Surveys of Enacted Curriculum

Tools for Aligning Instruction, Standards, & Assessments

Chicago Symposium: Excellence in Mathematics & Science Teaching

February 6, 2009

Rolf K. Blank
RolfB@ccsso.org
Contact Information

RolfB@ccsso.org
202 336 7044
www.SECsurvey.org
www.SEConline.org
What is/are the SEC?

• Practical, reliable set of data collection tools used by teachers – data useful to many
• Online web-based surveys in Mathematics, English Language Arts, Science, Soc Studies
• Reporting instructional data and alignment in user-friendly charts
• Assist in Facilitating group discussions for observed differences across classrooms, schools, and districts
Session topics

- What is SEC?  --
- Why this approach to data?
- How are data collected?
- How are data reported / used?
- Cognitive demand
- Examples of applications
What problem are we addressing?

• **Teaching**: What produces change in instruction esp. to improve achievement? What is the role of data? How to have teachers work together on improvement?

• **Research**: How do we measure classroom practices? differences among classes?

• **Policy**: What is the effect of common standards/curriculum and assessments?
Data-informed School Improvement

Chicago

CIM process in Schools (data cycle)

- Assessment data -- baseline
- Analysis discussion –teachers, admin.
- Set targets from test results; Identify adjustments to instruction, curriculum
- Teaching change
- Benchmark assessments –measure
- Digital content & support –district, school
- Assessment data – 1 yr, 2 yrs-- Gains ?
Key Question leading to SEC Research into Practice

• How can Educators obtain reliable, valid data to determine Alignment of instruction with required standards and assessments?

• Then …
Next Question -- SEC Data Research into Practice

• How are the curriculum data useful?

OR

• (What is the importance of “Alignment?”)
Intended (3-4 Math Benchmarks)

Administration Year: 2005
Viewing: [Diagram]
Data Cut: All Data
Count: 1

Assessed (3rd Grade Math Achievement Test)

Administration Year: 2005
Viewing: [Diagram]
Data Cut: All Data
Count: 1
Enacted (3rd Grade Teacher Reports)

Administration Year: 2005
Viewing: Group Data -
Data Cut: Grade 3
Count: 56

Intended (3rd Grade Math Indicators)

Administration Year: 2005
Viewing:
Data Cut: All Data
Count: 1
Alignment as a Systemic Tool

Curriculum

Classroom Content Alignment

Standards Assessments
Research has found that faculty in successful schools always question existing instructional practice and do not blame lack of student achievement on external causes.

— Carl Glickman, 2002
Surveys of Enacted Curriculum

The **intended** curriculum: State content standards—What students should learn

A neutral content grid with cognitive demand

The **enacted** curriculum: What teachers teach

The **learned** curriculum: Student outcomes based on school learning

The **assessed** curriculum: State (and other) assessments—tested learning
**Education Improvement Questions**

- **Collecting Data**: How can in-depth subject content data be collected - not simple topic checklists - to analyze teaching content in relation to curriculum goals, standards, or assessments?

- **Analyzing Data**: How can methods of teaching/practices be compared across classrooms, schools, districts, and states?

- **Using Data**: And, how can the data then be used to improve instruction toward standards?

*Source: Maine SEC Project*
SEC Development

• The Surveys of Enacted Curriculum (SEC) Collaborative Project was initiated in 1998 in Mathematics and Science.

• Over the past nine years the Council of Chief State School Officers (CCSSO), has worked with states thru the SEC Collaborative to implement the SEC tools for data collection, analysis, and reporting.
Development (cont.)

- In 2003, CCSSO and UW-Madison/WCER developed an Online, Web-based system for data collection and reporting.

- Surveys are available K-12 for Mathematics, Science, English Language Arts and Reading, and Social Studies.
Steps in SEC Development

• Research on course content and teacher decisions, Porter/Smithson, early '90s
  • Surveys: TIMSS, NAEP, Weiss/Nat S/M Survey

• States development of content standards, mid '90s

• CCSSO Science Assessment project--Opportunity to Learn items

• State Collaborative: 11 states '98-'01 (NSF grant) Development of SEC Survey models in M/S, Alignment analysis

• Use of SEC data in school improvement, experimental design study, 40 urban middle schools, '01-04
  • English Language Arts/reading survey, developed '02-04

• Evaluation of PD study: 5 M/S Partnerships/NSF, '02 – 05

• Current projects: 18 States, 4 Districts, 5 MSPs
States /Districts Active with SEC Tools and Data: 2001 - present

- Alabama
- Delaware
- Idaho
- Illinois
- Indiana
- Iowa
- Kansas
- Maine
- Michigan
- Minnesota
- Mississippi
- Montana
- New Hampshire
- New York
- North Carolina
- Ohio
(2) States/Districts Active with SEC Tools and Data: 2001 - present

- Oklahoma
- Oregon
- Pennsylvania
- Tennessee
- Utah
- Vermont
- Virginia
- Wisconsin
SEC by the Numbers: ’07-08

12,100  SEC Teacher Surveys  (30 states)
  Math
  Science
  ELAR
  Soc Stud
  ELD  (SEC ELL Consortium)

140  Standards or Assessment documents
  Alignment analysis
SEC Collaborating Organizations

• Council of Chief State School Officers  
  www.SECsurvey.org

• Wisconsin Center for Education Research  
  www.SEConline.org

• Learning Point Associates  
  www.SECsupport.org

• TERC Using Data Project  
  www.ra.terc.edu/DEC
SEC Collaborating Organizations

• Measured Progress
  www.measuredprogress.org

• The College Board
  www.collegeboard.com
Survey Sections

- School & Class Description
- 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, Frequency
  - Content, Active,
  - Collegial, Coherence
- Instructional Content
  - Topic x Cog. Demand
Welcome to SEC On-Line

The Surveys of Enacted Curriculum web site.

The purpose of this site is to encourage teacher reflection and conversation about classroom practice and instructional content.

About the Survey

Using a survey data collection and reporting model, teachers can compare their own practice and instructional content to responses by other teachers around the country and within their school or district.

Participating states, schools and districts are able to make use of aggregated teacher reports (individual teacher responses are disclosed only to the teacher) to develop a baseline of information about teacher practice in mathematics, science and English language arts, or to inform professional development or school improvement planning efforts.

Registration Guide

Login

Username:
Password:

If you do not have a Username, please click here to register or use guest access.

Survey Administrators

1. Contact Us to coordinate survey dates and participation
2. Check with your Computer Lab Director to make sure facilities meet minimum requirements
3. Test the survey on computers to be used by participants
4. Print the Reference Guide (PDF) and make copies for
INSTRUCTIONAL ACTIVITIES IN MATHEMATICS

Listed below are questions about the types of activities that students in the target class engage in during mathematics instruction. For each activity you are asked to estimate the relative amount of time a typical student will spend engaged in that activity during classroom instruction over the course of a school year. The activities are not necessarily mutually exclusive; across activities your answers will undoubtedly greatly exceed 100%. Consider each activity on its own, estimating the range that best indicates the relative amount of instructional time that a typical student spends over the course of a school year engaged in that activity.

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

<table>
<thead>
<tr>
<th></th>
<th>None</th>
<th>&lt;10%</th>
<th>10-25%</th>
<th>26-50%</th>
<th>More than 50%</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>Watch the teacher demonstrate how to do a procedure or solve a problem.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>26</td>
<td>Read about mathematics in books, magazines, or articles (not textbooks).</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>27</td>
<td>Take notes from lectures or the textbook</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>28</td>
<td>Complete computational exercises or procedures from a textbook or a worksheet.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>29</td>
<td>Present or demonstrate solutions to a math problem to the whole class.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>30</td>
<td>Use manipulatives (e.g., geometric shapes or algebra tiles), measurement instruments (e.g., rulers or protractors), and data collection devices (e.g. surveys or probes).</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>31</td>
<td>Work individually on mathematics exercises, problems, investigations or tasks.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>32</td>
<td>Work in pairs or small groups on mathematics exercises, problems, investigations or tasks.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>33</td>
<td>Do a mathematics activity with the class outside the classroom.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>34</td>
<td>Use computers, calculators, or other technology to learn mathematics.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>35</td>
<td>Maintain and reflect on a mathematics portfolio of their own work.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>36</td>
<td>Take a quiz or test.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
LABORATORY ACTIVITIES IN SCIENCE

Listed below are some questions about what students in the target class do in science. For each activity pick one of the choices (using the radio buttons at right) to indicate the percentage of instructional time that students are doing each activity. Please think of an average student in this class in responding.

When students in the target class are engaged in laboratory activities, investigations, or experiments as part of science instruction, what percentage of that time do students:

<table>
<thead>
<tr>
<th>Activity</th>
<th>None</th>
<th>Less than 10%</th>
<th>10-25%</th>
<th>26-50%</th>
<th>More than 50%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make educated guesses, predictions, or hypotheses.</td>
<td>⊗</td>
<td>⊗</td>
<td>⊗</td>
<td>⊗</td>
<td>⊗</td>
</tr>
<tr>
<td>Follow step-by-step directions.</td>
<td>⊗</td>
<td>⊗</td>
<td>⊗</td>
<td>⊗</td>
<td>⊗</td>
</tr>
<tr>
<td>Use science equipment or measuring tools to collect data.</td>
<td>⊗</td>
<td>⊗</td>
<td>⊗</td>
<td>⊗</td>
<td>⊗</td>
</tr>
<tr>
<td>Collect Data.</td>
<td>⊗</td>
<td>⊗</td>
<td>⊗</td>
<td>⊗</td>
<td>⊗</td>
</tr>
<tr>
<td>Change a variable in an experiment to test a hypothesis.</td>
<td>⊗</td>
<td>⊗</td>
<td>⊗</td>
<td>⊗</td>
<td>⊗</td>
</tr>
<tr>
<td>Organize and display information in tables or graphs.</td>
<td>⊗</td>
<td>⊗</td>
<td>⊗</td>
<td>⊗</td>
<td>⊗</td>
</tr>
<tr>
<td>Analyze an interpret science data.</td>
<td>⊗</td>
<td>⊗</td>
<td>⊗</td>
<td>⊗</td>
<td>⊗</td>
</tr>
<tr>
<td>Design their own investigation or experiment to solve a scientific question.</td>
<td>⊗</td>
<td>⊗</td>
<td>⊗</td>
<td>⊗</td>
<td>⊗</td>
</tr>
<tr>
<td>Make observations/classifications.</td>
<td>⊗</td>
<td>⊗</td>
<td>⊗</td>
<td>⊗</td>
<td>⊗</td>
</tr>
</tbody>
</table>
### Processes of Inquiry in English Language Arts

Listed below are some questions about what students in the target class do in English language arts. For each activity, pick one of the choices (using the radio buttons at right) to indicate the percentage of instructional time that students are doing each activity. Please think of an average student in this class in responding.

When students in the target class participate in instruction about the processes of inquiry as part of English language arts, how much of that time do they use to engage in the following tasks?

<table>
<thead>
<tr>
<th>Task</th>
<th>None</th>
<th>10% or Less</th>
<th>11-25%</th>
<th>26-50%</th>
<th>More than 50%</th>
</tr>
</thead>
<tbody>
<tr>
<td>72. Listening and responding to directions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>73. Questioning (e.g., interviewing, probing, interrogating)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>74. Skimming, scanning, taking notes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>75. Organizing, outlining, summarizing information</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>76. Developing research questions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>77. Conducting research procedures</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>78. Working with reference sources (e.g., dictionary, encyclopedia, internet sites)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>79. Examining secondary or primary sources</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>80. Evaluating credibility and utility of information sources</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>81. Becoming literate in electronic media</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>82. Learning and using library skills (e.g., classification systems, serial locations)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>83. Organizing information for display or presentation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>84. Documenting findings (e.g., citations, references)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Taking the Online Survey

- Approximately 60-90 minutes to complete
- May be completed in multiple sittings
- Data is saved as each section is submitted
- Data reported online in pre-designed charts and content maps
Uses a multi-dimensional language for describing instructional content

Topics

by

Cognitive Demand

(Expectations for Student Learning)
<table>
<thead>
<tr>
<th>Topics Algebra</th>
<th>Memorize</th>
<th>Perform Procedures</th>
<th>Communicate Understanding</th>
<th>Solve non-routine problems</th>
<th>Conjecture/Generalize/Prove</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple Step Equations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inequalities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Literal Equations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lines / Slope and Intercept</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operations on Polynomials</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quadratic Equations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Science content matrix

<table>
<thead>
<tr>
<th>Categories of Cognitive Demand</th>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Memorize facts, definitions</td>
</tr>
<tr>
<td>Nature of Science</td>
<td></td>
</tr>
<tr>
<td>Meas/Calc. in Science</td>
<td></td>
</tr>
<tr>
<td>Life Science</td>
<td></td>
</tr>
<tr>
<td>Physical Science</td>
<td></td>
</tr>
<tr>
<td>Earth Science</td>
<td></td>
</tr>
<tr>
<td>Chem/Biol/ Physics (HS)</td>
<td></td>
</tr>
<tr>
<td>Time on Topic</td>
<td>Middle School Mathematics Topics</td>
</tr>
<tr>
<td>---------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>&lt;none&gt;</td>
<td>Number sense / Properties / Relationships</td>
</tr>
<tr>
<td>0 1 2 3</td>
<td>Place value</td>
</tr>
<tr>
<td></td>
<td>Whole numbers</td>
</tr>
<tr>
<td></td>
<td>Operations</td>
</tr>
<tr>
<td></td>
<td>Fractions</td>
</tr>
<tr>
<td></td>
<td>Decimals</td>
</tr>
<tr>
<td></td>
<td>Percents</td>
</tr>
<tr>
<td></td>
<td>Ratio, proportion</td>
</tr>
<tr>
<td></td>
<td>Patterns</td>
</tr>
<tr>
<td></td>
<td>Real numbers</td>
</tr>
<tr>
<td></td>
<td>Exponents, scientific notation</td>
</tr>
<tr>
<td></td>
<td>Factors, multiples, divisibility</td>
</tr>
<tr>
<td></td>
<td>Odds, evens, primes, composites</td>
</tr>
<tr>
<td></td>
<td>Estimation</td>
</tr>
<tr>
<td></td>
<td>Order of operations</td>
</tr>
<tr>
<td></td>
<td>Relationships between operations</td>
</tr>
<tr>
<td></td>
<td>Mathematical properties (e.g., distributive property)</td>
</tr>
</tbody>
</table>

Note: The table entries are placeholders and represent an example of how time on topic and expectations for students in mathematics are tracked. The numbers in the table indicate the level of focus or importance assigned to each topic or skill.
## Expectations for Students in Mathematics

### Memorize Facts/ Definitions/ Formulas
- Recite basic mathematics facts
- Recall mathematics terms & definitions
- Recall formulas and computational procedures

### Perform Procedures
- Use numbers to count, order, denote
- Do computational procedures or algorithms
- Follow procedures/instructions
- Solve equations/formulas/routine word problems
- Organize or display data
- Read or produce graphs and tables
- Execute geometric constructions

### Demonstrate Understanding of Mathematical Ideas
- Communicate mathematical ideas
- Use representations to model mathematical ideas
- Explain findings and results from data analysis strategies
- Develop/explain relationships between concepts
- Show or explain relationships between models, diagrams, and/or other representations

### Conjecture/ Generalize/ Prove
- Determine the truth of a mathematical pattern or proposition
- Write formal or informal proofs
- Recognize, generate or create patterns
- Find a mathematical rule to generate a pattern or number sequence
- Make and investigate mathematical conjectures
- Identify faulty arguments or misrepresentations of data
- Reason inductively or deductively

### Solve Non-routine Problems/ Make Connections
- Apply and adapt a variety of appropriate strategies to solve non-routine problems
- Apply mathematics in contexts outside of mathematics
- Analyze data, recognize patterns
- Synthesize content and ideas from several sources
Applications

- Alignment analysis -- instruction, standards, assessments
- Instructional improvement in schools
- Needs assessment/ Evaluation
- Indicators – for comparison, analysis, monitoring change over time
PISA Math (15 yr) by State Math teaching

Administration Year: 2008
Viewing: 2008 PISA Gr. 9_12 Data
Data Cut: All Data
Count: 1

Administration Year: 2008
Viewing: State Data - Ohio
Data Cut: All Data
Count: 156

Number Sense / Properties / Relationships
Operations
Measurement
Consumer Applications
Basic Algebra
Advanced Algebra
Geometric Concepts
Advanced Geometry
Data Displays
Statistics
Probability
Analyses
Trigonometry
Special Topics
Functions
Instructional Technology

Number Sense / Properties / Relationships
Operations
Measurement
Consumer Applications
Basic Algebra
Advanced Algebra
Geometric Concepts
Advanced Geometry
Data Displays
Statistics
Probability
Analyses
Trigonometry
Special Topics
Functions
Instructional Technology
Science State HS Test by Science instruction
Science Instruction practices: State vs. district

Science Chart F: INSTRUCTIONAL ACTIVITIES IN SCIENCE

Administration Year: 2007
Sample Selection: Wisconsin
Report By: Grade 4th

Wisconsin

Legend
Mean
1 SD  ± 1 SD

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

Listen to teacher explain something to the class as a whole about science.

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

Work individually on science assignments.

Write about science in a report/paper on science topics.

Do a laboratory activity, investigation, or experiment.

State - Grade 4th
- All Grade 4 (84)
- Grade 4-12 (6)
- Grade 5-8 (86)
- Grade K-4 (17)

District - Grade 4th
- All Grade 4 (4)
- Grade 4-12 (0)
- Grade 5-8 (4)
- Grade K-4 (0)

Your Data

0%
Sci instruction

Watch the teacher demonstrate a scientific phenomenon.

Collect data (other than laboratory activities).

Work in pairs or small groups (other than laboratory activities).

Do a science activity with the class outside the classroom or science laboratory (for example, field trips or research).

Use computers, calculators, or other educational technology to learn science.

Maintain and reflect on a science portfolio of their own science work.

Take a quiz or test.
State HS Science test by PISA Science (15 yr)
The Goal

To render **quantitative descriptions** of instruction, standards, and assessments using a **common language** in order to **facilitate comparisons** and analyses of the three domains of a standards-based approach to education reform and their relationship to one another.
The Two Dimensions Of Content

What students should know

[Topics]

And…

Be Able to Do

[Expectations for student performance]
Describing Instructional Content

SEC utilizes a two-dimensional taxonomy based on:

**Topic**

by

**Cognitive Demand**
... adding levels of relative emphasis yields a 3-D construct

<table>
<thead>
<tr>
<th>Coarse Content Areas</th>
<th>Memorize</th>
<th>Perform Procedures</th>
<th>Demonstrate Understanding</th>
<th>Conjecture, Hypothesize</th>
<th>Non-routine problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number Sense</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measurement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic Algebra</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advanced Algebra</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geometric Concepts</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>--------------------------------------------------------</td>
<td>-------------------------------------------------</td>
<td>----------------------------</td>
<td>------------------------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Knowledge</td>
<td>Explanation</td>
<td>Cognitive System Retrieval</td>
<td>Level 1: Recall Recite</td>
<td>Remembering</td>
<td>Knowledge Understanding</td>
</tr>
<tr>
<td>Comprehension: Interpretation, translation, extrapolation</td>
<td>Interpretation</td>
<td>Cognitive System Comprehension</td>
<td>Level 2: Skill Concept Understand, summarize, interpret, organize</td>
<td>Understanding</td>
<td>Skills</td>
</tr>
<tr>
<td>Application</td>
<td>Application</td>
<td>Cognitive System Analysis</td>
<td>Level 3: Strategic Thinking Explain, generalize, connect, order, synthesize, analyze</td>
<td>Applying</td>
<td>Products</td>
</tr>
<tr>
<td>Analysis</td>
<td>Perspective</td>
<td>Cognitive System Utilization</td>
<td></td>
<td>Analyzing</td>
<td>Reasoning</td>
</tr>
<tr>
<td>Synthesis</td>
<td>Empathy</td>
<td>Meta-Cognitive System Goal Setting and Monitoring</td>
<td>Level 4: Extended Thinking Evaluate, generate, extrapolate, develop hypotheses</td>
<td>Evaluating</td>
<td>Applying</td>
</tr>
<tr>
<td>Evaluation</td>
<td>Self-Knowledge</td>
<td>Self-System Beliefs, Efficacy and Emotions</td>
<td></td>
<td>Creating</td>
<td></td>
</tr>
</tbody>
</table>
Two Applications

a) Using Data – Urban Schools (Chicago 2001-03)

b) Billings, MT 3-year process
Alignment Index:
Instruction to Standards Mathematics Across 4 Districts

<table>
<thead>
<tr>
<th>Counts</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>99</td>
</tr>
<tr>
<td>Control</td>
<td>124</td>
</tr>
<tr>
<td>Leaders</td>
<td>16</td>
</tr>
</tbody>
</table>

(Measuring change in alignment over time)
Standards
Assessment
Curriculum

Science/Math Initiatives
Professional Development

Chart 1: Flow Chart of Study Design

- Teacher & School Data Reports
  - Spring 2001

- Teacher Data Measure Change
  - Spring 2003

- Phase I Schools
  - Assist Schools/Professional Development
  - August 2001 - January 2003

- Phase II Schools
  - Assist Schools/Professional Development
  - Spring 2003 - Winter 2004

All Schools

Improved Student Achievement
2005-2008 Comparison–Measurement–Gr 8 Instruction Maps
Billings District Curriculum Maps – 7th and 8th Grades
Comparison – Gr 8 Curriculum, Instruction, and CRT

The percentages come from the Gr 8 district avg points earned out of the points possible for each state standards content topic on the MT CRT.
8th Grade Comparison – Cognitive Demand 2005 - 2008

Cognitive Demand

Memorize/Recall
Perform Procedures
Demonstrate Understanding
Conjecture, Generalize, Prove
Solve non-routine problems/ Make Connections

2005 Billings Public Schools (Gr. 8) [8]
2008 Billings Public Schools (Gr. 8) [7]