Assessment **FOR** Learning

Evaluation Cafe

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The Assessment Vocabulary Landscape

- Assessment (Authentic, Performance, Formative Summative, Multiple Forms, Teacher-made, Off-the Shelf, Peer, Self, Standards, Benchmarks, etc.)
- Evaluation (Formative, Summative, Value-Laden, Objective, Subjective, etc.)
- Grades (Weighted, Interim, Final, Curving, On-Line, GPA, Achievement, etc.)
- Testing (High Stakes, Low Stakes, No Stakes?, NCLB, AYP, MEAP, ACT, GLCEs, On-Line, Computer Based, Norm-referenced, Criterion Referenced, Multiple-Choice, Open-Ended, etc.)

Assessing Your own Assessment Situation

- Describe your own classroom assessment package.
- Describe your **most interesting** or **best** assessment technique you use during lessons. How does it help you assess what students know or need to know?
- Describe your **least effective** assessment technique.Why is/was it not effective? How might it be improved?

Three Aspects of Assessment in Teaching and Learning
(some definitions)

- Assessment **AS** Learning
- Assessment **FOR** Learning
- Assessment **OF** Learning

Assessment **AS** Learning
(Personal Learning Planning)

- Links curriculum with learning and teaching
- Gather and interpret evidence of current learning
- Weighing evidence against learning goals
- Evaluating/deciding next steps
- Note progress and execute next steps
- Essentially a learning feedback loop

Assessment **OF** Learning
(Local Moderation)

- Links curriculum with everyday assessment
- Goes beyond traditional summative assessment
- Talk to students about their progress
- Talk to students about their levels of attainment
- *Share standards within/across programs/departments*
- Increase confidence of professional judgments of attainment

Assessment **FOR** Learning
(Formative Assessment)

- Links everyday practice with teaching and learning
- Process of interaction between teachers and students
- Discuss with students what is to be learned
- Recognize when learning has taken place
- Provide useful and timely feedback that supports next steps in learning

Assessment **For** Learning
(Research Base)

- Black and Williams (1998): “Inside the Black Box” (*PDK*)
- Black and Williams (1998): “Assessment and Classroom Learning” (*Assessment in Evaluation*); a review of the evidence
- Black, Harrison, Lee, Marshall, & Williams (2003): *Assessment for Learning: Putting it into Practice*
- Clarke (2005): *Formative Assessment in Action* and *Formative Assessment Project*
- McCallum (2000): Formative Assessment - Implications for Classroom Practice

Assessment **For** Learning
(Samples across the Curriculum)

- **Science:** Black (2001): "The Science Teacher's Role in Formative Assessment" and *National Education Science Standards* (1996)
- **Mathematics:** NCTM (1995, 2000): *Assessment Standards for School Mathematics, Principles 2000*
- **English:** Black, Harrison, Lee, Marshall, & Williams (2003): *Assessment for Learning: Putting it into Practice*
- **Statistics:** Lajoie: *Handbook on Assessments in Statistics Education*
- **Social Studies & Language Arts:** Glatthorn (1999): *Performance Standards and Authentic Learning* (The Achievement Cycle)
- **Performing Arts:** CCSSO (2002): *Envisioning Arts Assessment*; ASU (2000) *Assessment in the Arts*

This isn’t exactly new!

- *Curriculum and Evaluation Standards for School Mathematics* (NCTM, 1989)
- *Professional Teaching Standards* (NCTM, 1991)
- *Assessment Standards* (NCTM, 1995)
- *Principles and Standards for Teaching Mathematics* (NCTM, 2000)
- Balanced Assessment Project

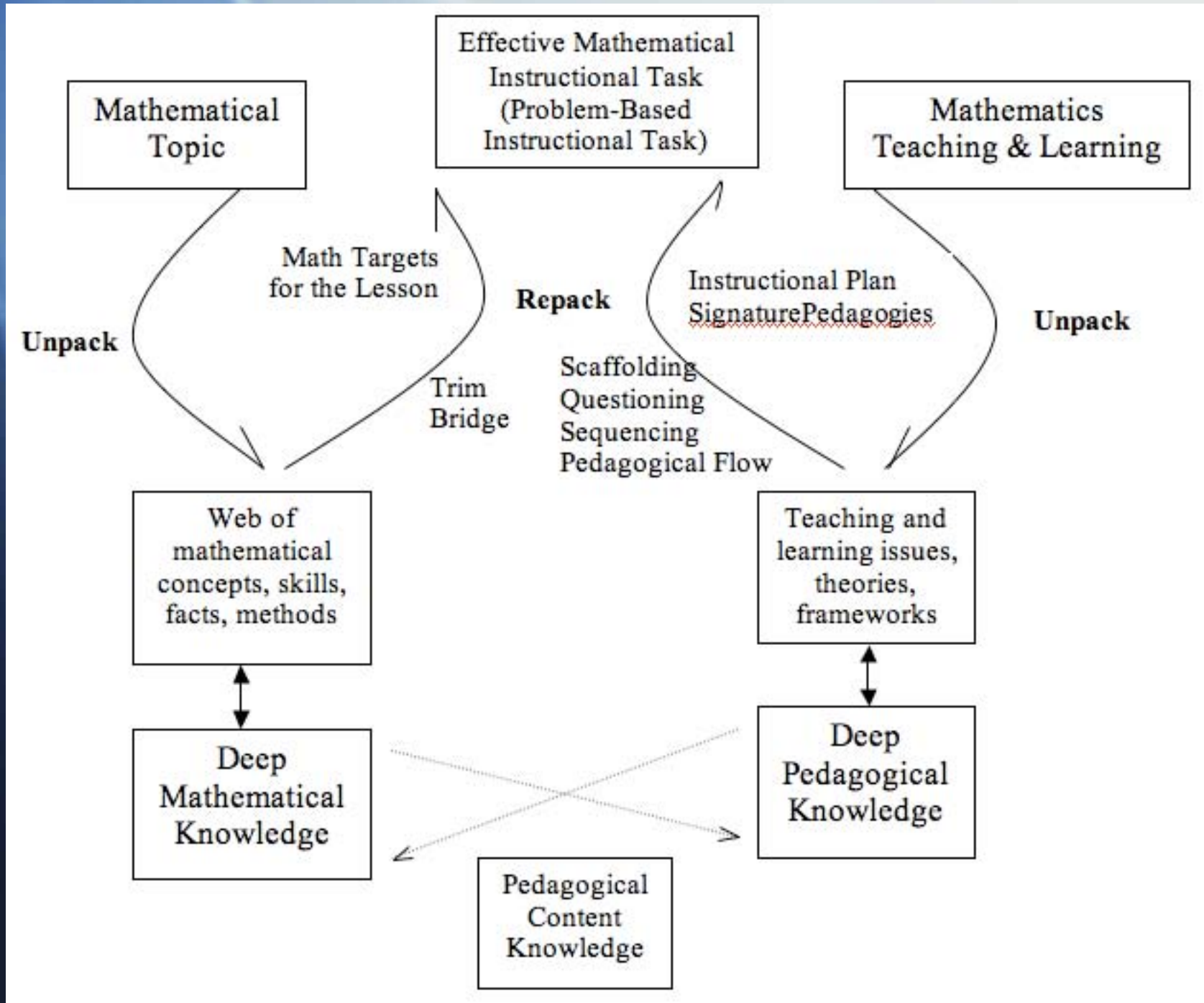
NCTM *Assessment Standards*

- The Mathematics Standard
- The Learning Standard
- The Equity Standard
- The Openness Standard
- The Inferences Standard
- The Coherence Standard
- **Do these have a familiar ring to them?**

An Example of AfL Ideas from a Current Mathematics PD

PD Key Foci

- Unpacking the mathematics
- Advanced and connected perspective
- Deeply reflective about mathematics, teaching, learning, lesson development
- Problem-based instructional tasks
- Signature pedagogies


Effective Mathematical Instructional Task (Problem-Based Instructional Task)
Mathematical Topic
Mathematics Teaching & Learning
Math Targets for the Lesson
Repack
Instructional Plan SignaturePedagogies
Unpack
Unpack
Trim Bridge
Scaffolding
Questioning
Sequencing
Pedagogical Flow
Web of mathematical concepts, skills, facts, methods
Teaching and learning issues, theories, frameworks
Deep Mathematical Knowledge
Deep Pedagogical Knowledge
Pedagogical Content Knowledge

Transfer to General PD
(Common Themes)

- Unpacking content
- Advanced and connected perspective
- Deeply reflective about content, teaching, learning, lesson development
- Problem-based instructional tasks
- Signature pedagogies; powerful pedagogy

Themes of Powerful Pedagogy

- Unpack/Repack Lesson Development
- Teaching through Problem Solving to develop habits of mind and habits of practice
- Signature Pedagogies
- Deeply reflective about content, teaching, learning, **lesson development**
- Connected and Coherent Curriculum
- May use Lesson-Study as a way to improve pedagogy (Plan, Teach, Reflect, Replan, Reteach)

Problem-Based Instructional Tasks
(mathematics)

- Help students develop a deep understanding of important mathematics
- Emphasize connections, especially to the real world
- Are accessible yet challenging
- Can be solved in several ways
- Encourage student engagement and communication
- Encourage the use of connected multiple representations
- Encourage appropriate use of intellectual, physical, and technological tools

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(general)

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Signature Pedagogies
(mathematics)

- Potent teaching approaches that warrant common application
- Global to local application, individual teaching practices acknowledged and valued

(Phrase borrowed from Shulman, 2005)

Signature Pedagogies
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Some Signature Pedagogies
(mathematics)

- Teaching through problem solving
- Teaching through questioning
- Focus on sense making
- Functions approach to algebra
  e.g., graphs, situation involving two variables leads to factor, solve, graph
- Conjecturing approach to geometry
- Multiple representations
- In context can help
  e.g., F° and C° with inverse functions
- Use real data whenever possible
- Students actively engaged in investigating and learning important mathematics

Some Signature Pedagogies
(general)

- Teaching through problem solving
- Teaching through questioning
- Focus on sense making
- Understanding particular issues through broader themes
- Conjecturing approach to issues and themes (e.g., what ifs)
- Multiple representations (e.g., primary & secondary texts, audio, video)
- In contexts and real-world examples where possible
- Students actively engaged in investigating and learning important content

Assessing Students
(mathematics?I)

Four purposes of assessment at classroom level

- Sort students (assign a grade or select for college admission)
- Certify students (determine understanding of content)
- Diagnose students (identify learning needs)
- Evaluate instruction (judge the effectiveness of instruction; reteach if necessary)

(Norman Webb, UW Madison, Thoughts on Assessment in the Mathematics Classroom)

Assessing Students
(mathematics?II)

Good classroom assessment includes the following:

- Supports student learning
  (a means to improve learning not an end in itself)
- Uses multiple techniques (determine understanding of content)
- Is conceptually based (link to structure of knowledge)
- Track and report student progress (monitor growth in student understanding and provide constant feedback to students)

Assessing Students

(mathematics?III)

Valuable classroom assessment skills for teachers:

- Understand students' thinking
- Develop effective questioning techniques
- Constructing good tasks
- Good management of information (efficient and useful)
- Sampling students' work
- Constructing rubrics and scoring schemes
- Collaboration with others

Ten Principles of AfL
Assessment **For** Learning should . . .

- be part of effective planning and learning.
- focus on how kids learn.
- be recognized as central to classroom practice.
- be regarded as a key professional skill for teachers.
- be sensitive and constructive because it has emotional impact.
- take account of the importance of learner motivation.
- promote commitment to learning goals and a shared understanding of the criteria by which they are assessed.
- recognizes the full range of achievements of learners.

And AfL,

- Develops learners' capacity for self assessment so that they can become reflective and self-managing
- Learners should receive constructive guidance about how to learn.

Main Assessment **For** Learning Components

- Improve questioning strategies and techniques.
- Develop and implement models of self- and peer-assessment.
- Develop and refine good feedback techniques.
- Use summative assessments to inform and improve teaching.
- Develop a balanced, multiple-type assessment package.

(based on Black & Williams: Kings's, Medway, Oxfordshire Formative Assessment Project (KMOFAP))

An Activity in Higher-Order Thinking Bloom's Taxonomy

- Knowledge
- Comprehension
- Application
- Analysis
- Synthesis
- Evaluation

- Write an assessment item (question) for your discipline at each of the Bloom levels.
- What does your question tell you about what your student(s) know?

Verb Analysis

- For each document, count student action verbs using primary unit of analysis
- Calculate relative frequency of verb use by document

$$\frac{\text{number of occurrences}}{\text{total number of counted verbs}}$$

- Identify commonly used verbs
- Code commonly used verbs by cognitive demand based on Bloom's Taxonomy (consensus by committee)
- Construct charts and plots to analyze for commonalities and differences across documents

1	acknowledge	
4	analyze	
3	apply	
2	collect	
2	compare	
5	conduct	
2	construct	
1	count	
1	define	
2	describe	
5	design	
3	determine	
5	develop	
2	distinguish	
2	estimate	
2	explain	
3	explore, use to	
3	find	
5	formulate	
1	identify	
6	interpret	
1	know	
	order	
2	quantify	
1	recognize	
2	represent	
1	select	
3	show	
3	solve	
5	summarize	
2	understand	
3	use	

These are all of the verbs that have a relative frequency of more than .02 in any document.

#Occurrences / Total Verbs

How would you classify these verbs according to Bloom's Taxonomy?

1	acknowledge	
4	analyze	
3	apply	
2	collect	
2	compare	
5	conduct	
2	construct	
1	count	
1	define	
2	describe	
5	design	
3	**determine**	
5	develop	
2	distinguish	
2	estimate	
2	explain	
3	explore, use to	
3	find	
5	formulate	
1	identify	
6	interpret	
1	know	
	order	
2	quantify	
1	recognize	
2	represent	
1	select	
3	show	
3	solve	
5	summarize	
2	understand	
3	**use**	

Tough Decisions and Honest Feedback

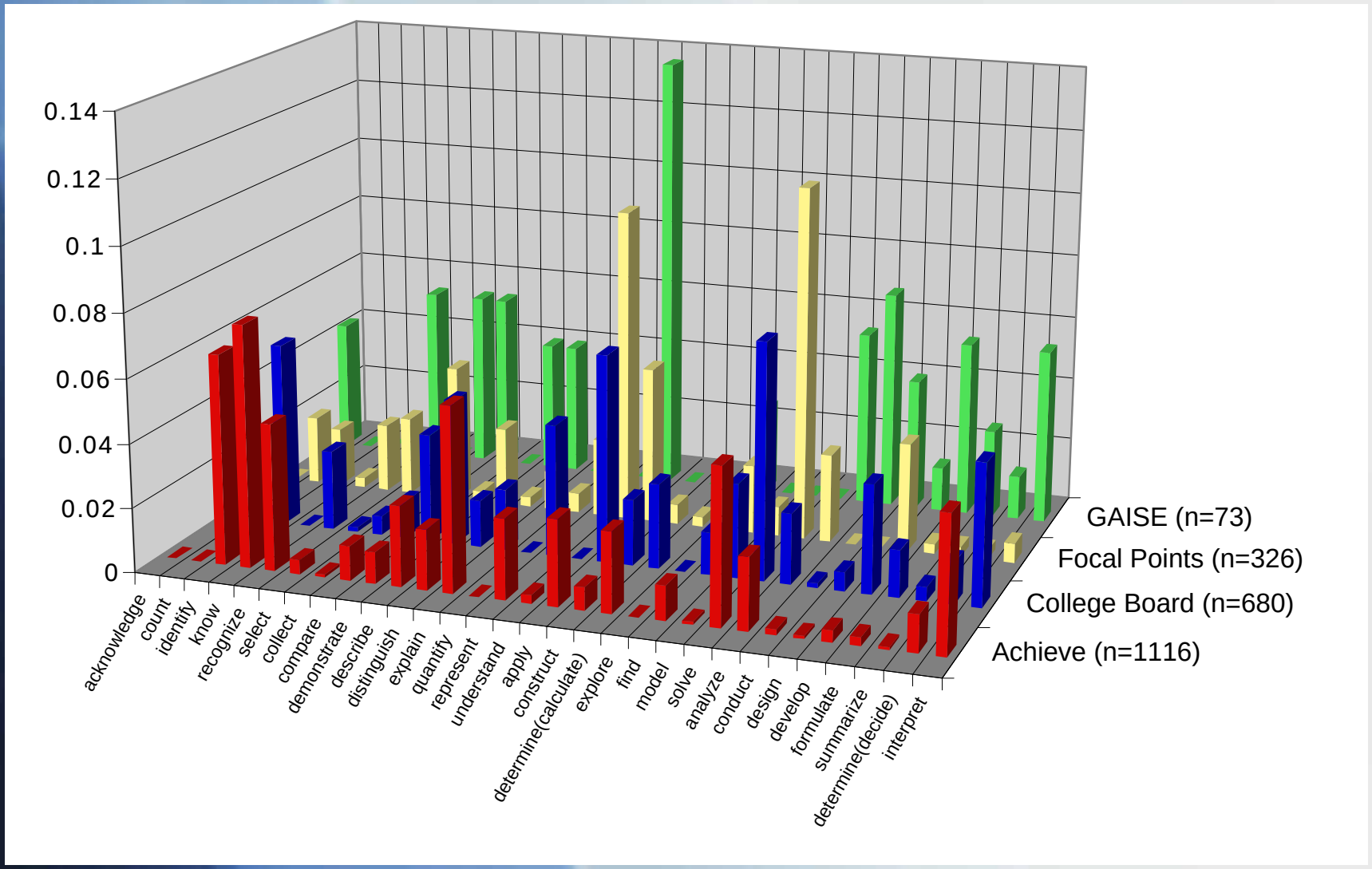
The Verb "Determine" can be coded in two ways:

1. Determine the number of solutions. (Calculate--level 3)
2. Determine if a linear model is appropriate. (Decide--level 6)

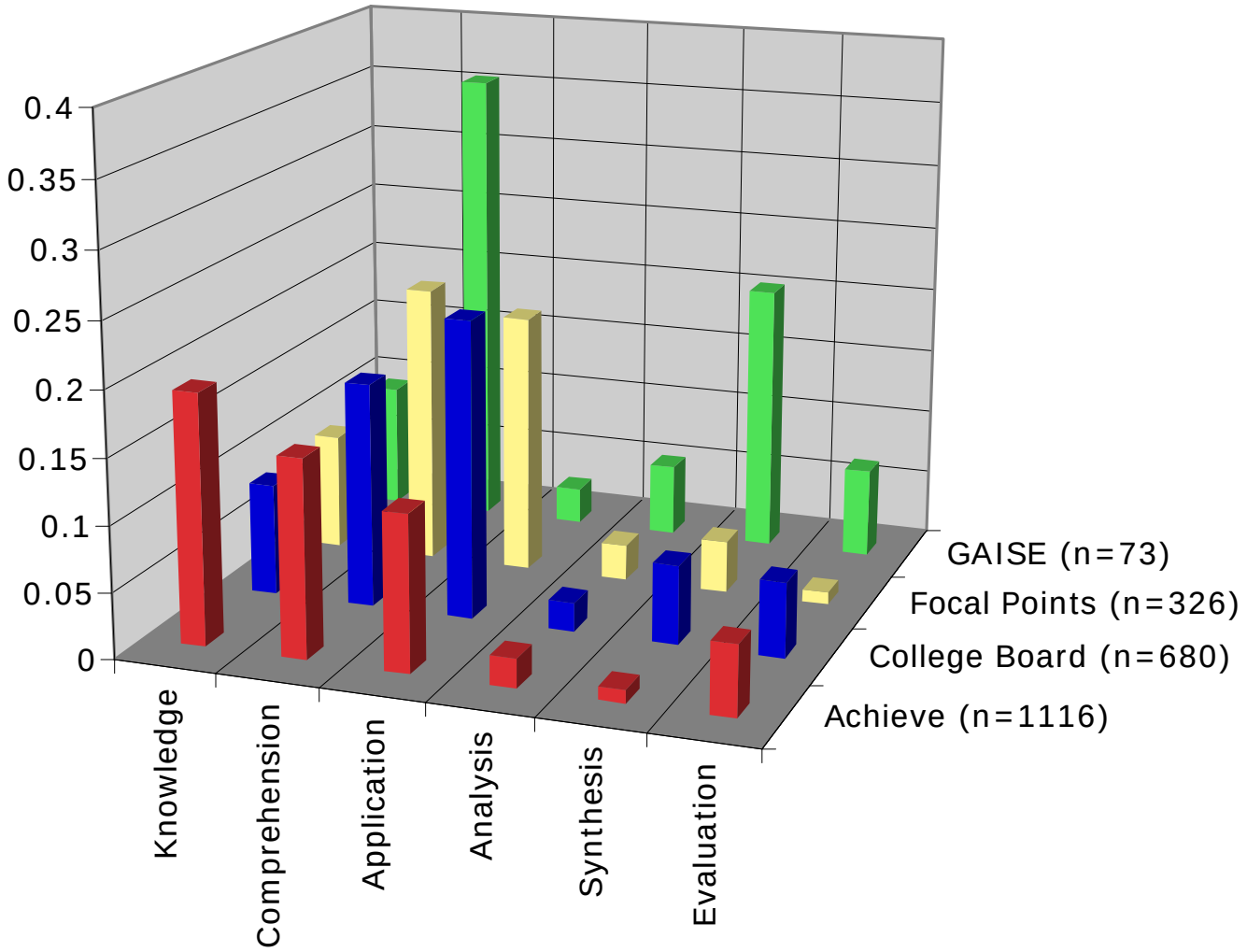
Decision: Recount and code them separately.

Most Frequently Used Verbs

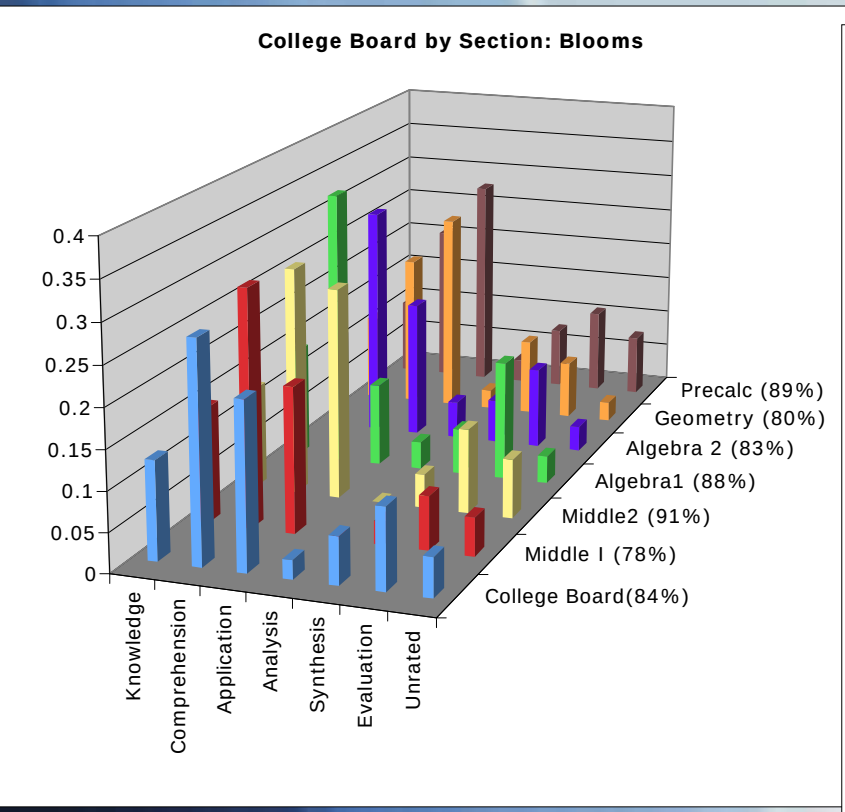
(≥.20 relative frequency in any document)

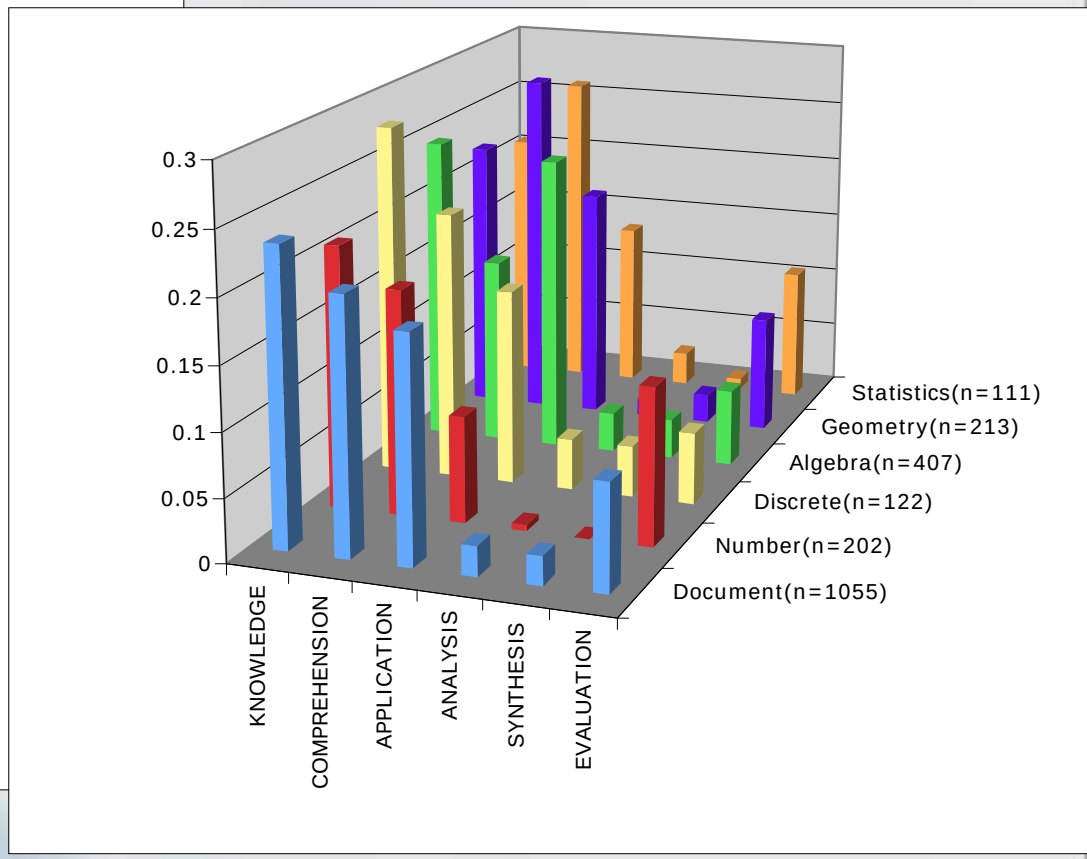


Most Frequently Used Verbs
Cognitive Demand



Achieve


College Board by Section: Blooms
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
Knowledge
Comprehension
Application
Analysis
Synthesis
Evaluation
Unrated
Precalc (89%)
Geometry (80%)
Algebra 2 (83%)
Algebra1 (88%)
Middle2 (91%)
Middle I (78%)
College Board(84%)


0.3
0.25
0.2
0.15
0.1
0.05
0
KNOWLEDGE
COMPREHENSION
APPLICATION
ANALYSIS
SYNTHESIS
EVALUATION
Statistics(n=111)
Geometry(n=213)
Algebra(n=407)
Discrete(n=122)
Number(n=202)
Document(n=1055)

So what?

- Taken as a whole, there are common themes. Clearly, there is some consensus about some topics that belong.
- There are some notable differences in the content of the documents.
- The authors of the documents *appear* to have different interpretations of what it means to learn, teach, and do mathematics, even in places where they agree on content.

An Activity In Higher-Order Thinking
Bigg's SOLO Taxonomy

- Pre-structural
- Unistructural
- Multistructural
- Relational level
- Extended abstract level

- Write an assessment item (question) for your discipline at each of the Bigg's levels.
- What does your question tell you about what your student(s) know?

Bigg's SOLO Taxonomy

- **Pre-structural:** students acquiring pieces of unconnected information, no organization, little overall sense
- **Unistructural:** students make simple and obvious connections, the significance of the connections is not demonstrated
- **Multistructural:** students make a number of connections, the significance of the connections is not demonstrated
- **Relational level:** students demonstrate the relationships between connections, students demonstrate the relationship between the connections and the whole
- **Extended abstract level:** students make connections beyond the immediate subject area, students generalize and transfer the principles from the specific to the abstract

(Biggs, J. (1995) Assessing for learning: some dimensions underlying new approaches to educational assessment. *The Alberta Journal of Educational Research*)

Peer & Self Assessment

- **Self Assessment:** help students to understand goals and assess how they can reach them; think of work as a set of goals; structure and organize their work to achieve the goals; initial attempts are often unsuccessful; establish feedback by comments and create environments of where feedback is safe and valuable can help.

- **Peer Assessment:** may be a prior requirement to self-assessment, may improve motivation to work carefully knowing others will be assessing their work; language is usually in language kid's understand and can relate to, feedback from the group may be more valuable or more powerful than from one-on-one with the teacher; may free time up for teachers to employ other assessment techniques such as observations.

- **Sources:** Handout

Next Week: Evaluation Cafe
Session III: Benchmarking Project