Response to Intervention: Making Science Accessible to All Learners

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Science is on the Rise

- Between the years of 2000 and 2016 it is estimated that….

-the 2 areas that will have the greatest demand for professionals are

1.) Healthcare

2.) Clean Energy Production and Environmental Protection

-Executive Office of the President's Council of Economic Advisors, 2009

Job Demand

- The growth of healthcare professionals will increase by 48%
- The growth of environmental professions will increase by 52%
- All other professions are anticipating an average of 13% growth

What kind of jobs can we expect to see in the future?

- Zero Energy Architects
- Digital Detectives
- Stem Cell Engineers
- Health Robotics Engineers
- Genetic Engineers
- Combined Heat and Power Mechanics
- ????

Will our students be prepared?

National Data

- National Assessment of Educational Progress

Science Skills Scores compared :

1996-2000-2005

-4th graders increased

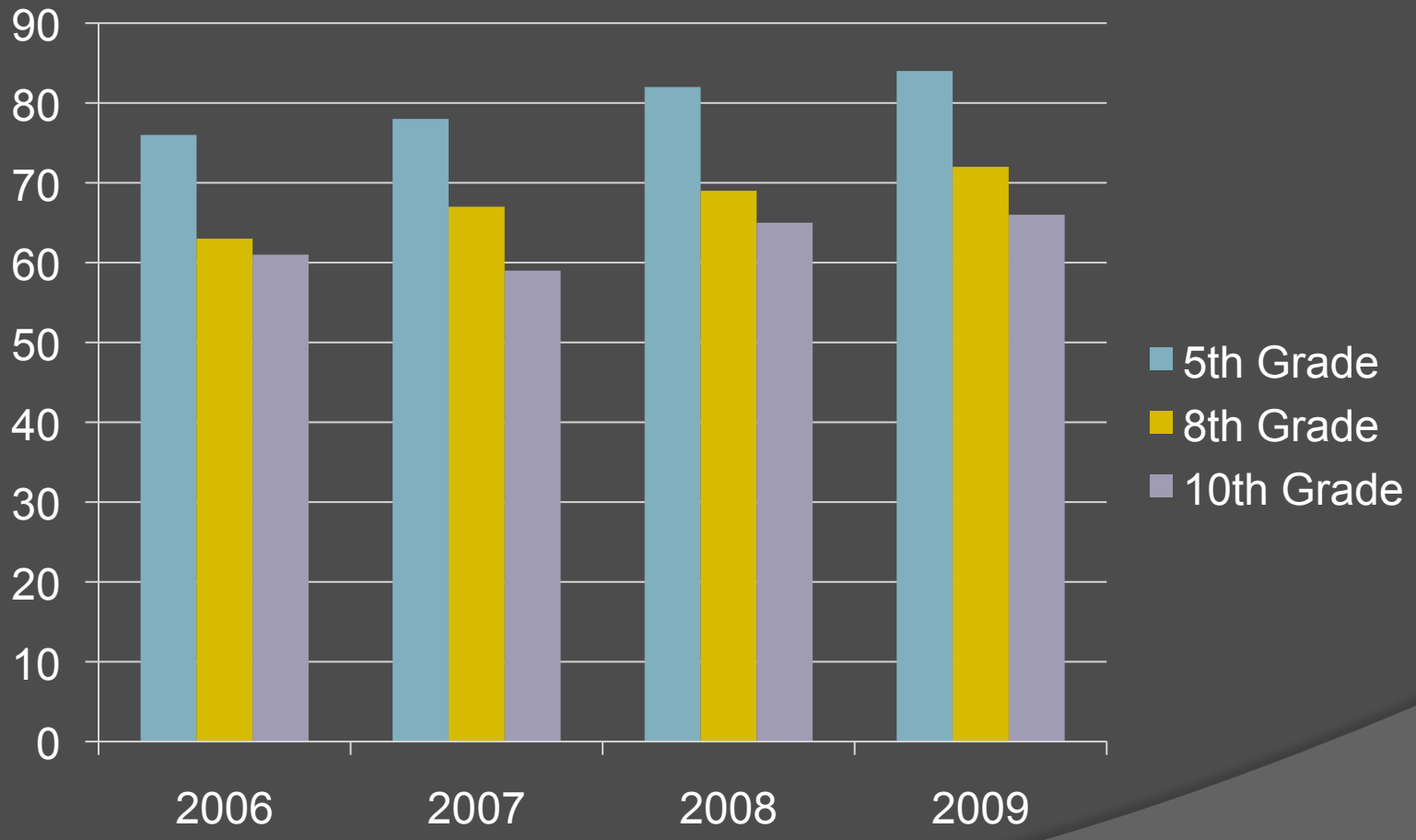
-8th graders showed no change

-12th graders decreased

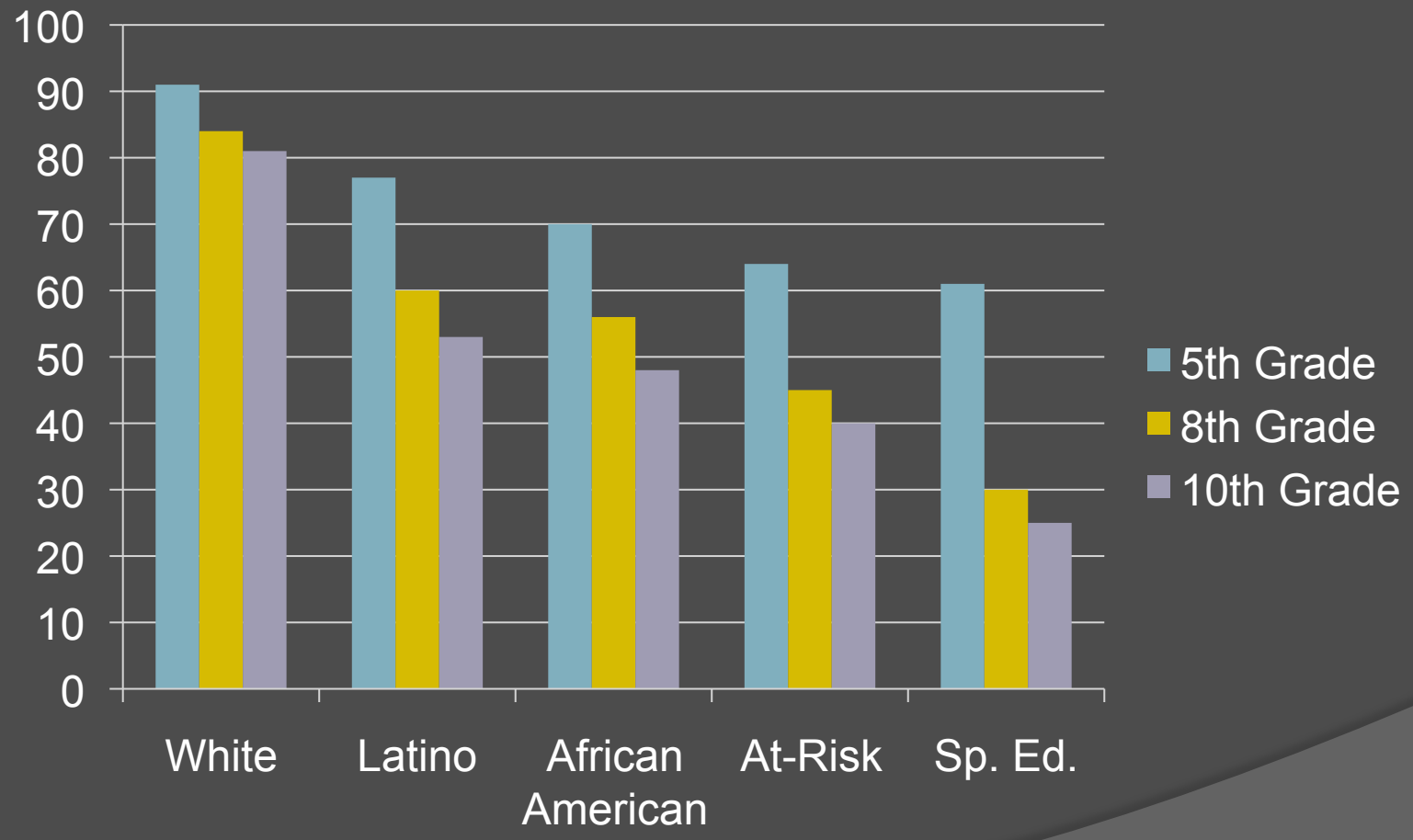
The State of Science in Texas

What does the data say?

Percent Passing TAKS



2008 TAKS Results by Population



Data by Objective- Elementary

Fifth Grade Mastery by Objective -2008	
Objective 1: Nature of Science	90%
Objective 2: Life Science	90%
Objective 3: Physical Science	87%
Objective 4: Earth Science	75%

Data by Objective- Middle

8th Grade Mastery by Objective- 2008	
Objective 1: Nature of Science	77%
Objective 2: Life Science	75%
Objective 3: Matter	72%
Objective 4: Forces, Motion & Energy	78%
Objective 5: Earth and Space Science	68%

Data by Objective- High

10th Grade Mastery by Objective- 2008	
Objective 1: Nature of Science	75%
Objective 2: Organization of Living Systems	68%
Objective 3: Interdependence of Organisms and the Environment	67%
Objective 4: Structure and Properties of Matter	61%
Objective 5: Motion, Force and Energy	72%

Thinking about the Future

- How do we prepare our students to pass TAKS?
- How do we prepare our students to graduate from high school?
- How do we prepare our students to get to and through college?
- How do we prepare our students to be successful professionals?

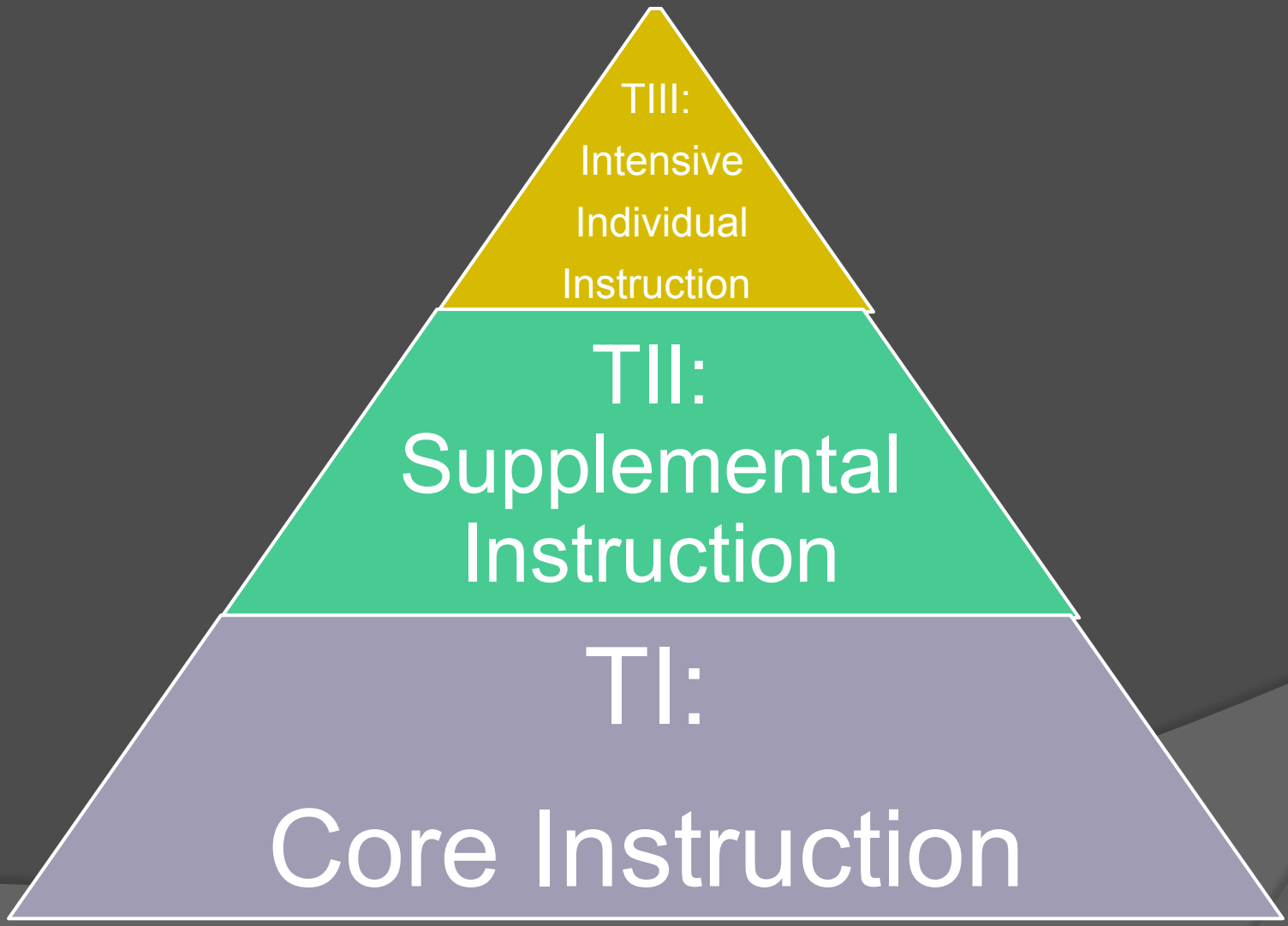
We are not reaching all of our students.

What do we do?

RtI Research

- UT, Austin-Vaughn Gross Center for Reading and Language Arts
- Intervention program for early readers to prevent learning difficulties in later grades- research in grades K-3
- Three Tier Model

Response to Intervention Model



Tier Descriptions

- Tier I
  -all students
  -core curriculum
  -progress monitoring
  -ongoing professional development
- Tier II
  -students not making adequate progress in Tier I
  -small group
  -students that “catch up” move back to Tier I
  -students that continue to struggle are moved to Tier III
- Tier III
  -small group or individual
  -longer periods of instruction

RtI Controversy

- Small research base but universal implementation
- No consistent model
- Overrepresentation/tracking
- Meeting students needs/Teacher preparation
- TAKS-based? What is our goal?
- What does RTI look like in other subjects?

So.....

Where do we start?

Tier I

Where are we at with our core instruction?

Success in Science- Tier I

- 5 main foci

1.) Effective Lesson Planning

2.) Engaging Students

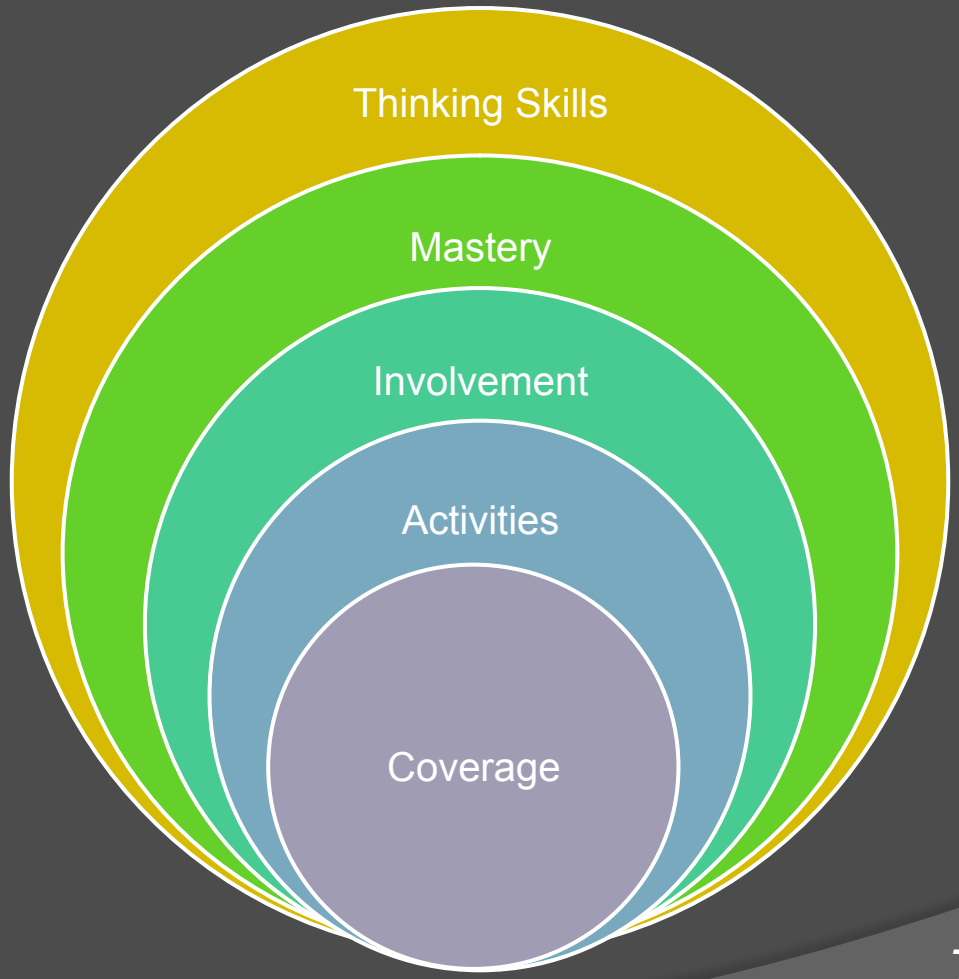
3.) Making Content Comprehensible for All Learners

4.) Developing Academic Language

5.) Assessment

1.) Effective Lesson Planning

The Importance of Planning



The Skillful Teacher-
Saphier & Gower

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Saphier & Gower

"A clear objective articulated by a teacher in terms of student mastery is the indispensible anchor of good daily lesson planning. The quality of one's thinking about objectives during planning directly accounts for the effectiveness of student learning experiences."

Using the TEKS

1.) Know your TEKS- don't rely on textbooks, supplemental materials (Texas Standards)

2.) Plan with the END in mind.

-What concepts do you want your students to understand?

-What academic language are you hoping to develop?

-What connections do you want to make past learning/ experiences?

-What tools do you want them to be able to use? (vocabulary, measurement tools, scientific skills)

-What future concepts do you want them to be prepared for?

3.) Essential Questions-Lesson Planning

4.) Assessment

2.) Engaging Students: The First “E”

Strategies that Work:

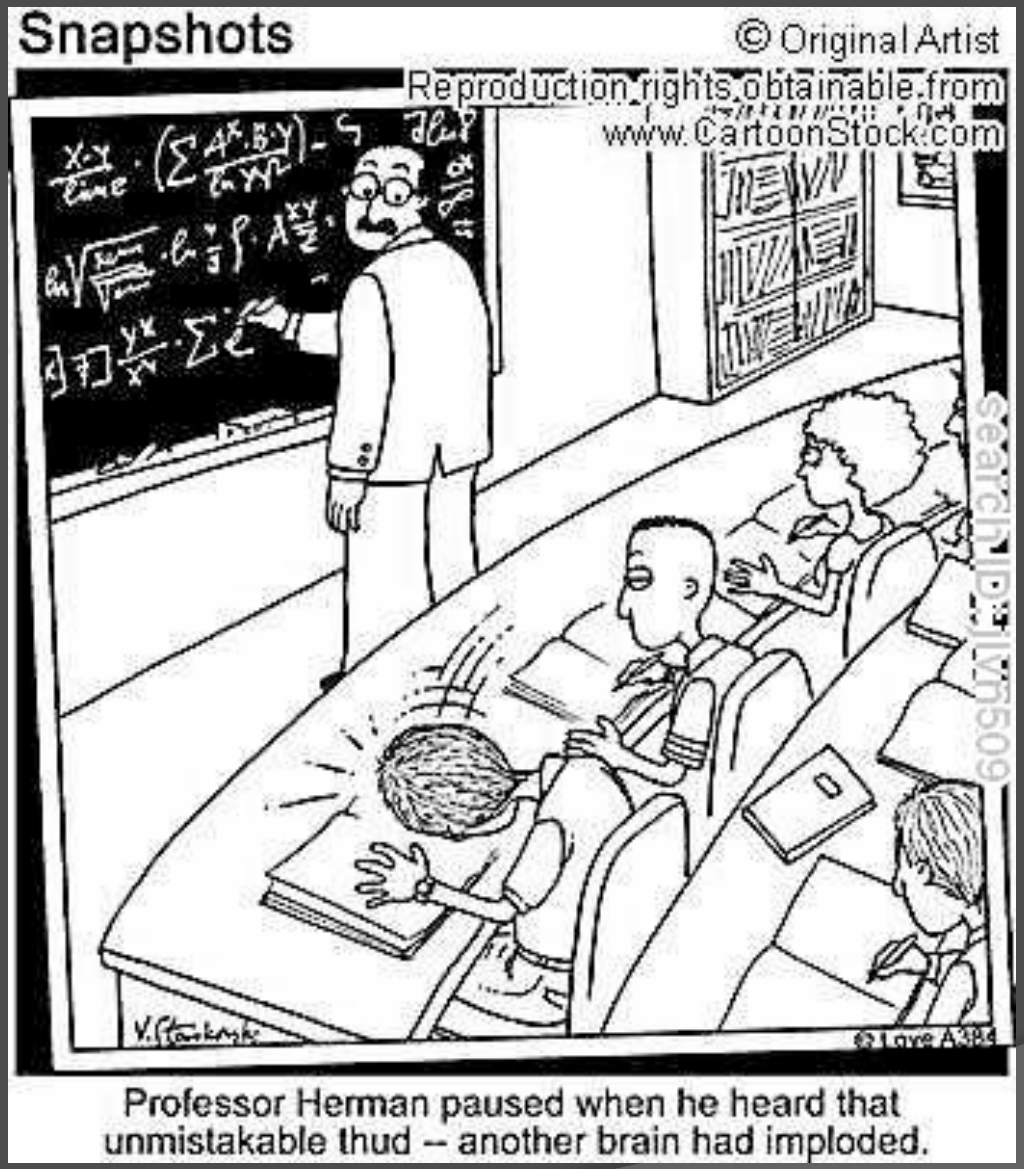
- Audio and Visual Media
- Podcasts
- Relevant Problem Solving
- Music
- Games
- Word Splashes
- Anticipation Guides
- Demonstrations
- Read Aloud

3.) Making Content Comprehensible

9 Strategies Most Likely to Improve Student Achievement

- Identifying similarities and differences
- Summarizing and note taking
- Reinforcing effort and providing recognition
- Homework and Practice
- Nonlinguistic Representations
- Cooperative Learning
- Setting Objectives and Providing Feedback
- Generating and Testing Hypotheses
- Cues, Questions and Advance Organizers

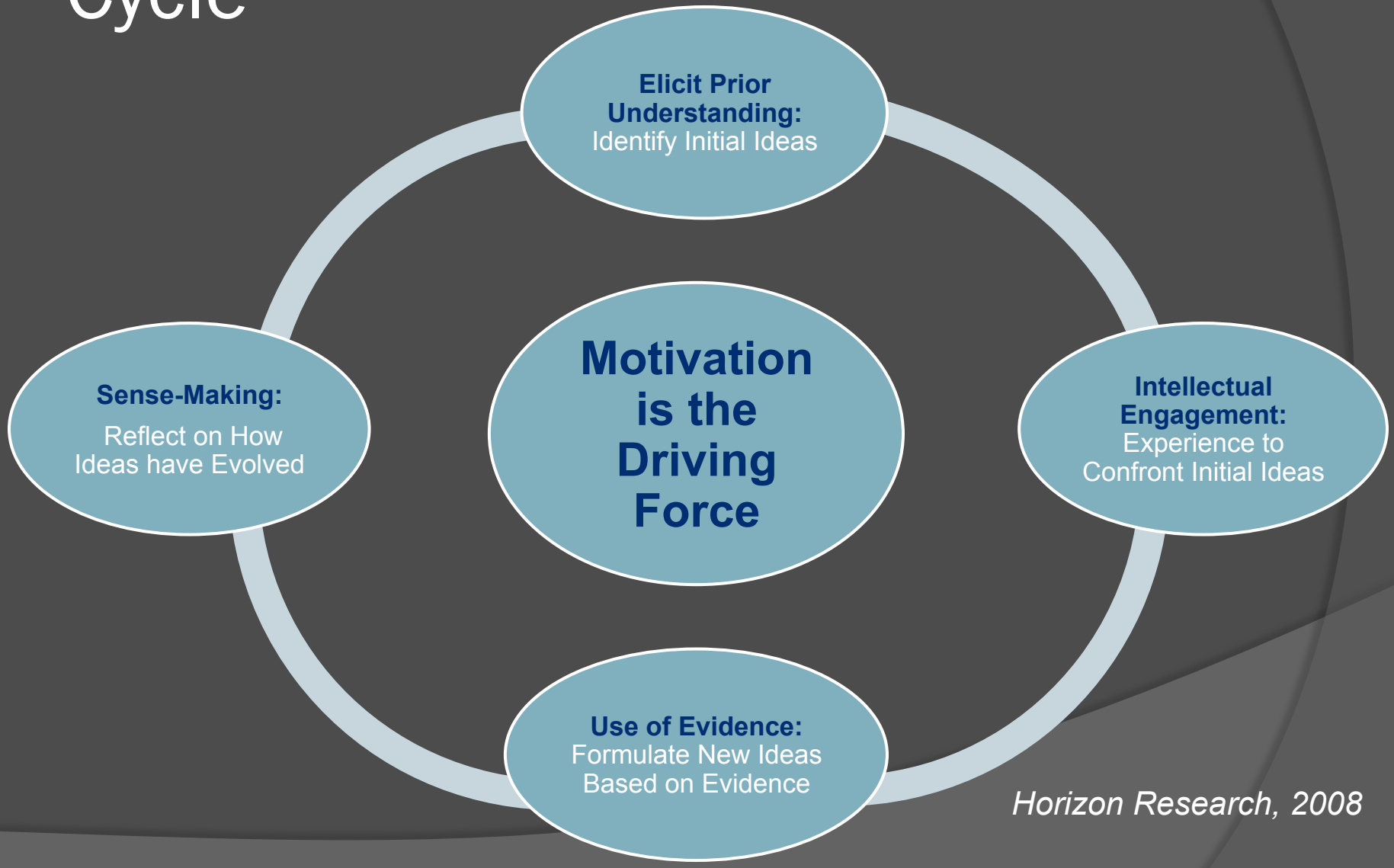
Classrooms that Work-
Marzano, Pickering and Pollock



Professor Herman paused when he heard that unmistakable thud -- another brain had imploded.

Academic Achievement

Effective Science Instruction Cycle



Horizon Research, 2008

Comparing Instructional Strategies

Less Effective

- **Teacher Lead**
- **Students Work Independently**
- **Memorization**
- **Text Driven Lessons**
- **Classroom is Quiet**
- **Pull Out**

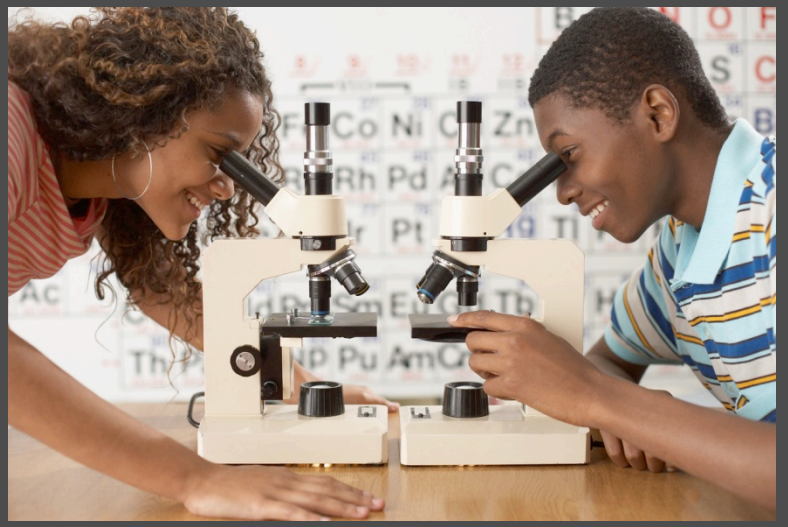
Modern

More Effective

- **Student Lead**
- **Students Work Cooperatively**
- **Internalization**
- **Inquiry Driven Lessons**
- **Students are Talking**
- **Sheltered Instruction**

Strategies that Work:

- Visuals
- Hands-On
- Kinesthetic Learning
- Varied Interactions:
  - -Whole Group
  - -Small Group
  - -Partners
- Multiple Presentations
- Frequent Formative Assessment



Engagement=Motivation

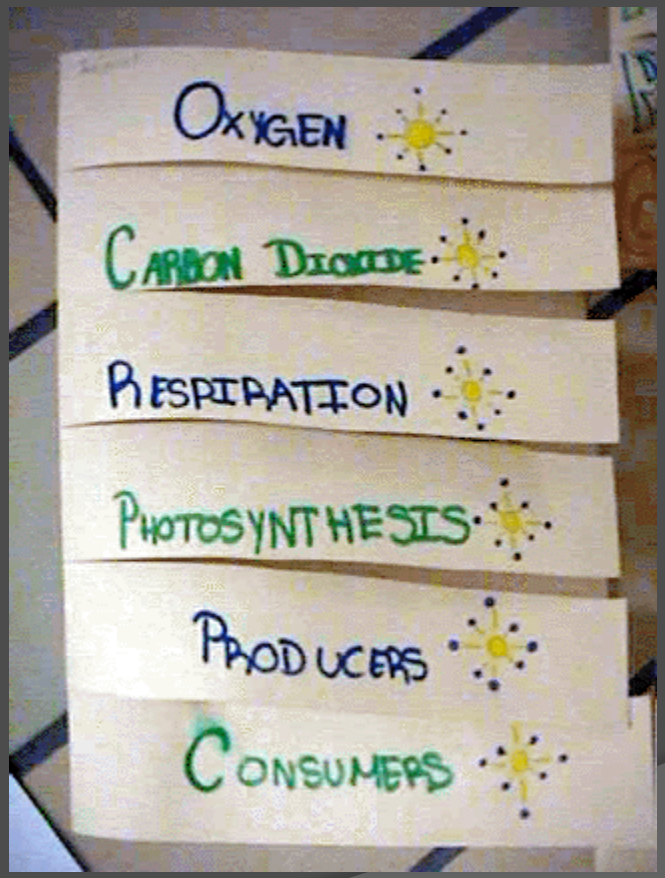
- How can we engage everyone?

- Differentiation
- Enrichment Opportunities
- STEM programs
- Community Involvement
- Field Lessons
- Contests
- Integration

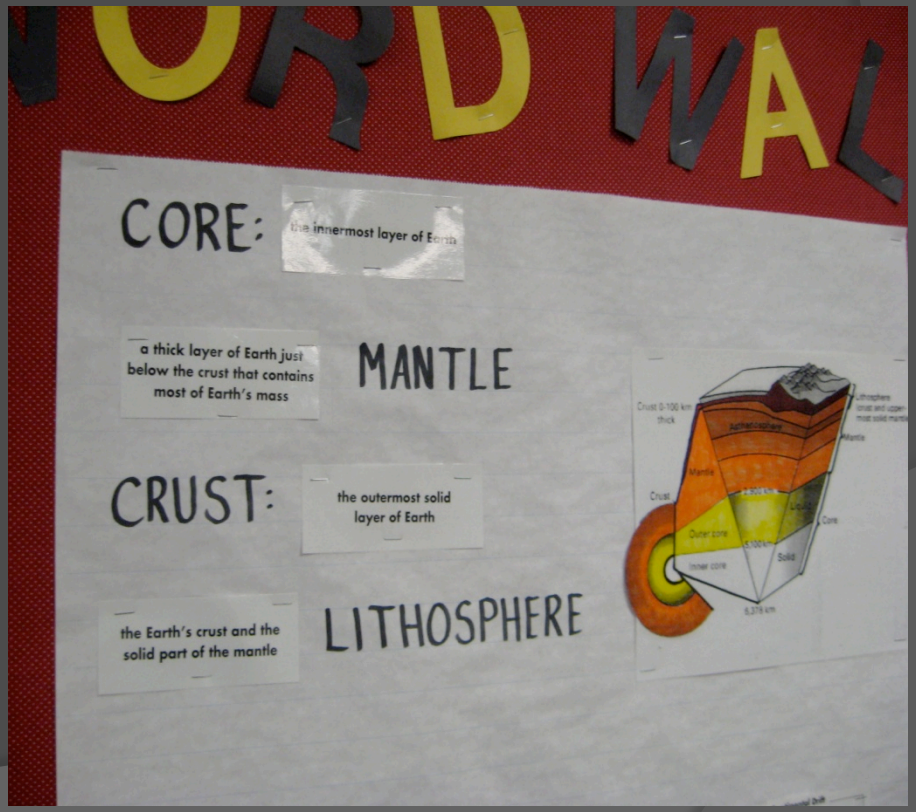
4.) Developing Academic Language

Strategies that Work:

- Graphic Organizers
- Foldables
- Cooperative Learning
- Class Discussions
- Journaling
- Word Walls
- Vocabulary Games
- Literature Integration



Word Walls Everywhere!



5.) Assessment

Strategies that Work:

- Data Driven Instruction
- Frequent Formative Assessments
- Summative Assessments used in Planning Process
- Connecting 3-D Experiences to 2-D Test Questions

Helpful Hints:

- Develop a Spiraled Curriculum- homework, stations, mini-lessons
- Progress Monitoring- how do you know where your students are at?
- Integrate reading and math skills into your weekly routines and lessons

Tier II

- Small Group Review
- Science Skill Stations with Teacher Support
- Group Problem Solving with Teacher Observation
- Before or After School Tutoring
- Enrichment Classes

Tier III

- Inclusion Teacher Support
- Second Instructional Period

  -Front Loading New Material

  -Reviewing Material

*not pull-out during science instruction!!!

How is RtI for Science different?

- Not based on precise quantitative data

  -Reading: fluency and comprehension

  -Math: fluency, computation and problem solving

  -Science: conceptual understanding

  (vocabulary is not enough)

How can you assess students in science?

- Multiple Choice
- Short Answer
- Essay
- Journal Entries
- Task Performance
- Anecdotal Records
- Model Eliciting Activities
- Small Group Observations
- Student Interviews

BEWARE!!!!

- Suggested Science RTI
- Packaged Science Programs
- Emphasis on rote memorization and not experiential learning and internalization

So, how do we support all learners in science?

How can administrators impact science achievement?

- Dedicate Time
- Clear Objectives
- Accountability at ALL Grade Levels
- Assessment Training
- Strategies for ELLs
- Support Teacher Learning
- Promote a Positive Attitude
- Join the Texas Regional Collaboratives

Questions?