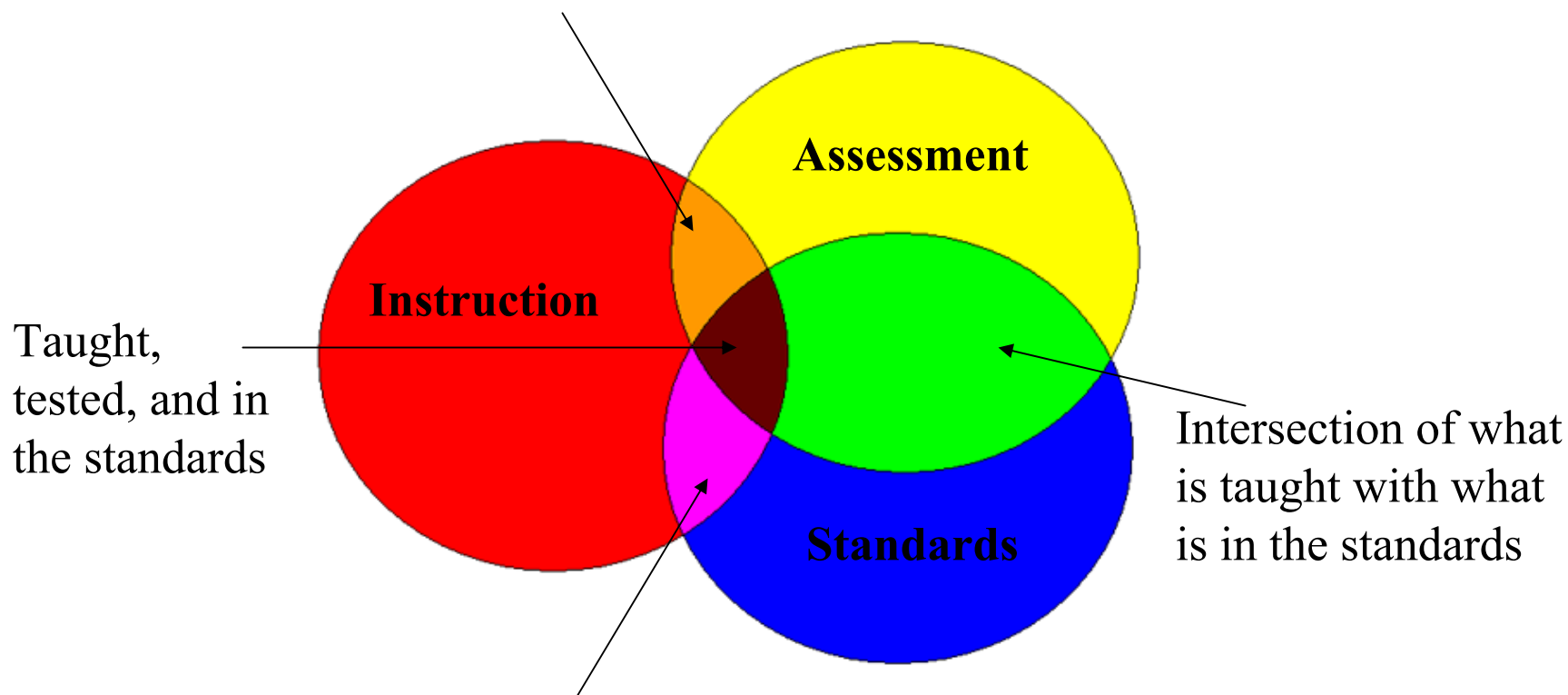


Standards

Assessment	Memorize	Perform	Communicate	Conjecture	Non-routine
Nbr Sense	0.048	0.116	0.007	0.008	0.001
Operations	0.019	0.441	0.007	0	0
Measurement	0.022	0.056	0.001	0.003	0.002
Algebra	0.014	0.05	0.019	0.004	0
Geometry	0.001	0.001	0.001	0.001	0.002

Alignment Relationships in Standards-based Reform

Intersection of what is taught with what is tested.



Intersection of what is taught with what is in standards.



A Quantitative Approach to Alignment

SEC Alignment Process

Content analyses of curriculum documents and reports of practice by content experts using two-dimensional content language.

Multiple raters (w/ content & assessment expertise) using independent ratings in combination with team discussions.

Content Description [Topic(s) by Cognitive Demand(s)]

Yields Alignment Index based on:

$$I = 1 - \frac{\sum |x - y|}{2}$$

Calculating Alignment

$$1 - ((\sum |x-y|_{(1-n)})/2)$$

Assessment	Memorize	Perform	Communicate	Conjecture	Non-routine
	0.048	0.116	0.007	0.008	0.001
	0.019	0.441	0.007	0	0
Measurement	0.022	0.056	0.001	0.003	0.002
Algebra	0.014	0.05	0.019	0.004	0
Geometry	0.016	0.007	0.002	0.001	0.002
Data Analysis	0.006	0.118	0.014	0.008	0.004
Instr. Technology	0	0	0	0	0
Scale Score	0.003	0.111	0.006	0	0

X	1	2	3
A	0.5	0.1	0.1
B	0	0.2	0
C	0.1	0	0

Y	1	2	3
A	0.3	0.2	0
B	0.1	0.1	0.1
C	0.2	0	0

Z	1	2	3
A	0.3	0.1	0
B	0	0.1	0
C	0.1	0	0

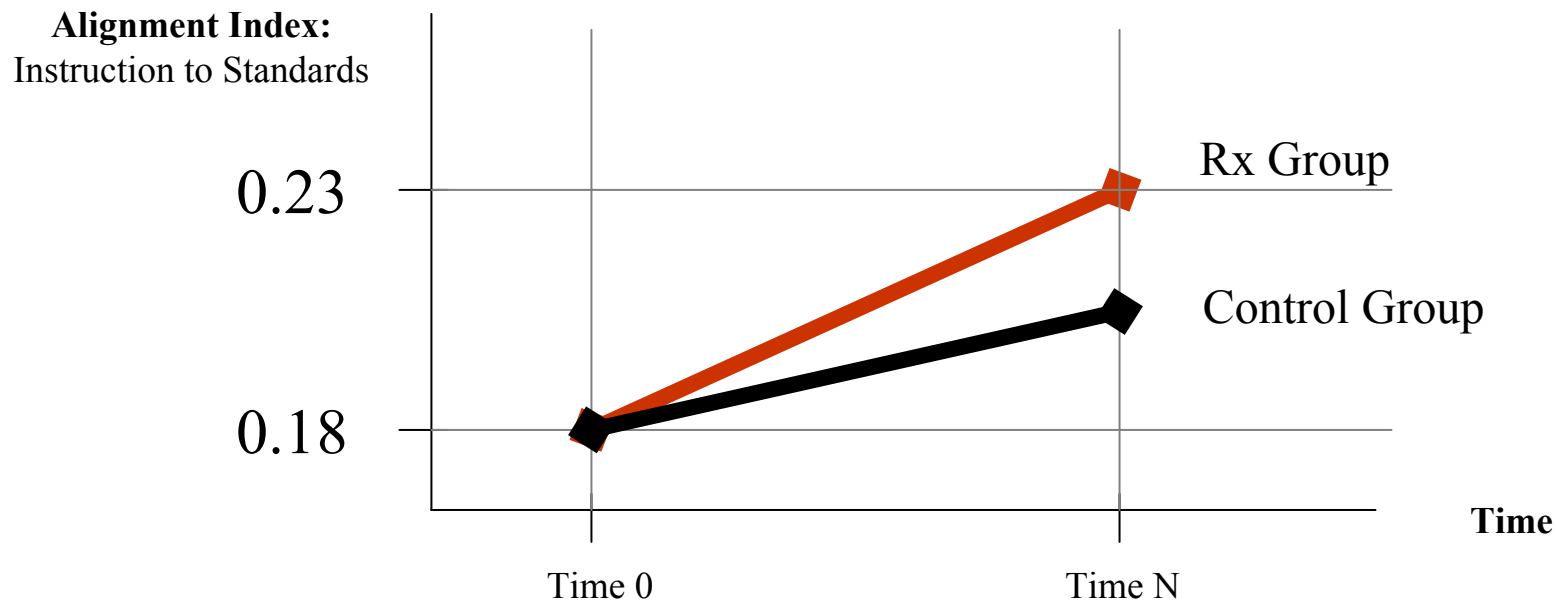
= Alignment
0.6



Alignment Analyses for Program Evaluation

Assessment	Memorize	Perform	Communicate	Conjecture	Non-routine
Nbr Sense	0.048	0.116	0.007	0.008	0.001
Operations	0.019	0.111	0.007		0
Algebra					0.002
Geometry	0.016	0.007	0.002	0.001	0.002
Data Analysis	0.006	0.118	0.014	0.008	0.004
Instr. Technology		0	0	0	0
Scale Score	0.003	0.111	0.006	0	0

Using alignment as an outcome measure

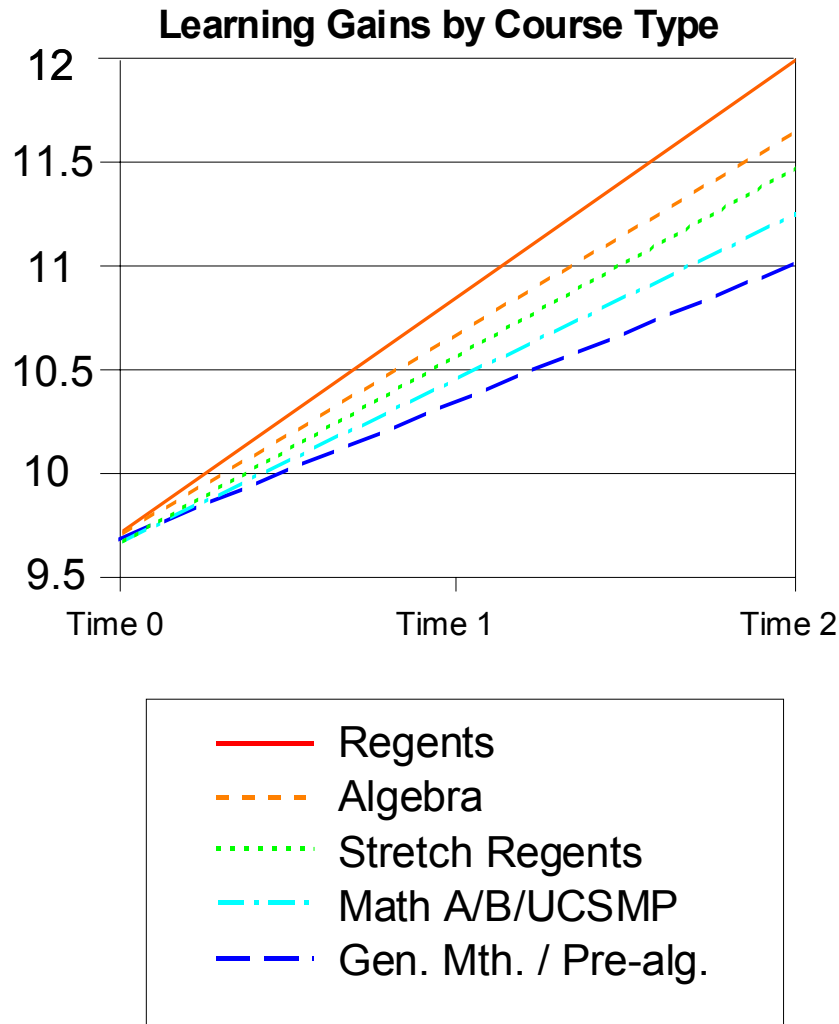


(Measuring change in alignment over time)

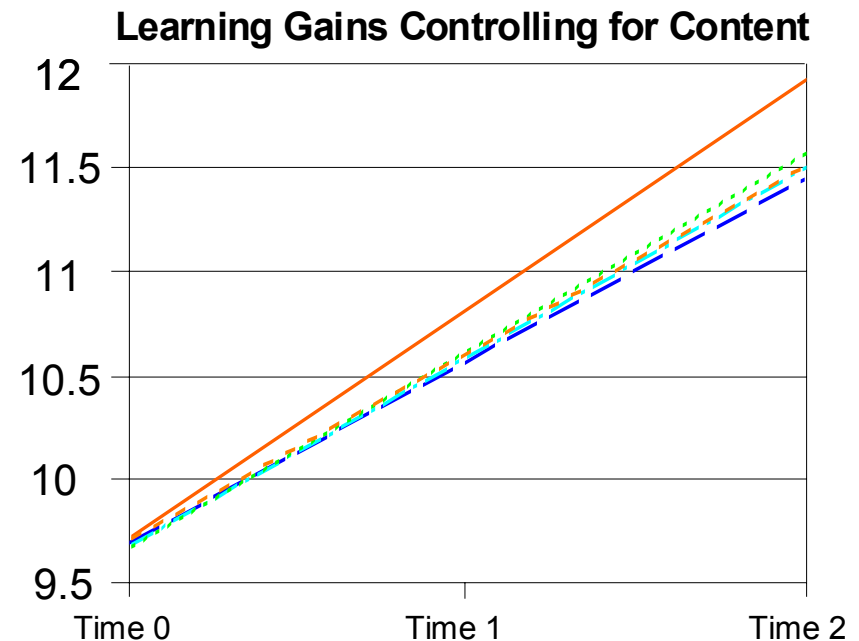


Explaining variation in student learning gains

Assessment	Memorize	Perform	Communicate	Conjecture	Non-routine
Nbr Sense	0.048	0.116	0.007	0.008	0.001
Operations	0.019	0.441	0.007	0	0
Geometry	0.016	0.007	0	0.001	0.002
Data Analysis	0.006	0.118	0.014	0.008	0.004
Instr. Tech. / applied / modeling	0	0	0	0	0
Statistics	0.003	0.141	0.006	0	0



From:
Upgrading High School Mathematics Instruction,
(Gamoran, Porter, Smithson, & White, 1997),
EEPAv19n4



Baseline Alignment Measures in 4 MSP Districts

Figure 8
Mathematics
Content Alignment to Standards & Tests
By Site and Treatment vs. Comparison

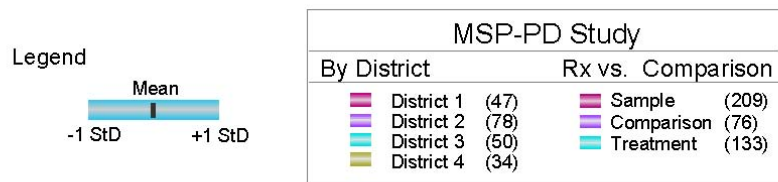
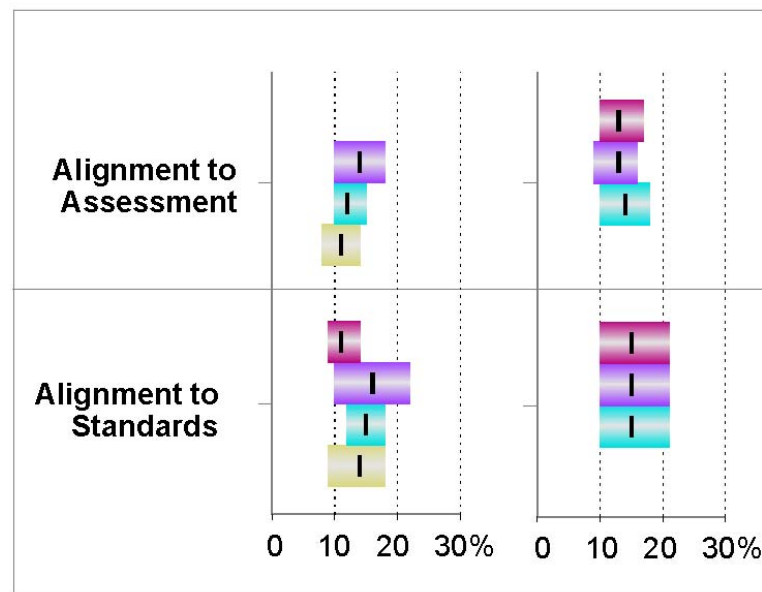
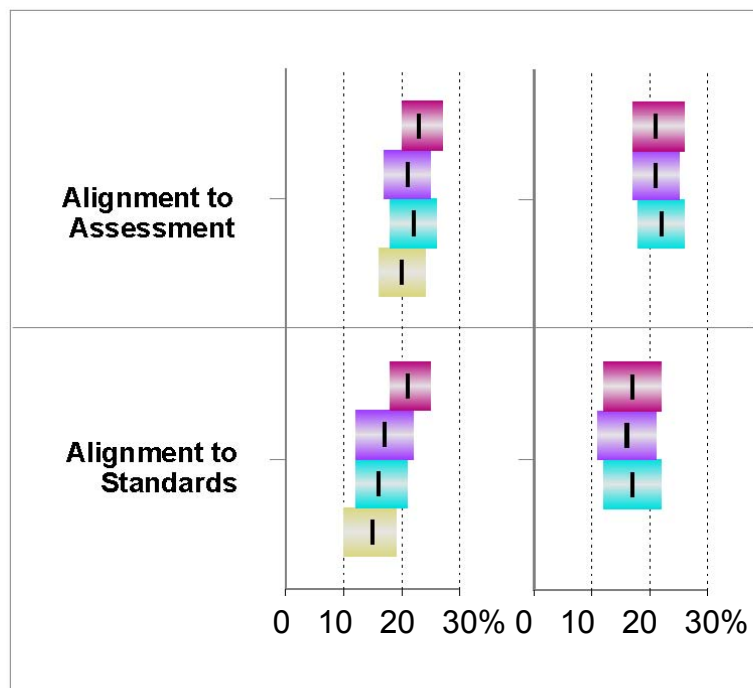
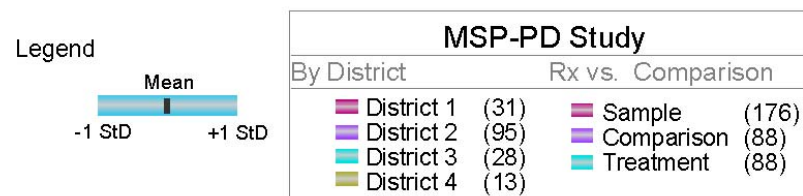


Figure 9
Science
Content Alignment to Standards & Tests
By Site and Treatment vs. Comparison





Accessing SEC Data On & Off-line

Assessment	Memorize	Perform	Communicate	Conjecture	Non-routine
Nbr Sense	0.048	0.116	0.007	0.008	0.001
Operations	0.019	0.141	0.002	0	0
Geometry	0.016	0.007	0.002	0.001	0.002
Data Analysis	0.006	0.118	0.014	0.008	0.004
Instr. Tech. & Learning	0	0	0	0	0
Scale Score	0.003	0.141	0.002	0	0

SEC Online Log-in:(www.seconline.org)

Username: _____

Password: _____

SEC Raw Data CDs:

by Project

Data Sets

Data Notes/Dictionary

Data Templates

Summary Measures



SEC Data Analysis – First Steps

Assessment	Memorize	Perform	Communicate	Conjecture	Non-routine
Nbr Sense	0.048	0.116	0.007	0.008	0.001
Operations	0.019	0.141	0.007	0	0
Measurement	0.018	0.001	0.003	0.004	0
Geometry	0.018	0.001	0.001	0.001	0.002
Data Analysis	0.008	0.118	0.014	0.008	0.004
Instr. Tech. & Instructional Design	0	0	0	0	0
Statistics	0.003	0.141	0.003	0	0

Research Questions/Program Goals

Sample Selection

unit of analysis & grouping

treatment & comparison/control groups

Constructing the Baseline

Describe & Classify

Balance & Natural Variation

Consistency with Other Data Sources

Analysis of Variance (ANOVA)

Examining Relationships (Corr.)

Analysis of Change *(requires 2nd round of data collection)*





SEC Raw Data

Folders, Files & Templates

Folder: **Data Sets** (excel format)

AAmth2004plus.xls

AAsci2004plus.xls

File Layout (worksheets):

Part A Notes

Content Notes

PartAraw

Content Data Tables

Scales

Charts

Scsum

OutputMtx



SEC Raw Data

Folders, Files & Templates

Folder: **Data Templates**

Alignment Templates

AlignSbjDocTemplate

(Calculates alignment and produces comparison maps)

Content Map Templates

GrSbjInstrMapTemplate

(Creates single map/page content maps)



SEC Summary Measures (Scales)

Assessment	Memorize	Perform	Communicate	Conjecture	Non-routine
Nbr Sense	0.048	0.116	0.007	0.008	0.001
Operations	0.015	0.441	0.007	0	0
Geometry	0.006	0.001	0.007	0.004	0
Data Analysis	0.006	0.118	0.014	0.008	0.002
Instr. Tech. & Learning	0	0	0	0	0
Scale Score	0.002	0.341	0.006	0	0

See these files for Scale definitions and preliminary results of reliability analyses:

SECmthScales.xls

SECsciScales.xls

SECelaScales.xls

Located in the folder “Data templates”

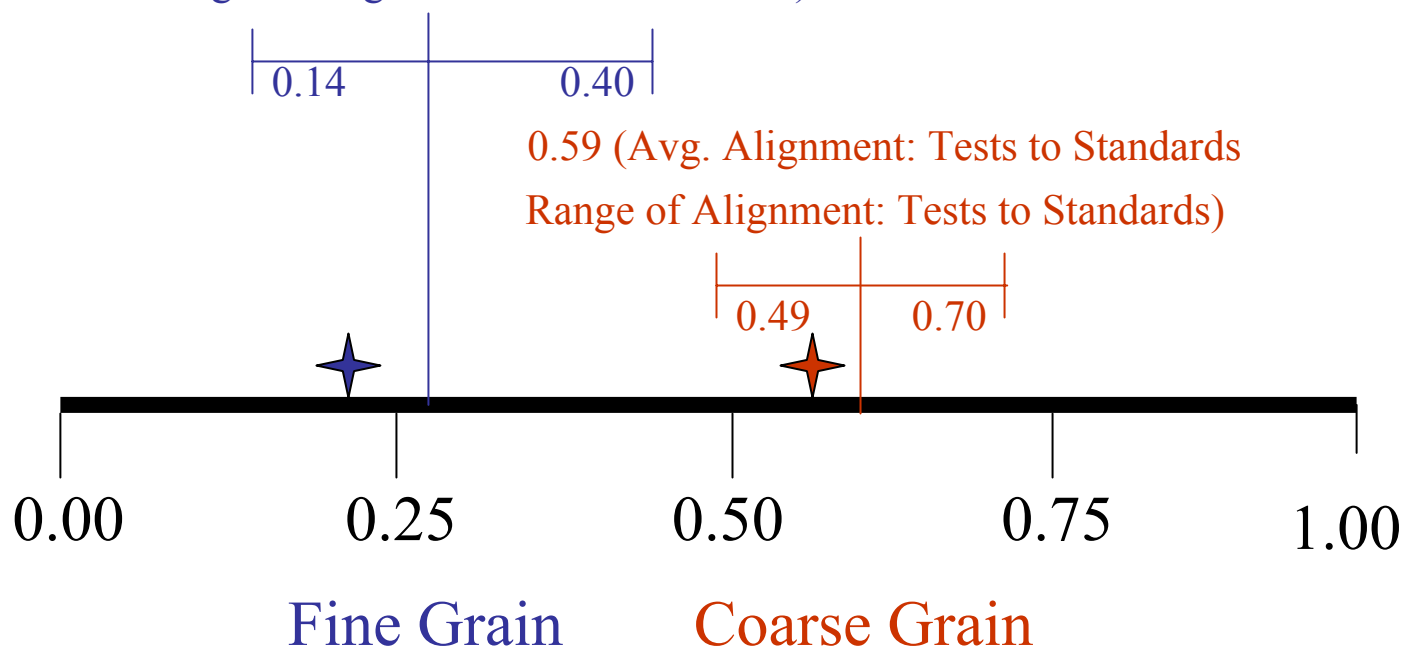
Alignment as a Quantity

Assessment	Memorize	Perform	Communicate	Conjecture	Non-routine
Nbr Sense	0.048	0.116	0.007	0.008	0.001
Operations	0.019	0.441	0.007	0	0
	0.056	0.001	0.003	0.002	
	0.05	0.019	0.004	0	
Geometry	0.016	0.007	0.002	0.001	0.002
Data Analysis	0.006	0.118	0.014	0.008	0.004
Instr. Tech. & Instructional Design	0	0	0	0	0
Scale Score	0.003	0.341	0.006	0	0

The Importance of Grain Size

0.27 (Avg. Alignment: Test to Standard)

Range of Alignment: Test to Standard)

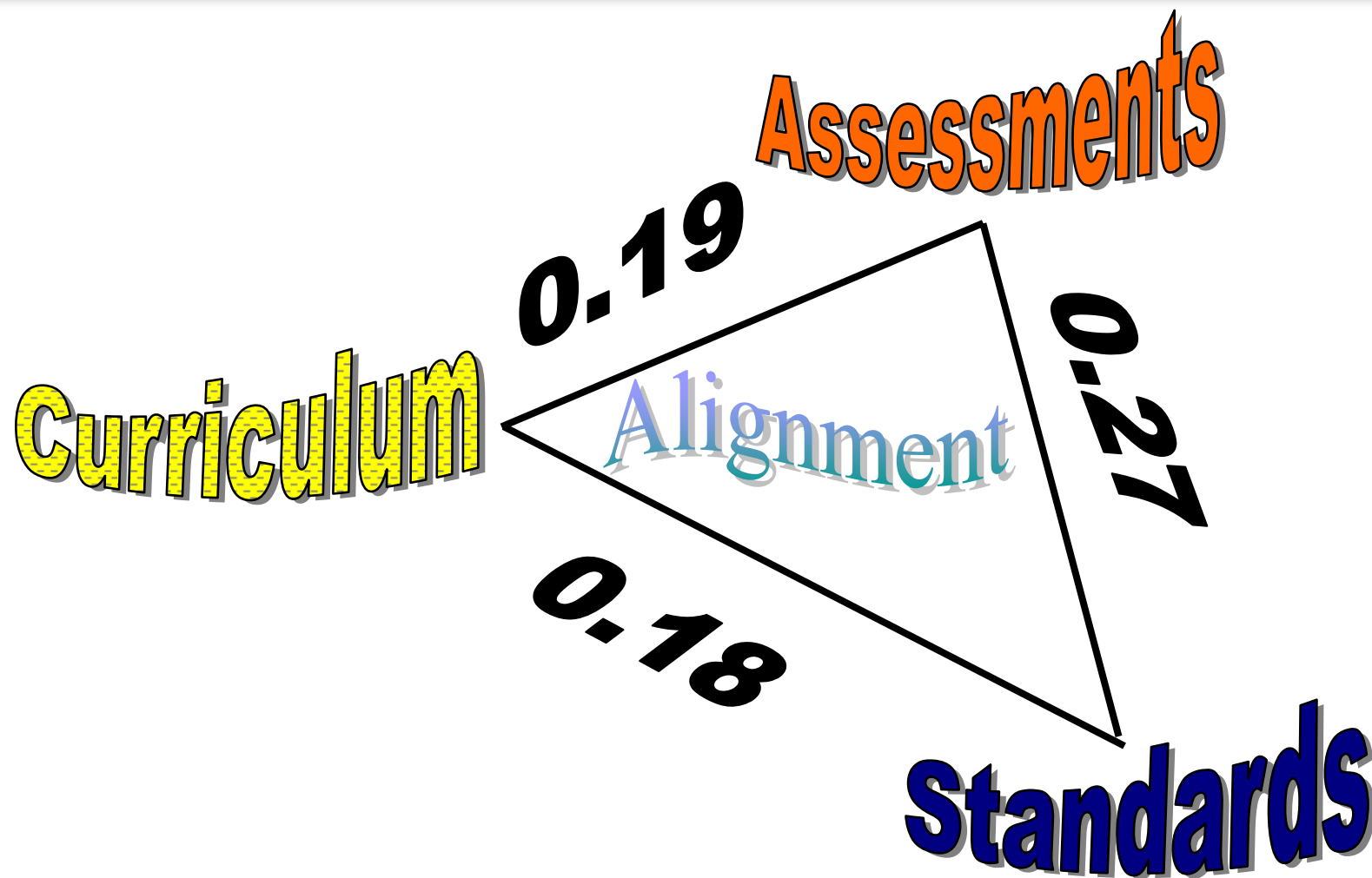


- ★ State U Grade 8 Mathematics Alignment: Test to Standard (0.55)
- ★ State U Grade 8 Mathematics Alignment: Test to Standard (0.23)

(Based on results for 10 states, across grades 4, 6 and 8: SEC Collaborative 2003)

Alignment as a Systemic Tool

Assessment	Memorize	Perform	Communicate	Conjecture	Non-routine
Nbr Sense	0.048	0.116	0.007	0.008	0.001
Operations	0.019	0.441	0.007	0	0
Geometry	0.022	0.14	0.001	0.003	0.002
Algebra	0.016	0.002	0.019	0.004	0
Data Analysis	0.006	0.118	0.002	0.001	0.002
Instr. Technology	0.006	0.118	0.014	0.008	0.004
Scale Score	0.002	0.141	0	0	0



Fine Grain