Linking Research to TEKS/TAKS Success:

What Will help My Students?

Susan Hudson Hull, Ph.D.

Mathematics Director, Charles A. Dana Center

CAMT, July 2003

We are hearing a lot in **No Child Left Behind** about using research-based decision making, scientific-based research, and evidence-based research.

What does this mean …
At the national level?
At the state level?

Classifications of Research

- Scientifically based research: rigorous data analysis, systematic methods, objective, reliable, valid, experimental or quasi-experimental
- Evidence-based research: integrating professional wisdom with the best empirical evidence to make instructional decisions (Whitehead, 2002)
- Scientific research: adheres to broad scientific principles; includes other research beyond experimental or quasi-experimental

Common Research Designs

- Experiment: random selection, only one variable, cause and effect
- Quasi-experiment: comparisons among groups before and after an intervention or among matched groups
- Correlational Study: descriptive; helps determine strength of relationship; not about cause and effect
- Case Study: detailed information about a particular participant or small group; descriptive studies of why, how, or under what conditions a program works; identifies contributing factors

Together with scientifically based research, these approaches add different perspectives, but ultimately any research used to evaluate program effectiveness should converge on interconnected findings.

Making Sense of Research for Improving Education, Dana Center, 2003.

Research can help practitioners make decisions by answering questions such as:

"Is there evidence that this approach is effective?"

"Why and how is this approach effective?"

Studies with different purposes need different designs and implementations.

Making Sense of Research for Improving Education, Dana Center, 2003.

Use research to make decisions, and also use professional wisdom. Consider…

- Relevance: Is the program grounded in our values, beliefs, and desired outcomes?
- Generalizability to specific circumstances: Will this work with our students?
- Statistical soundness: Is this study appropriate? Bias-free? Clear, complete, and replicable? With strong evidence to support findings?
- Preponderance of evidence: Are there other studies with similar finding?

Making Sense of Research for Improving Education, Dana Center, 2003.

Also consider what evidence does not exist and why.

If a program is built on basic education research principles about "what works" or if there were observational evidence that a program qualifies as a "best practice," then examine the program further for alignment to local circumstances.

Making Sense of Research for Improving Education, Dana Center, 2003.

Don't just look at research; conduct your own evaluation of programs!

- First decide on goals: What does it mean to be successful?
- How do we measure success?
- What data do we collect?
- How do we evaluate the data?
- How do we determine what counts as evidence?

Making Sense of Research for Improving Education, Dana Center, 2003.

Strengthening instructional programs and ensuring student success: An emphasis on using evidence-based research

To set the stage for looking at research:

- Make decisions about what is valued; set expectations
- Ask the right questions
- Evaluate the research

Who sets expectations and determines what is valued?

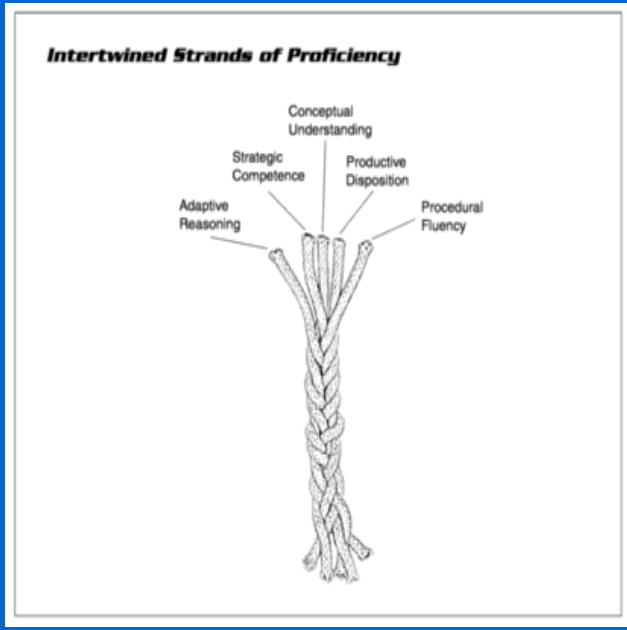
National	No Child Left Behind
State	Texas Accountability System
District	District Goals

Plus, it's the right thing to do for students.

What does it mean to learn mathematics successfully?

Mathematical proficiency: interwoven strands developed together; emphasizing no strand over the others

- Understanding (conceptual understanding)
- Computing (procedural fluency)
- Applying (strategic competence)
- Reasoning (adaptive reasoning)
- Engaging (productive disposition)



- Adding It Up, NRC, 2001

Goal: mathematical proficiency for ALL students

- Instruction should support the development of mathematical proficiency for all
- Instructional materials should integrate the five strands of mathematical proficiency.
- Assessments should contribute to the goal of mathematical proficiency.
- Teachers should have the support that will enable them to teach all students to be mathematically proficient.
- Efforts to achieve mathematical proficiency for all students must be coordinated, comprehensive, and informed by scientific evidence.

- Helping Children Learn Mathematics, NRC, 2002

What does research suggest K-8?

- Opportunity to learn is considered the single most important predictor of student success
- Students learn best when presented with academically challenging work focused on sense-making, problem solving, and skill building
- Teacher beliefs about what students need to (and can) learn influence their instructional decisions
- The same teaching and learning principles apply to all students, including those with special needs

- Adding It Up, NRC, 2001

What does research suggest for improving Algebra I?

Factors for improving scores:

- sense of urgency and priority
- expectation that all students can and should learn Algebra
- expectation that all teachers will work collaboratively for student success
- effective professional development for all teachers
- appropriate resources and materials, such as graphing calculators.

- Improving Algebra I End-of-Course Exam Scores: Evidence from the Field, Charles A. Dana Center, 2000

What does research suggest 9-12?

- Set clear goals and establish high expectations
- Use data to guide instruction
- Focus on instruction and individual learning
- Support teachers and enhance collaboration
- Foster an environment of respect and affection for students

- Opening Doors: Promising Lessons from Five Texas High Schools, Charles A. Dana Center, 2001

Characteristics of Effective Schools

- Relentless pursuit of high achievement
- Alignment of efforts to the goal of high achievement
- Attention to individual students and their achievement

- Marzano, Pickering, & Pollock, 2001

The Effect of Schools and Teachers: Change in Performance*

		School	
		Effective	Ineffective
Teacher	Effective	96	63
	Ineffective	37	3

*Measured in percentile.

Baseline: performance at 50th percentile.

- Marzano, Pickering, & Pollock, 2001

Implications for District and Campus Policy

- No central vision = blurred vision
- Sophisticated teaching techniques require sustained and robust support.
- Coherence among curriculum, assessment, professional development, support, policies, and practices is critical.
- Isolated, individual investments in professional development are ineffective.
- Districts, campuses, teachers, and administrators should be held accountable for instructional practice and student success.

- Holcomb, 2002

Creating powerful and equitable learning requires school and district leaders to …

- Focus persistently and publicly on teaching and learning;
- Align strategically curriculum, instruction, assessment, policies, and practices;
- Focus on each individual student and his or her achievement; and
- Motivate and support professional and organizational learning.

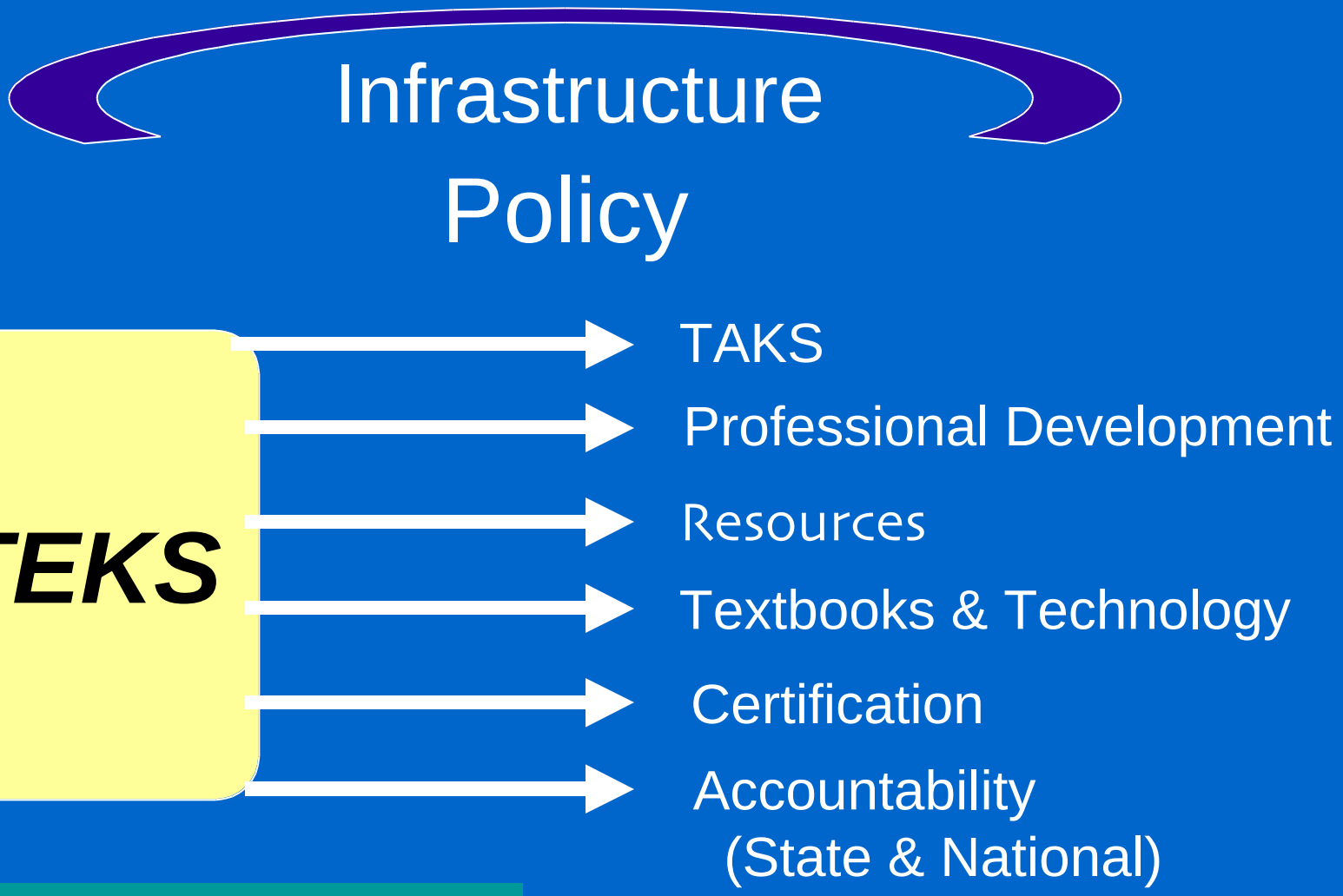
- Dana Center EIN Leadership Academy, 2002

How is Texas responding to No Child Left Behind?

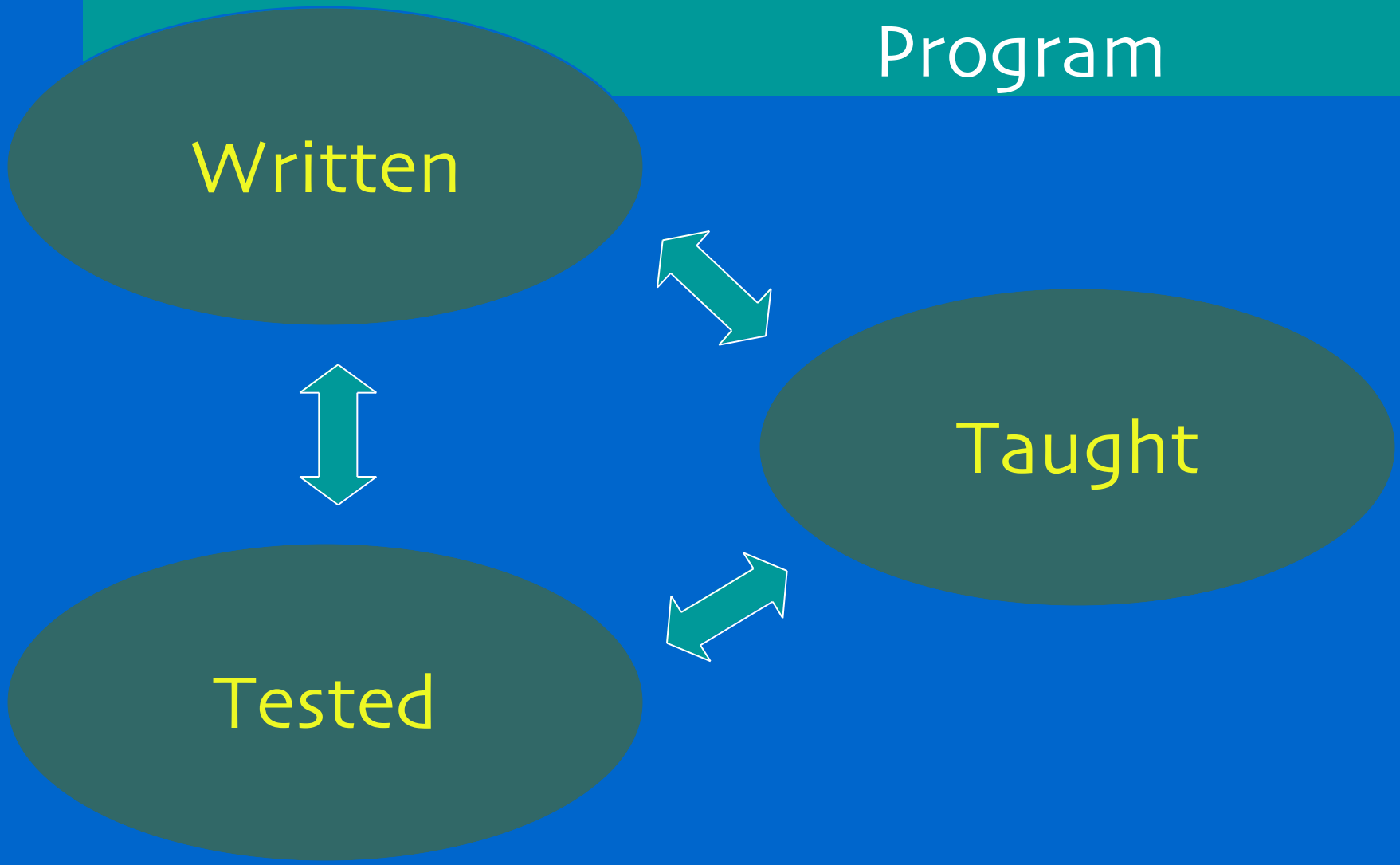
How do we use research and evidence to improve student performance?

Data
Expectations
Professional Development
Collaboration
Support
Leadership

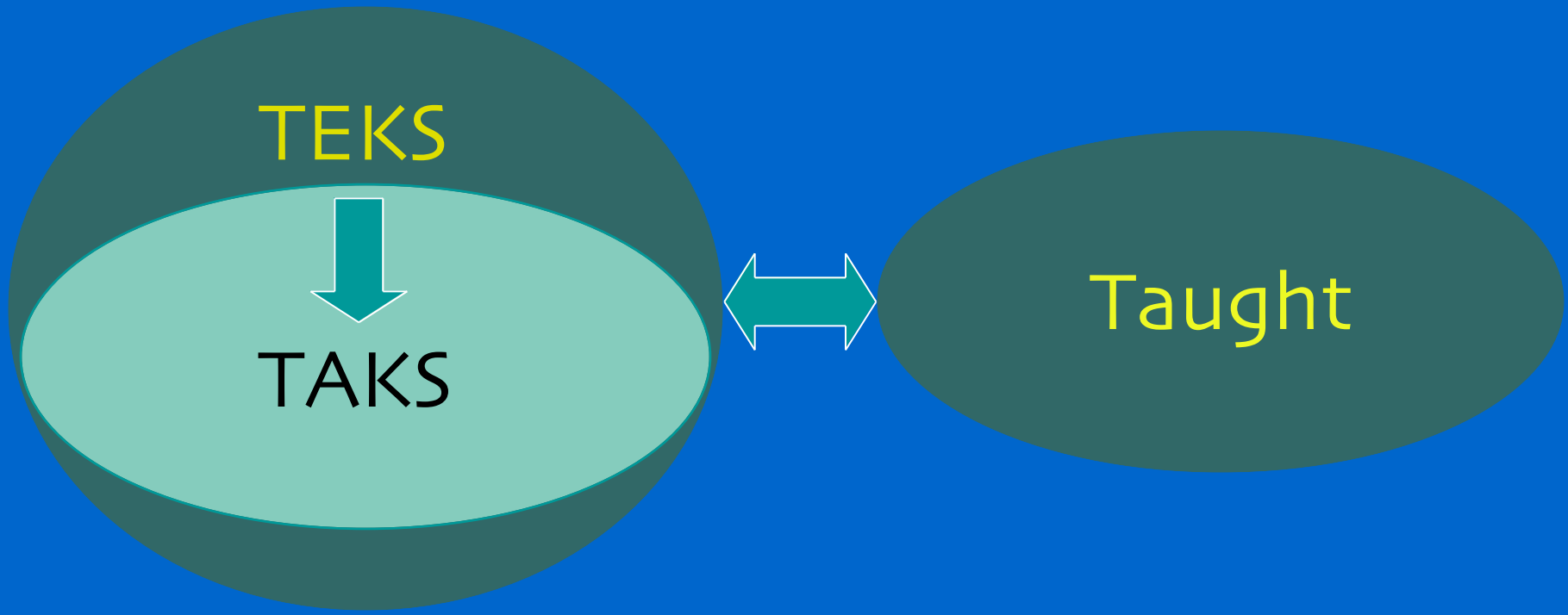
How it Works in Texas



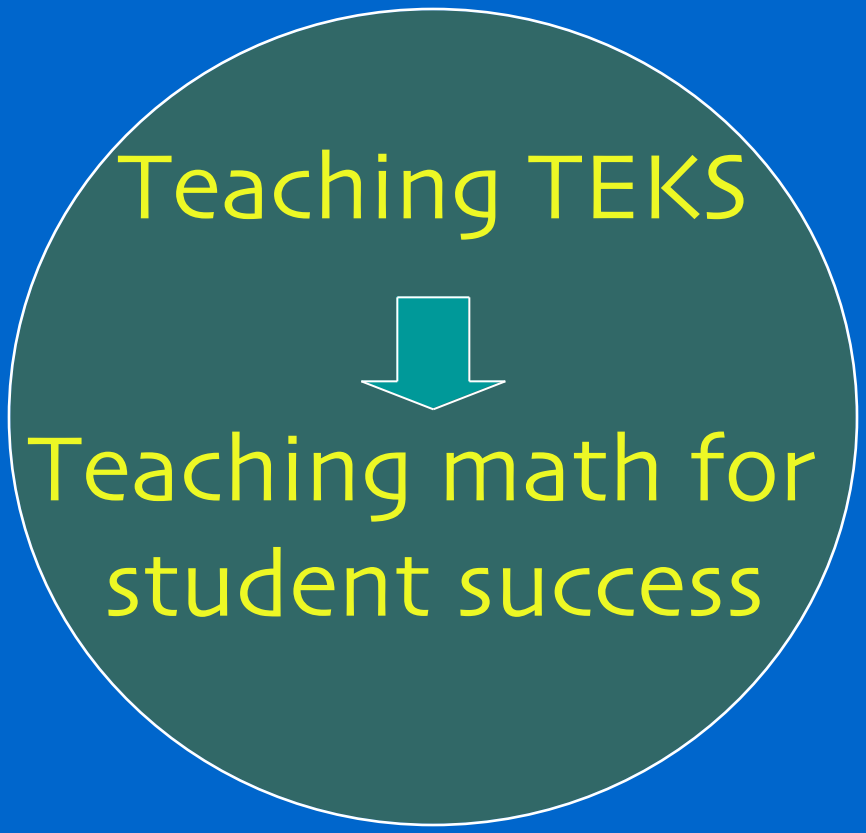
The Instructional Program



The Instructional Program in Texas



Goal: Student Learning/ Student Achievement



It's not about TAKS, it's about TEKS!

Mathematics Strategies to Support TEKS and TAKS

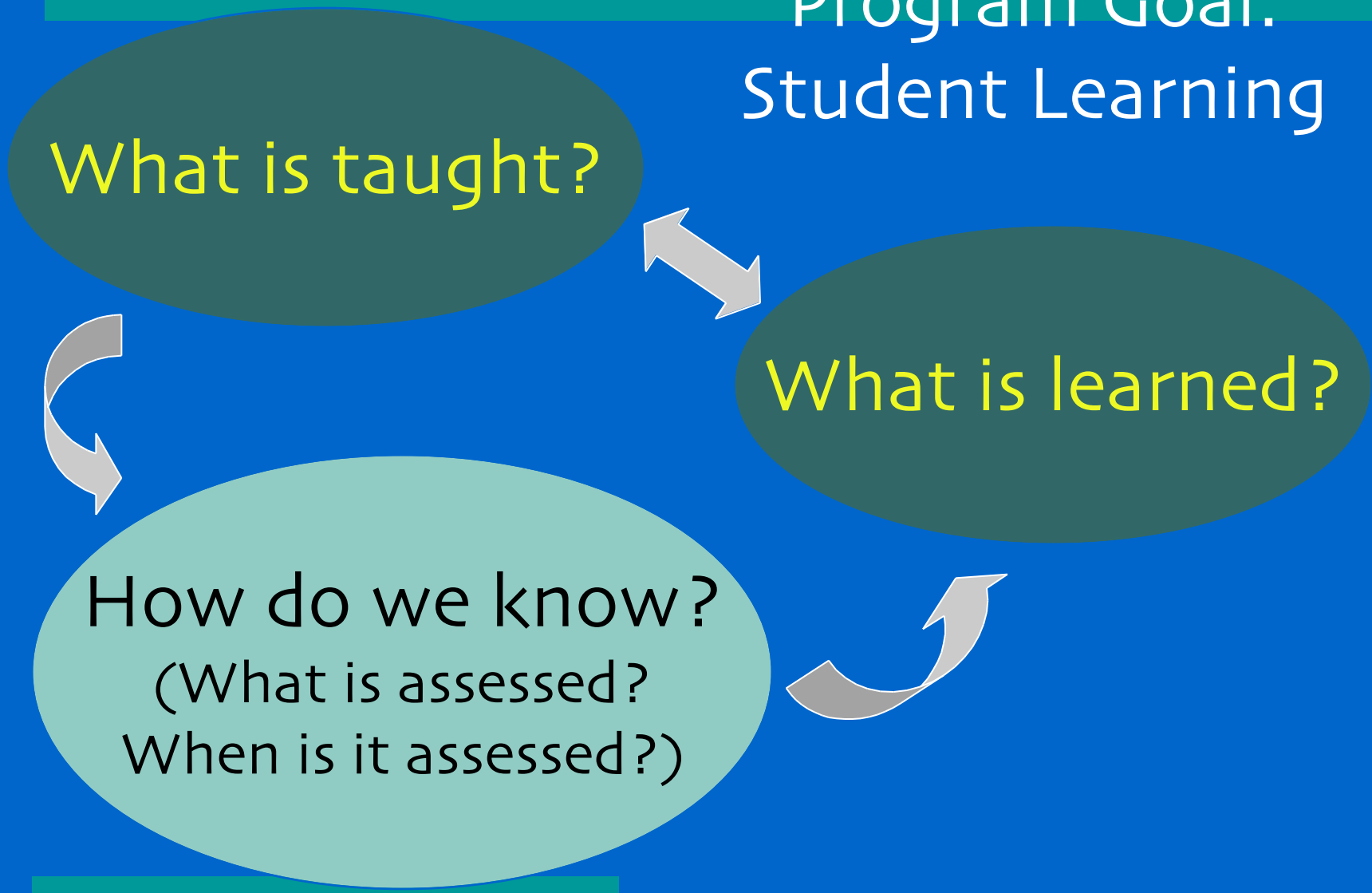
Teach the TEKS

Teach the TEKS

Teach the TEKS

It's not about TAKS, it's about TEKS!

The Instructional Program Goal: Student Learning



Linking instruction and assessment

Assessment should …

- support the learning of important mathematics
- furnish useful information to both teachers and students
- be a valuable tool for making instructional decisions
- be a routine part of the ongoing classroom activity rather than an interruption

- Principles and Standards for School Mathematics, 2000

Where and when to assess …

Assessment Tools	Timing
Diagnostic assessments, state or district	Beginning of school year
Benchmark assessments, campus or district	According to campus/district schedule
(TAKS) Texas Assessment of Academic Skills	End of school year, dates set by state

Where and when to assess …

Assessment Tools	Timing
Diagnostic assessments, state or district	Beginning of school year
Performance assessments	Ongoing; teachers continually monitor student progress
Benchmark assessments, campus or district	According to campus/district schedule
(TAKS) Texas Assessment of Academic Skills	End of school year, dates set by state

Professional development to build teacher knowledge and provide necessary support

- Professional development on how to determine what students understand
- Professional development on instructional practice, including intervention strategies
- Intensive, in-depth professional development focused on teacher understanding of mathematics
- Additional areas of need

This is a lifelong learning pursuit, not a one-time, short-term endeavor.

The challenge: What can I do now?

- Study the TEKS with colleagues to determine what students need to know
- Plan instruction and student tasks to reach instructional goals
- Ask questions and assess student understanding in multiple ways throughout instruction
- Use your student data to help make instructional decisions
- Participate in intensive professional development and followup
- Read research and discuss with colleagues
- Conduct and participate in evaluation of your school's programs

Contact information:

Susan Hudson Hull

Mathematics Director,

Charles A. Dana Center

(512) 471-6190

shhull@mail.utexas.edu

Presentation available under Resources:
www.mathtekstoolkit.org

Reference List

- Charles A. Dana Center. (2000). Improving Algebra I End-of-Course Exam scores: Evidence from the field. Austin,TX: Author.
- Holcombe, L. (2002). Teacher professional development and student learning of Algebra: Evidence from Texas. Unpublished doctoral dissertation, Harvard University, Cambridge.
- Hull, S. (2000). Teachers' Mathematical Understanding of Proportionality: Links to Curriculum, Professional Development, and Support. Unpublished doctoral dissertation, University of Texas, Austin.
- Kilpatrick, J., Swafford, J., & Findell, B. (Eds.). (2001). Adding it up: Helping children learn mathematics. Washington, DC: National Academy Press, National Research Council, Mathematics Learning Study Committee.
- Kilpatrick, J., Swafford, J., & Findell, B. (Eds.). (2002). Helping children learn mathematics. Washington, DC: National Academy Press, National Research Council, Mathematics Learning Study Committee.
- Marzano, R., Pickering, D., & Pollock, J. (2001). Classroom instruction that works: Research-based strategies for increasing student achievement. Alexandria, VA: Association for Supervision and Curriculum Development.