Effective Teaching Strategies

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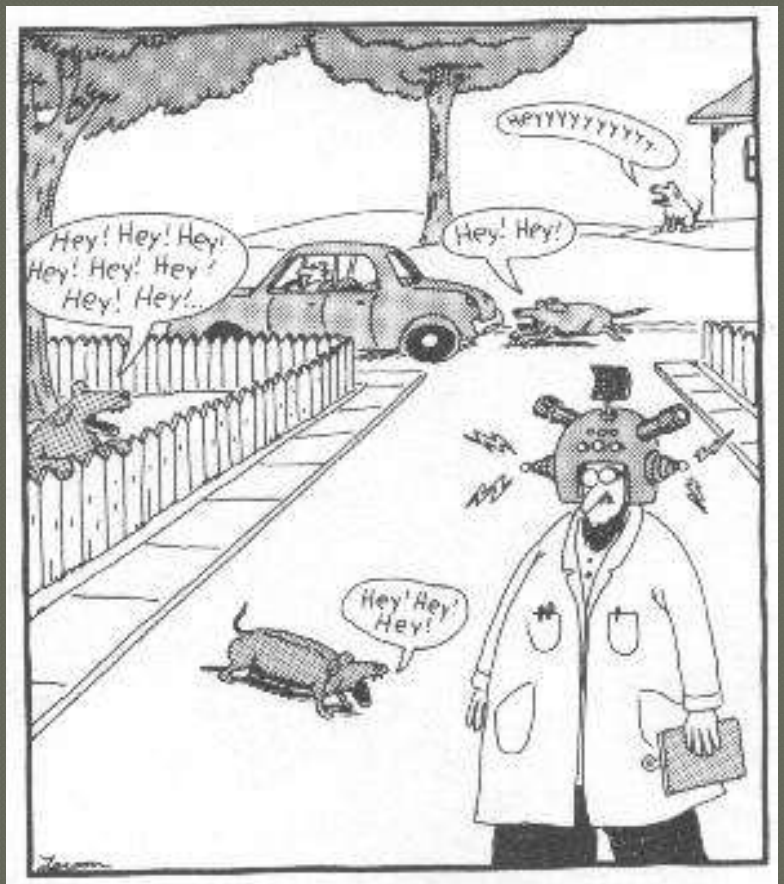
Have you had this experience?

How do you know if your students "get it"?



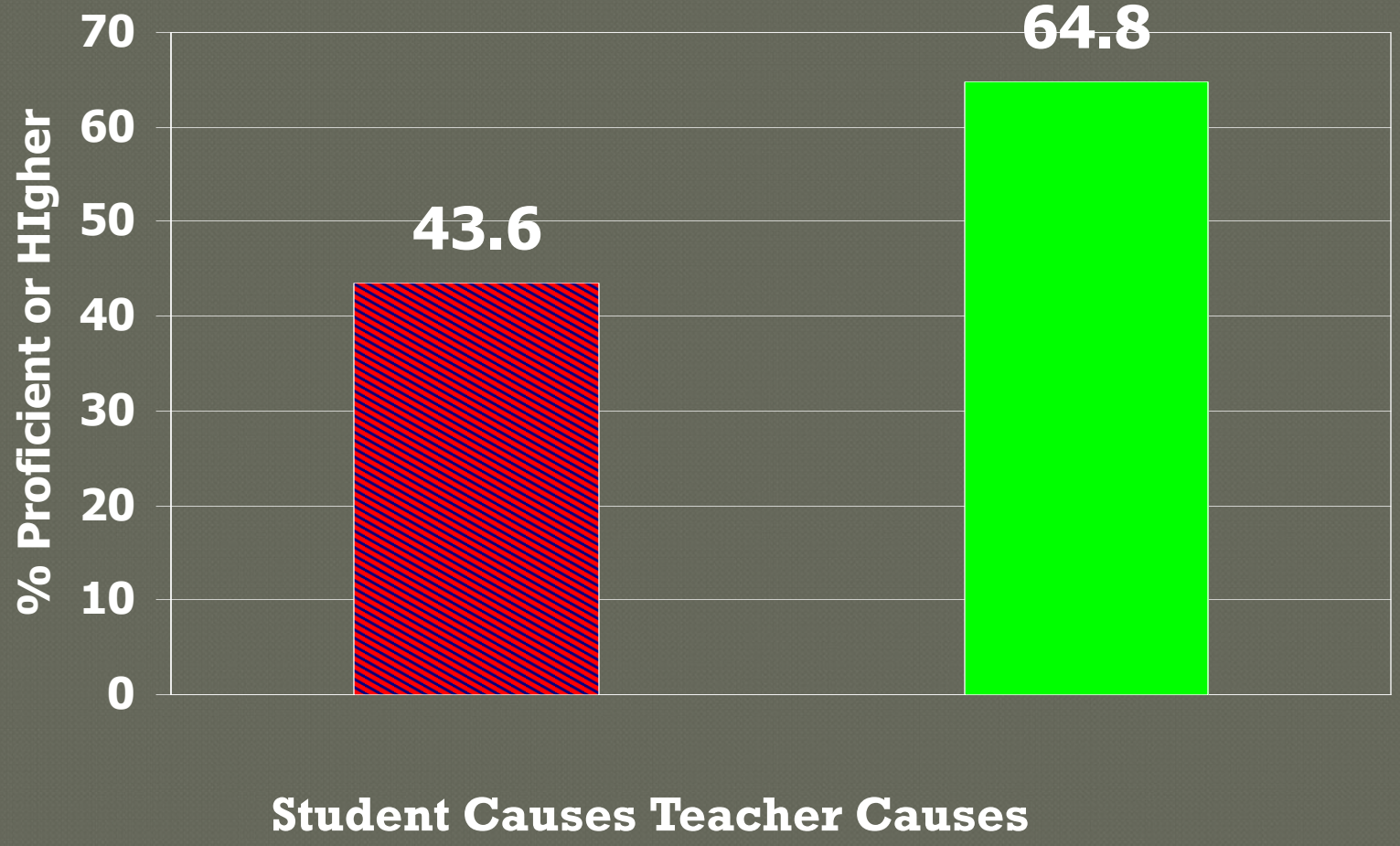
Donning his new canine decoder, Professor Schwartzman becomes the first human being on Earth to hear what barking dogs are actually saying.

Generate Hypotheses

- Same population – diversity:
  - minority, ELL, Low SES, Sp.Ed
- Same class size
- Same schedule, materials, curriculum
- Teacher A: 18% of students proficient
- Teacher B: 82 % of students proficient

ACTIVITY: *Develop hypotheses about causes of differences of success*

If you think that teachers and leaders influence student achievement, you are right!



Source: Center for Performance Assessment, *Leadership for Learning* (2005): www.MakingStandardsWork.com.

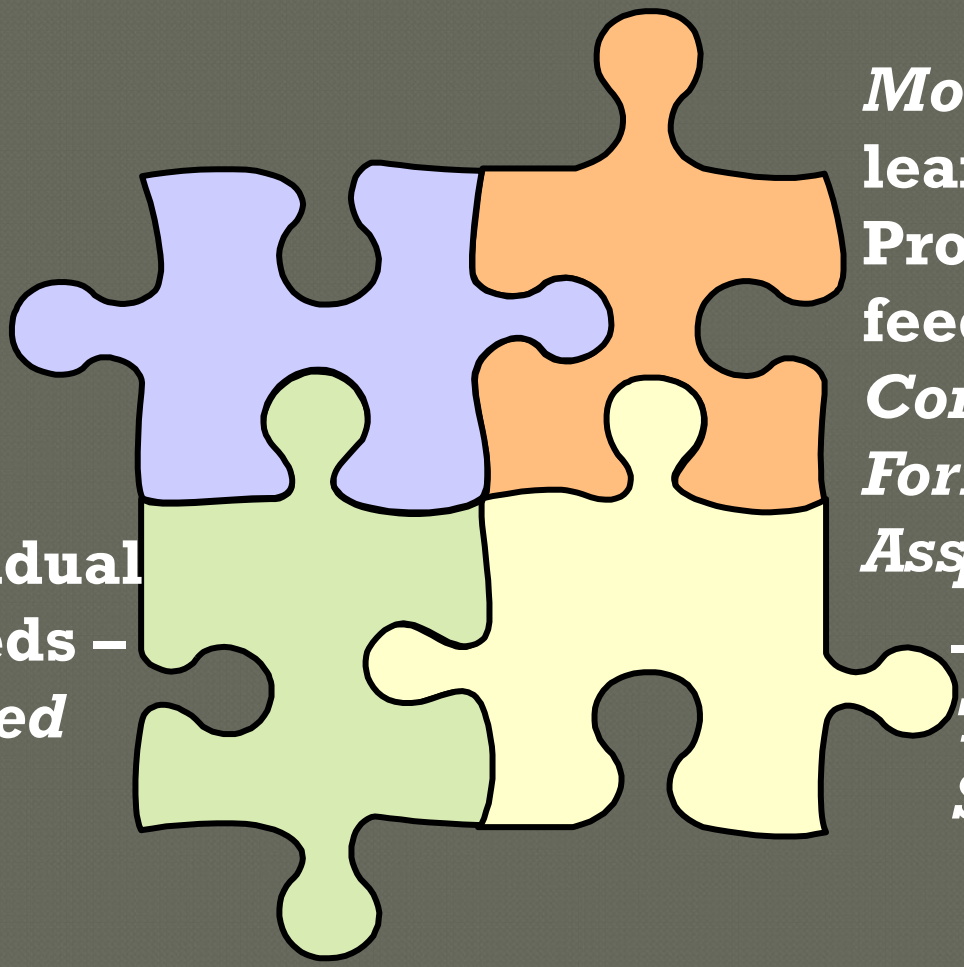
Effective Teaching Strategies

- You already do these – this is NOT new!
- ETS connects teaching strategies with research showing which works with what objectives
- Key to success
  - Connecting lesson plan objective with specific teaching strategies
  - Familiarity with the ten strategies
  - Applying the strategies to specific teaching context
  - Using easy and frequent formative assessments to plan for future application of strategies

Connect the Pieces: What *Every* Learning Team Must Know and Do

What* must be learned – *Priority Standards

Meet* individual student needs – *Differentiated Instruction



Monitor* learning, Provide feedback - *Common Formative Assessments

How* to teach – *Effective Teaching Strategies

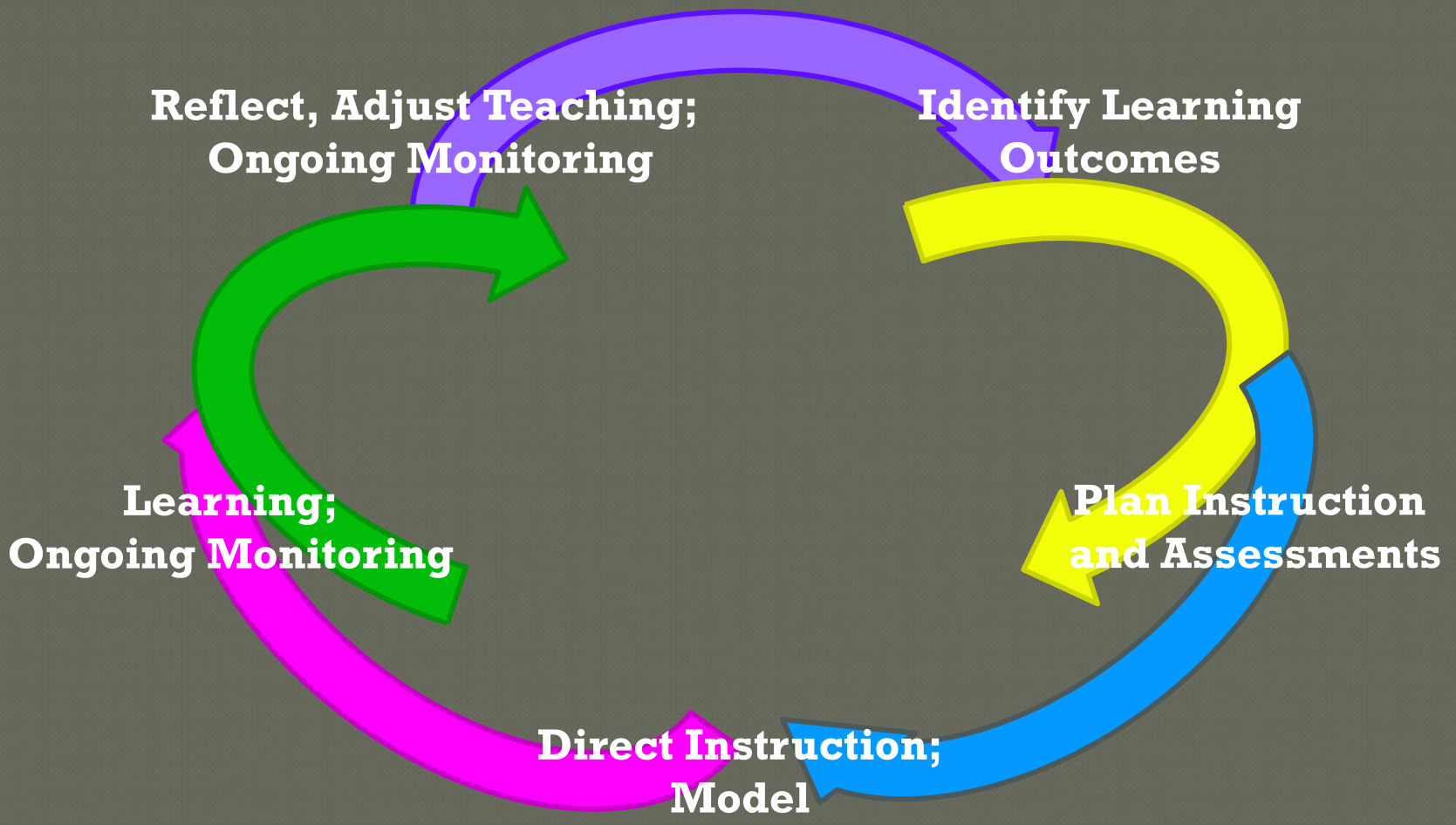
Setting Context for ETS

Data Teams/Learning Teams/Professional Learning Communities –

1. Generate, Collect, Graph Data
2. Analyze, Identify Obstacles, Prioritize
3. Set Goal(s)
4. Determine Instructional Strategies*
5. Identify Results Indicators

*Natural extension: Collaborative Lesson Planning

Student Learning Cycle: Teaching, Assessing, Reflecting



Point to Ponder …

"Optimal learning is a direct result of effective instruction which is a direct result of essential and thorough lesson planning."

Nan Woodson

Synthesis of Studies

- Marzano, Pickering, and Pollock, *Classroom Instruction That Works (2001)*
- Reeves, *Accountability in Action, 2nd Edition (2004)*
- Reeves, *Accountability for Learning (2004)*
- Mendler, *Motivating Students Who Don't Care* (2000)
- White, *Show Me the Proof!* (2005)
- The "jury standard"

Most Effective Teaching Strategies?

- "Effective" = actions of the teacher that elevate or lift cognition of learners
- The simple question is, "Is it working for you?"
- What teaching strategies are most commonly used in your schools?

- ACTIVITY: Turn to someone next to you and discuss what types of teaching strategies work for you

What Does *Effective* Mean?

"The reflective process is at the very heart of accountability. It is through reflection that we distinguish between the popularity of teaching techniques and their effectiveness. The question is not 'Did I like it?' but rather, 'Was it effective?'"

Source: Douglas B. Reeves, *Accountability for Learning* (2004), p. 52.

Planning and Selecting Strategies

Strategies should be selected on the basis of 'best fit' related to:

- WHAT: Expected learning outcomes
- WHO: Learners (needs, interests, levels)
- WHY: Relevance, Enduring Understanding
- WHEN: Timing or stage of learning

WHAT: Expected Learning Outcomes

Starting Point: Expected learning outcomes

- State Standards
- District Power Standards/Objectives
- Unwrapped Standards: Content
  - Concepts – Information/Declarative Knowledge
  - Skills – Procedural/Application Knowledge

WHO: Learners

- Interests
- Strengths
- Processes
- Products or Evidence of Learning
- Choices/Options
- Differentiated Instruction

WHY: Relevance, Enduring Understanding

- Authentic learning opportunities
- Develop high level thinking skills/processes
- Applications in context of relevant topics, tools, examples
- Emphasis on connections

Activities lead to learning but the learning is for life…

WHEN: Timing/Stage of Learning

- Does the path to the intended learning include considerations of beginning, middle, and end/closure stages?
  - access and activate prior knowledge, building background
  - multiple, high-level guided practice
  - relevant, authentic independent applications

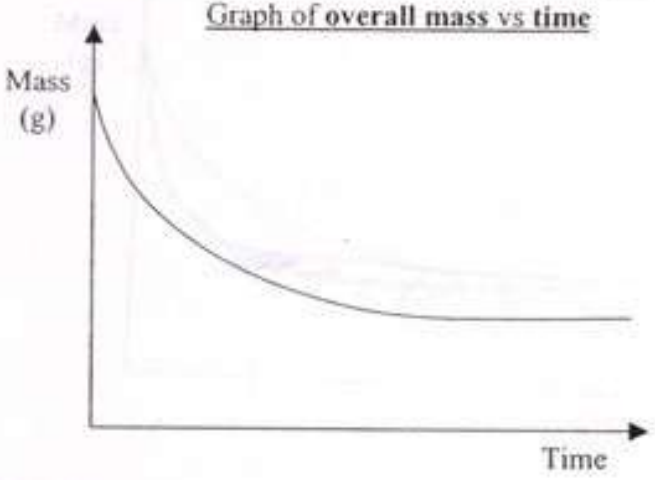
What DOES Work: "Top Ten Teaching Strategies"

1) Similarities and differences
2) Summarizing and note taking
3) Reinforcing effort and recognition
4) Homework and practice
5) Nonlinguistic representation
6) Cooperative learning
7) Objectives and feedback
8) Generate and test hypotheses
9) Questions, cues, advance organizers
10) Nonfiction writing

A Closer Look

Category:	***Achievement Gain (Percentiles):***
1. Identifying Similarities and Differences	45
2. Summarizing and Note taking	34
3. Reinforcing Effort and Providing Recognition	29
4. Homework and Practice	28
5. Nonlinguistic Representations	27
6. Cooperative Learning	27
7. Setting Objectives and Providing Feedback	23
8. Generating and Testing Hypotheses	23
9. Questions, Cues, and Advance Organizers	22

Can your students do this?



1. Explain the shape of the graph.

It's curvy, with a higher bit at the end and a rather aesthetically pleasing slope downwards towards a pretty flat strait bit. The actual graph itself consists of 2 strait lines meeting at the lower left hand corner of the graph and moving away at a 90° angle. Each line has an arrow head on the end.

Category #1 – Similarities and Differences

Category – Similarities and Differences

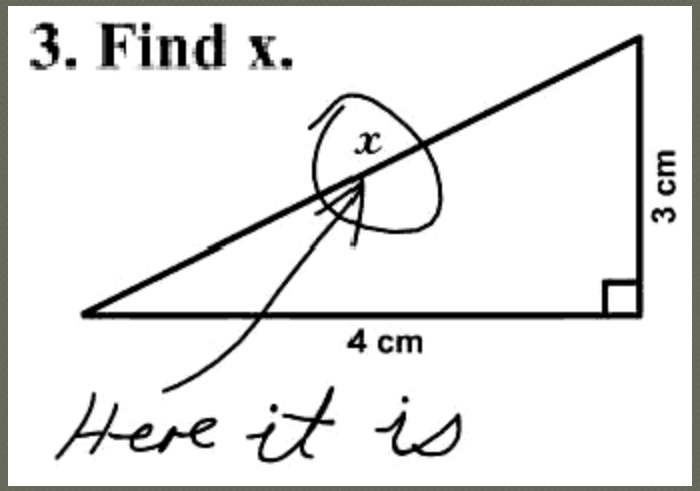
- Key premises
  - Basic to human thought
  - Core of all learning and thinking
- Strategies/Techniques
  - Compare
  - Classify
  - Metaphor
  - Analogy

Comparing Math Concepts

Characteristics	Linear Functions	Non-Linear Functions	Similarities/ Differences
Graphs	Straight line	Curves	Sim – can be graphed (both functions)
			Diff - appearance
Degree	First degree	Second degree or higher	Sim – has x, y
			Diff – exp/logs in non-linear functions
Solving	Substitution Factoring Simultaneous equations	Factoring Simultaneous equations	Sim – factoring, simultaneous
			Differences

Category #2 – Summarizing and Note Taking

Solving for "X"



Category – Summarizing and Note Taking

- Key Premises
  - Two of the most useful academic skills students can have
  - Note taking *then* summarizing
  - Templates help students organize thinking
- Techniques
  - Note taking
  - Summarizing

Lunch and fun times for all

- A special prize will be awarded to any who can solve this puzzle over lunch (must be back by 1pm to claim prize)

The missing dollar

- **Three men go to stay at a motel, and the man at the desk charges them $30.00 for a room.** They split the cost ten dollars each. Later the manager tells the desk man that he overcharged the men, that the actual cost should have been $25.00. The manager gives the bellboy $5.00 and tells him to give it to the men. The bellboy, however, decides to cheat the men and pockets $2.00, giving each of the men only one dollar.
- Now each man has paid $9.00 to stay in the room and 3 x $9.00 = $27.00. The bellboy has pocketed $2.00. $27.00 + $2.00 = $29.00 - so **where is the missing $1.00?**

Category #3 – Reinforcing Effort and Providing Recognition

Category – Reinforcing Effort and Providing Recognition

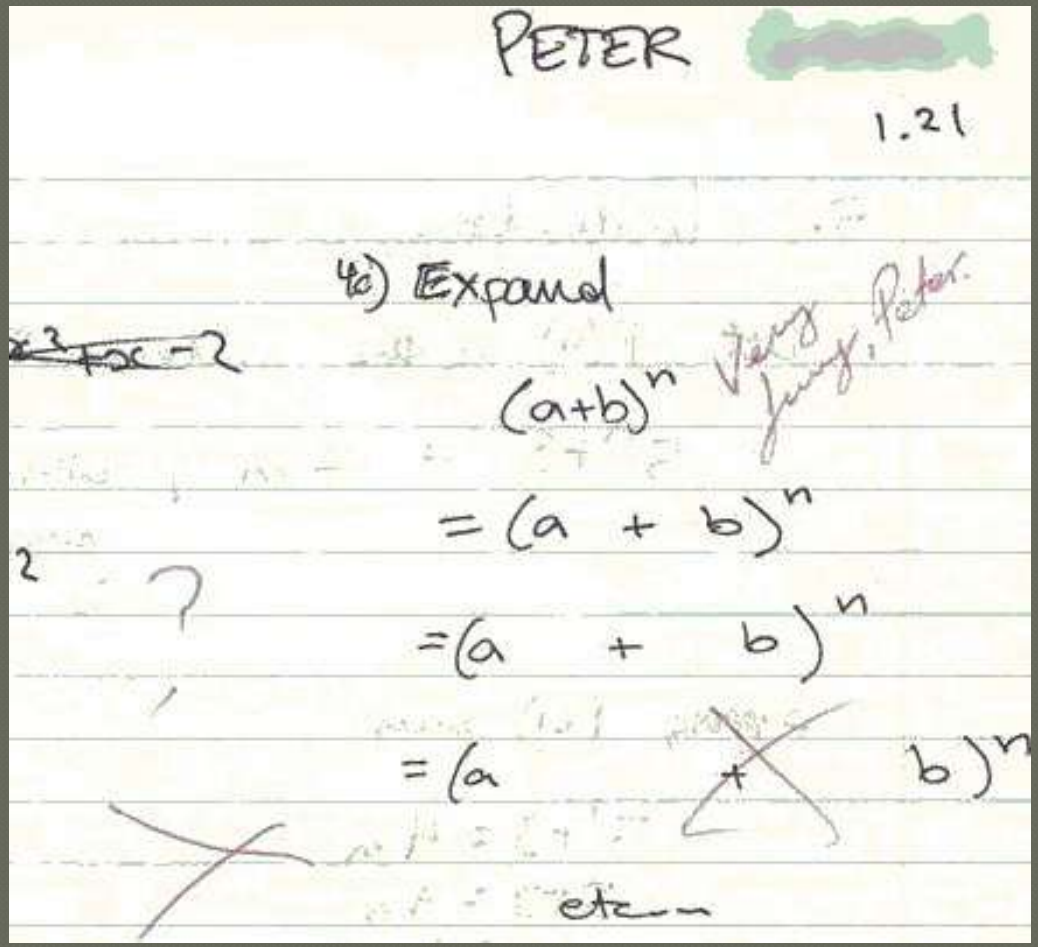
- Key Premises
  - Effort can be taught and learned
  - Increased effort = greater success
  - Recognize accomplishments that go above and beyond what is expected
- Techniques
  - Effort/Motivation
  - Providing Recognition

Category #4 – Homework and Practice

Category – Homework and Practice

- Key Premises
  - Both provide students with opportunities to deepen their skills relative to content
- Techniques
  - Homework
  - Practice

Homework –what a headache



Strategy: Homework

- Vary amount of homework by grade level; general guideline of 10 minutes per grade level
- Minimize parental involvement
- State purpose of homework
- Create time for homework to be completed DURING SCHOOL
- Provide feedback on assignments

Strategy: Practice

- Massed/Focused practice - skills and processes: frequent repetitions
- Mastering a skill requires:
  - appropriate focused practice
  - 24 repetitions = 80% competency
- Distributed practice - concepts: develop understanding through experiences and applications over time

Welcome to Day 2 – more fun!

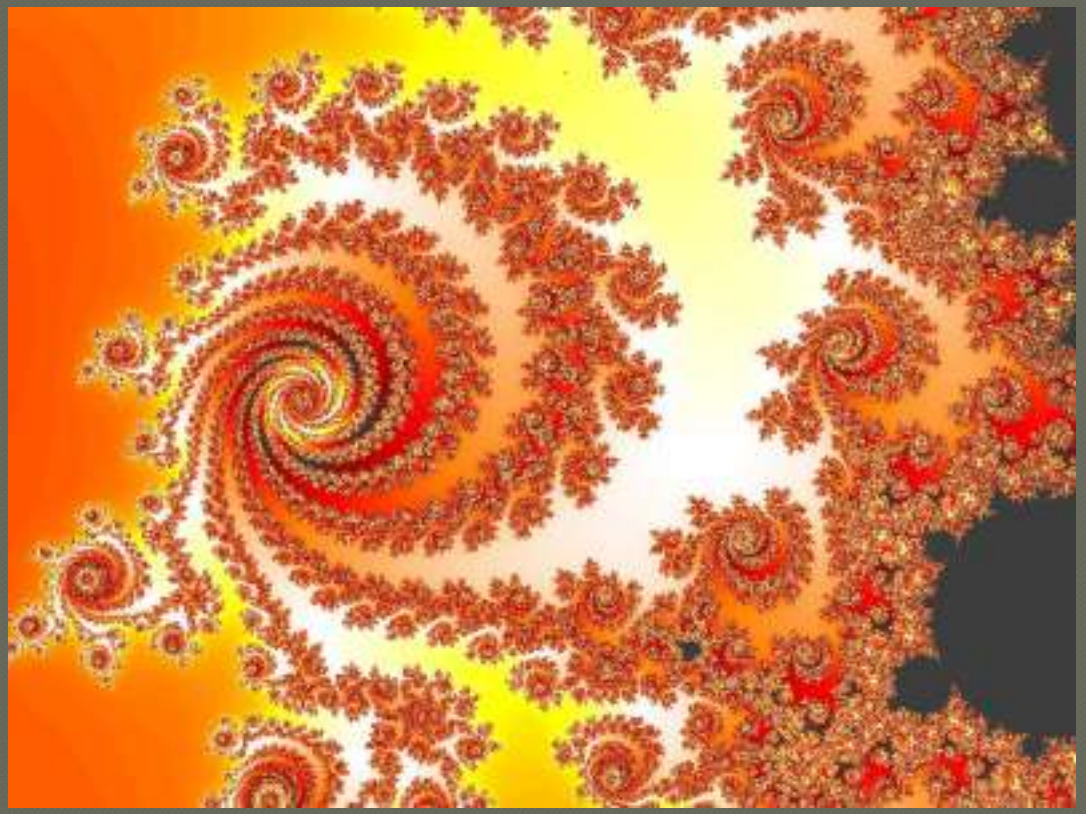
- Let's all sing along!
- Let's play the game of algebra (rpt)
  Alge alge brr brr brr (rpt).
  Let's play the game of algebra.
  The object is to capture X…
  First of all combine like terms…
  Get all the X's on one side…
  Get constants on the other side…
  Divide to get X all alone
  You've won the game of algebra

Reflection – what works for you?

- Last time we talked about
  - Identifying similarities and differences
  - Summarizing and note taking
  - Reinforcing effort and providing recognition
  - Homework and practice

- Take 5 minutes to discuss if you have tried any of these strategies which ones worked best and which didn't.

Category #5 Non-linguistic representation



Non-linguistic representation

- Turning the abstract into the real
  - Kinetic Learning – let's move it!
  - Graphic organizers – what do you use?
  - Manipulatives – making those möbius strips
  - Generating mental pictures – going 4-D
  - Looking/making pictures – an art/math connection

Category #6 Cooperative Learning

What can we do together?

Cooperative Learning

- On the chart list the pros/cons of using cooperative learning or flexible grouping techniques
- List several situations when it is helpful to use this strategies and other situations when it is not
- What are some ways you group students when you do so?

Cooperative Learning

- What does research tell us?
  - Use homogeneous groups sparingly

  (low ability students lose ground, medium ability students gain ground and high ability students are not significantly affected)
  - Students do best in small groups (3-4)
  - Use it consistently and systematically but not too often

Category #7 Setting Objectives and Providing Feedback

Setting Objectives

- Helping students set their own goals
  - Narrows the focus
  - Personalizes learning
  - Avoid goals that are too specific – limits learning
- Think about a personal or professional goal that you set for yourself and achieved.
  - Discuss what qualities of this goal made it succeed for you
  - Discuss how achieving this goal made you feel

Providing Feedback

- How were you told how you were doing in school?
- Did you have an opportunity to improve your work?
- Did you think you were graded fairly? Why or why not?

- What type of feedback would help your students improve? List the qualities

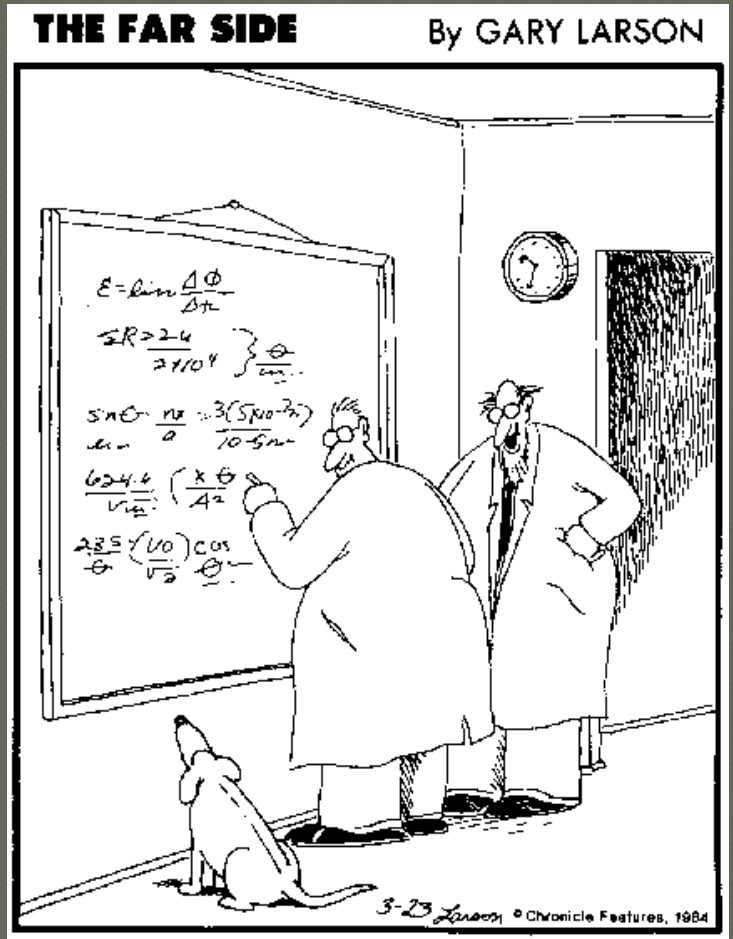
Lunch time puzzler

- **Chickens and Pigs**
- A farmer has some pigs and some chickens. He sent his son and his daughter to count how many of each he has. "I counted seventy heads," said his son. "And I counted two hundred legs," said his daughter. How many pigs and how many chickens does the farmer actually have?

The Solution

- Thirty pigs and forty chickens. Each chicken has 2 legs, and each pig has 4 legs. Since the number of heads is 70, the number of legs must be 140 plus 2 additional legs for each pig. Which account for the remaining 60 legs. Thus, the farmer has thirty pigs and forty chickens.

Category #8 Hypothesis Testing



Hypotheses Testing

- Students do this much of time: "When I do this, then this will happen"
- Generates rules, structures, principles, reasoning/rationale
- Many approaches:
  - Problem solving
  - Decision making
  - Historical investigation
  - Systems analysis

Hypotheses Testing

- List several math problems (statistics, matrix, equations) where students can use this strategy to find a pattern that defines a rule. (1,3,5,7,11 …
- Conditional statements; What "if" – "then" statements can be used in various disciplines of math? Write out two cards each that students would need to complete. (e.g. If x = 3a then 2x = ?)

Category #9 Cues, Questions and Advanced Organizers

Cues and Questions

- Sorts the important from everything else
- "Higher level" questions help student produce deeper learning.
  - "Why did you choose to solve the problem in this way?"
  - "How does this topic relate to our previous topic?"
  - "How else can you solve this problem?"
  - "How is this type of math used in the real world?"

Cues and Questions

- Wait time is critical – find ways to allow as many students as possible think of the answer before choosing a respondent
- Cueing allows student to anticipate learning
  - Post essential or focus question
  - Show picture or problem as a warm up activity
  - Telling students before a video clip what to look for

Advanced organizers

- Look at the graphic organizers and determine one instructional circumstance where you might be using it to help students structure their learning. Use post – its on the poster organizers and share out.
- Go to http://www.opencourtresources.com/thinking_maps/ for resources

Non-Fiction Writing

- Power of Non-Fiction writing –
  "Generous amounts of close, purposeful reading, rereading, writing, and talking are the essence of authentic literacy. These simple activities are the foundation for a trained, powerful mind—and a promising future."

Source: Mike Schmoker, *Results Now* (2006), p. 53

Non-Fiction Writing

A proof should be simple and elegant

What are other forms of math non-fiction writing?

Benefits of Nonfiction Writing

- Writing is thinking while connecting the dots
- Writing can encourage logical thought!
- Writing is reflection
- Writing and revision result in complex thinking, the making of connections, the interpretation of patterns, the production of thought

Math writing

- Journals – students can ask questions, pose questions, reflect on thinking (explain your answer), try new ways of solving problems, edit each others work etc.
- Technical writing is different from creative writing – proofs, definitions, expressions vs equations, vocabulary
- Applying what is learned to the "real world"

Writing Assessment

- KISS (keep it simple Sam!)
- Use the SAME rubric throughout the year
- Have students peer – edit work – use "stickies"
- Be consistent format and expectation
- Explain why "real" mathematicians have to communicate in their jobs. (e.g. we crashed a multi-million dollar probe into Mars one year b/c Canadian engineers used metric units in their telemetrics)

Gallery Walk

- Take the time to look at each strategy and find at least one application for your classroom
- Write them on the note cards and discuss with your group. List promising practices/challenges on sheet. (one per group)

Evaluation and Feedback

Your ideas and reflections are important to us. Please take time to complete and turn in the short evaluation form provided for you.