The NRCCTE Curriculum Integration Studies

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Located at the University of Louisville College of Education and Human Development

NRCCTE Partners

Mission

The National Center will improve the ***engagement, achievement, and transition of high school and postsecondary CTE students*** through technical assistance to states, professional development for CTE practitioners, and dissemination of knowledge derived from scientifically-based research.

Three Foci

- ***Engagement*** – Completing high school, completing programs
- ***Achievement*** – technical and academic
- ***Transition*** – to continued formal learning without the need for remediation; and to the workplace

Four Main Activities

- Research (Scientifically-based)
- Dissemination
- Technical Assistance
- Professional Development

www.nrccte.org

Curriculum Integration Research

- Math-in-CTE: study complete
  - Math-in-CTE Technical Assistance underway
- Authentic Literacy: research complete
  - Literacy-in-CTE Technical Assistance underway
- Science-in-CTE: pilot underway

Science-in-CTE

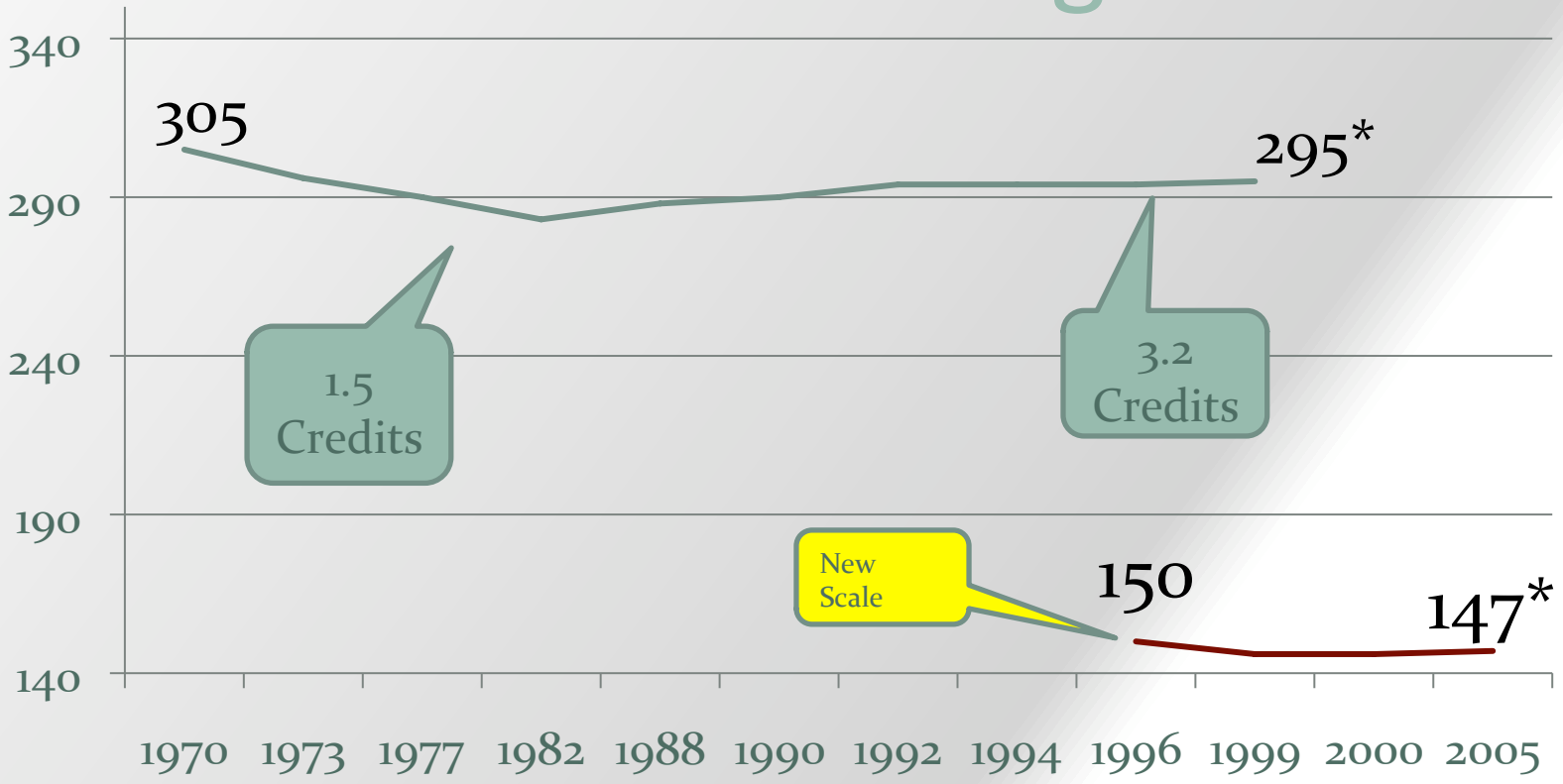
"The Pilot Study"

Spring 2010

Research Design: Participants

Participants	Primary Role
Experimental Ag Ed teachers	Implement the science enhanced lessons
Science teachers	Provide support for the Ag Ed teacher
Control Ag Ed teachers	Teach their regular curriculum

NAEP Science Scores – High School



CTE: What do we know?

- CTE keeps kids in school
- CTE helps kids focus their PS education plans
- CTE is an economic benefit to participants and to states
- CTE-based structures (e.g.,dual enrollment, career academies) can affect achievement and transition of youth to college and work.
- But what *more value* can CTE provide as part of the high school experience?

NRC Science-in-CTE

Perkins IV requires . . .

- Develop challenging academic and technical standards and related challenging, integrated instruction

The Science-in-CTE Pilot Study

A replication of Math-in-CTE

A study to test the possibility that enhancing the embedded science in Technical Education coursework will build skills in this critical academic area.

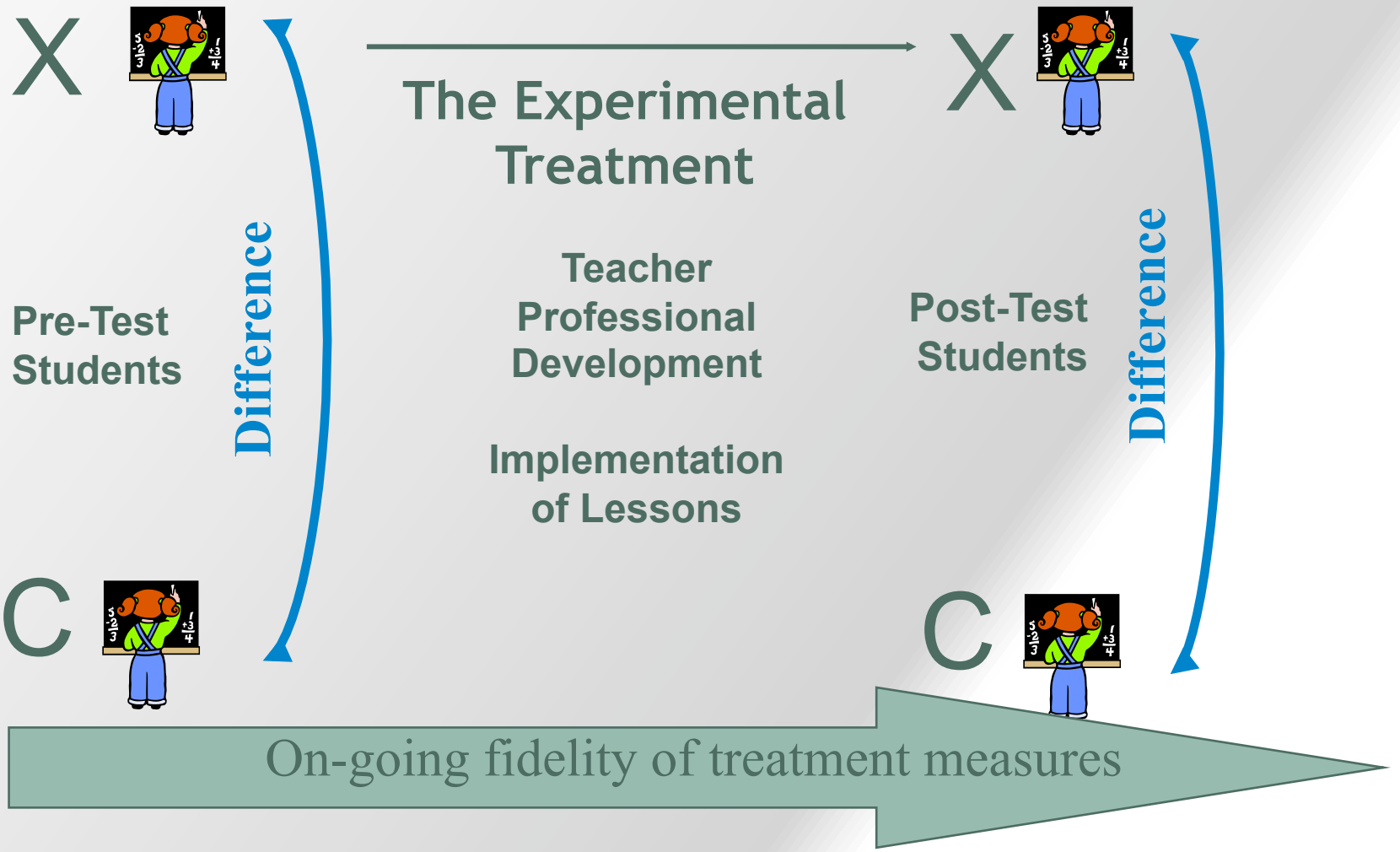
NRC Science-in-CTE

Science Study Questions

- Does enhancing the CTE curriculum with science increase science skills of CTE students?
- What works?

NRC Science-in-CTE

The Research Design



Science Study Design

- Random assignment of teachers to experimental or control condition
- One replication: animal/plant sciences with biology and chemistry
- One measures of science skill: Terra Nova
- Multi-method: quantitative and qualitative
- Focused on naturally occurring science (embedded in CTE curricula)
- Test a model of *Curriculum Integration*
- Intense focus on *Fidelity of Treatment*

NRC Science-in-CTE

A Process and A Pedagogy

a process and a pedagogy through which to enhance and teach the science embedded within existing CTE curricula

The Science-in-CTE Experimental Treatment:

1. Professional Development—one semester
   - Dec PD (2 days) – Mapping and lesson creation
   - Jan PD (2 days) – Lesson creation; scope and sequence
   - March PD (2 days) – Lesson critique
   - Ongoing support; pre and post reports

2. Pedagogic framework

   The 7 Elements adapted for science

NRC Science-in-CTE

Fidelity of the Treatment

- Pre and post teacher questionnaires
- Science Teacher Pre-Teaching Reports
- CTE Teacher Post-Teaching Reports
- Instructional Artifacts
- Focus Groups

NRC Science-in-CTE

Lessons Taught Spring 2010

- 15 Ag Ed & Science Teacher teams developed 15 science enhanced lessons
- 14 Ag Ed Teachers taught all 15 lessons
- 219/225 = 97%

- The Experimental Ag Ed Teachers did an OUTSTANDING JOB!!!!!!

Findings

- Positive
- Modifications to the pedagogy are warranted
- Additional replications are justified

Where do we go from here?

- Replication studies with Health Occupations and Agricultural Education Teachers
  - Spring 2011
- Provide technical assistance in Science-in-CTE to interested CTE teachers pending positive findings

Thank You!

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Math-in-CTE

The Math-in-CTE Study

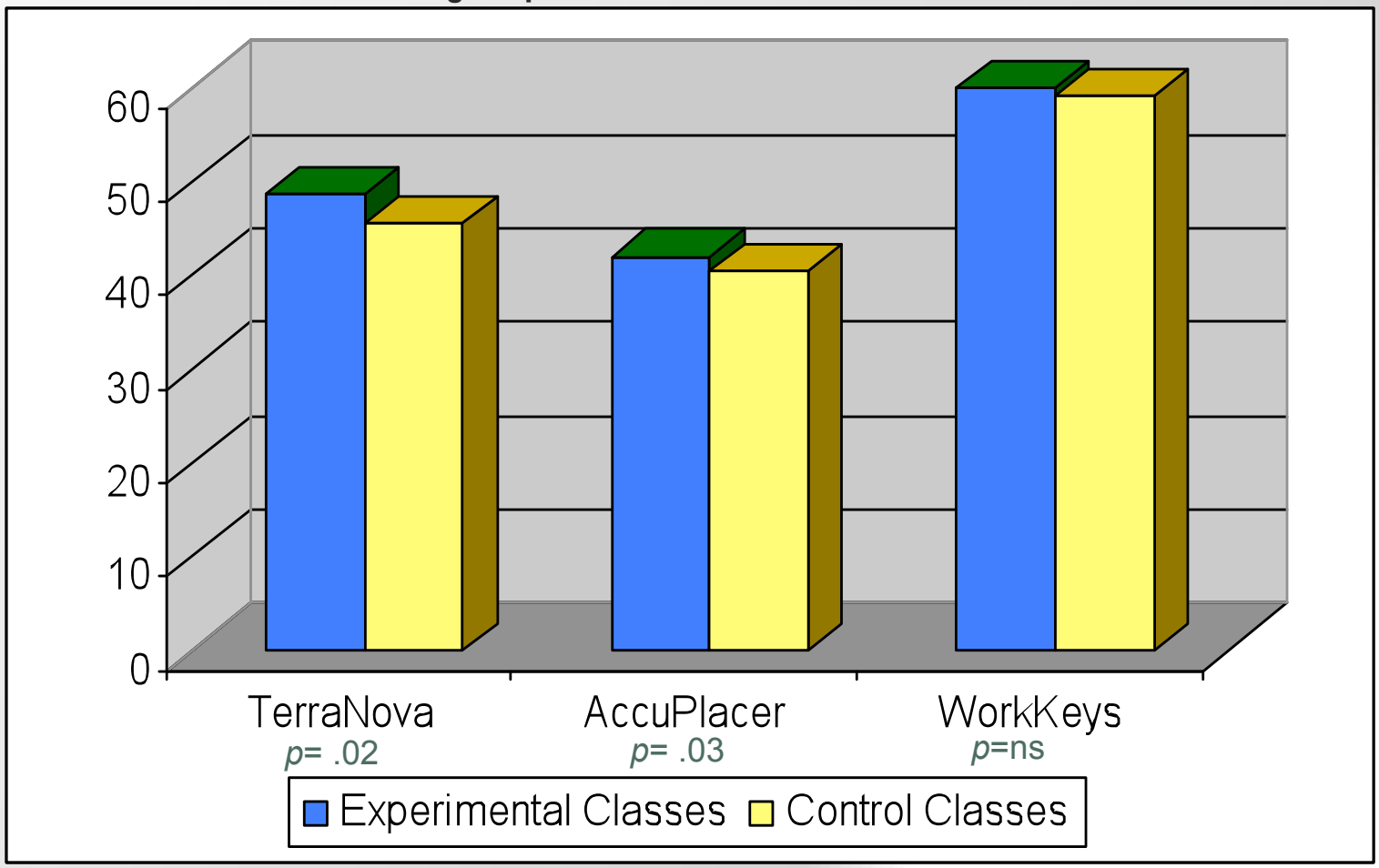
A study to test the possibility that enhancing the embedded mathematics in Technical Education coursework will build skills in this critical academic area without reducing technical skill development.

Math Study Questions

- Does enhancing the CTE curriculum with math increase math skills of CTE students?
- Can we infuse enough math into CTE curricula to meaningfully enhance the academic skills of CTE participants (Perkins III Core Indicator)
- . . . Without reducing technical skill development
- What works?

Math-in-CTE Findings

All CTEx vs. All CTEc
Post test % correct controlling for pre-test



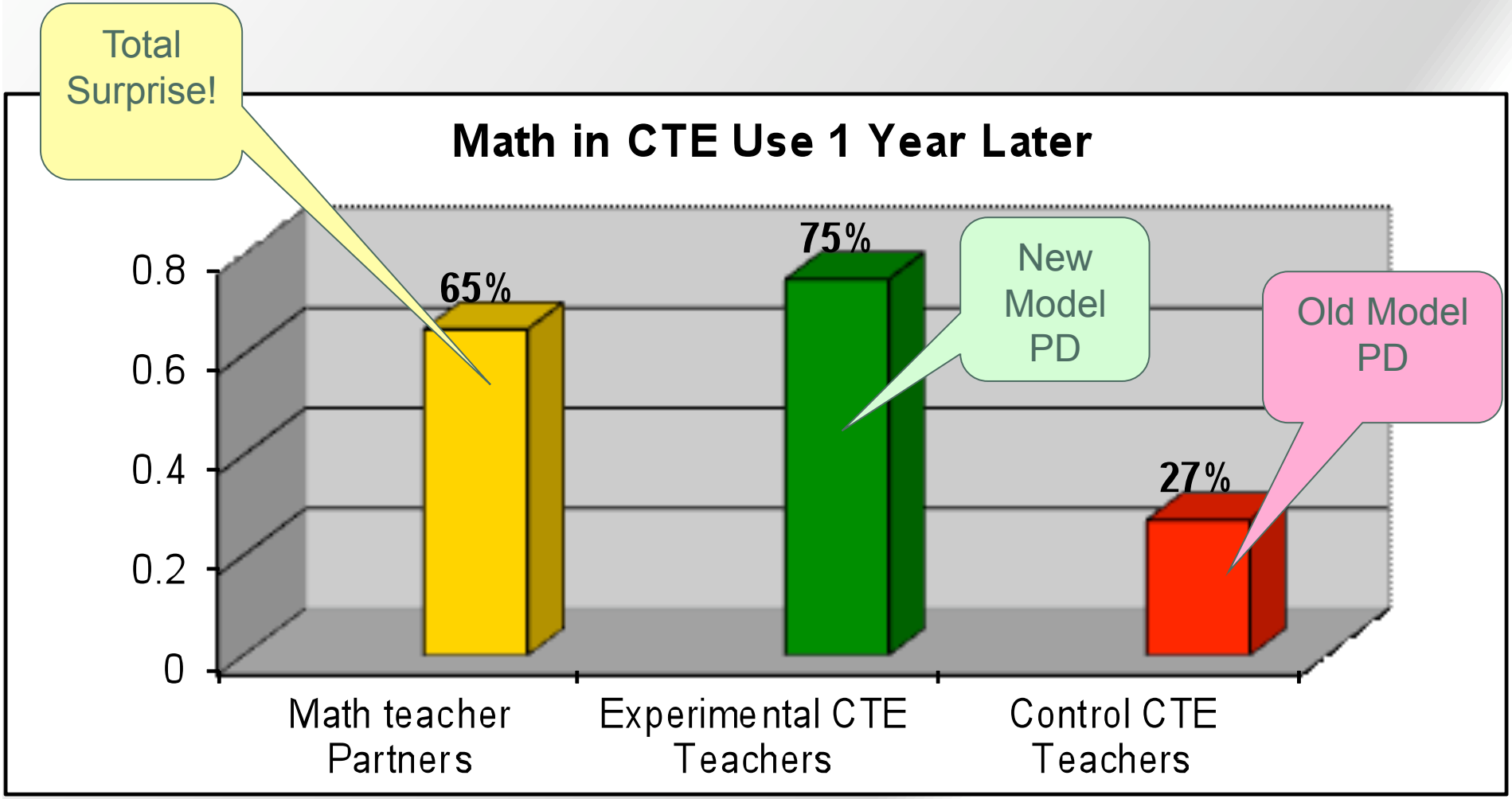
The Seven Elements Pedagogic Framework

1. Introduce the CTE lesson
2. Assess students' science awareness
3. Work through the ***embedded*** science example
4. Work through ***related, contextual*** examples
5. Work through ***explicit science*** examples
6. Students demonstrate understanding
7. Formal assessment

A Process and A Pedagogy

a process and a pedagogy through which to enhance and teach the **math** embedded within existing CTE curricula

Power of New Professional Dev Paradigm



Literacy-in-CTE

Literacy-in-CTE

- 101 teachers in 3 groups
- 15 returning teachers
- Professional Development: July - August 2009
  - 2.5^{+} days
- Treatment period: September 17 – April 9
- Weekly teacher reports of reading activities

Experimental design

- Random Assignment
- Pretest only
  - Demographic survey
- Pretest and posttest
  - Gates-MacGinitie Reading Test (untimed ~50 min)
    - Grade level 7-9
    - Forms S & T
  - Motivations for Reading Questionnaire (15 min)

Teachers

State	CTRL	ALS/ASH	MAX	Total
NY	12	15	16	43
SC	19	21	18	58
Subtotal	31	36	34	101
Year 3			15	15
Grand Total			49	116

Coop Learning & Skills Acquisition

	MAX	SAM	Coop Learning
Before Reading	**M**otivation Reducing the anxiety and improving the probability of success in reading	Introduction and modeling of the skill	Written commitment and small-group discussion
During Reading	**A**cquisition Individual silent reading for personal interpretation	Guided practice in learning skill	Individual gathering of data for discussion
After Reading	E**X**tension Cooperative construction of meaning through discussion, writing, etc.	Reflection on how the skill worked	Attempt to achieve small group and class consensus

6 Essential Elements for Adolescent Literacy Instruction

1.) Guided Reading of Text

2.) Direct Instruction

3.) Peer-Led Discussion of Text

4.) Word Study

5.) Purposeful Oral Reading and Text Production

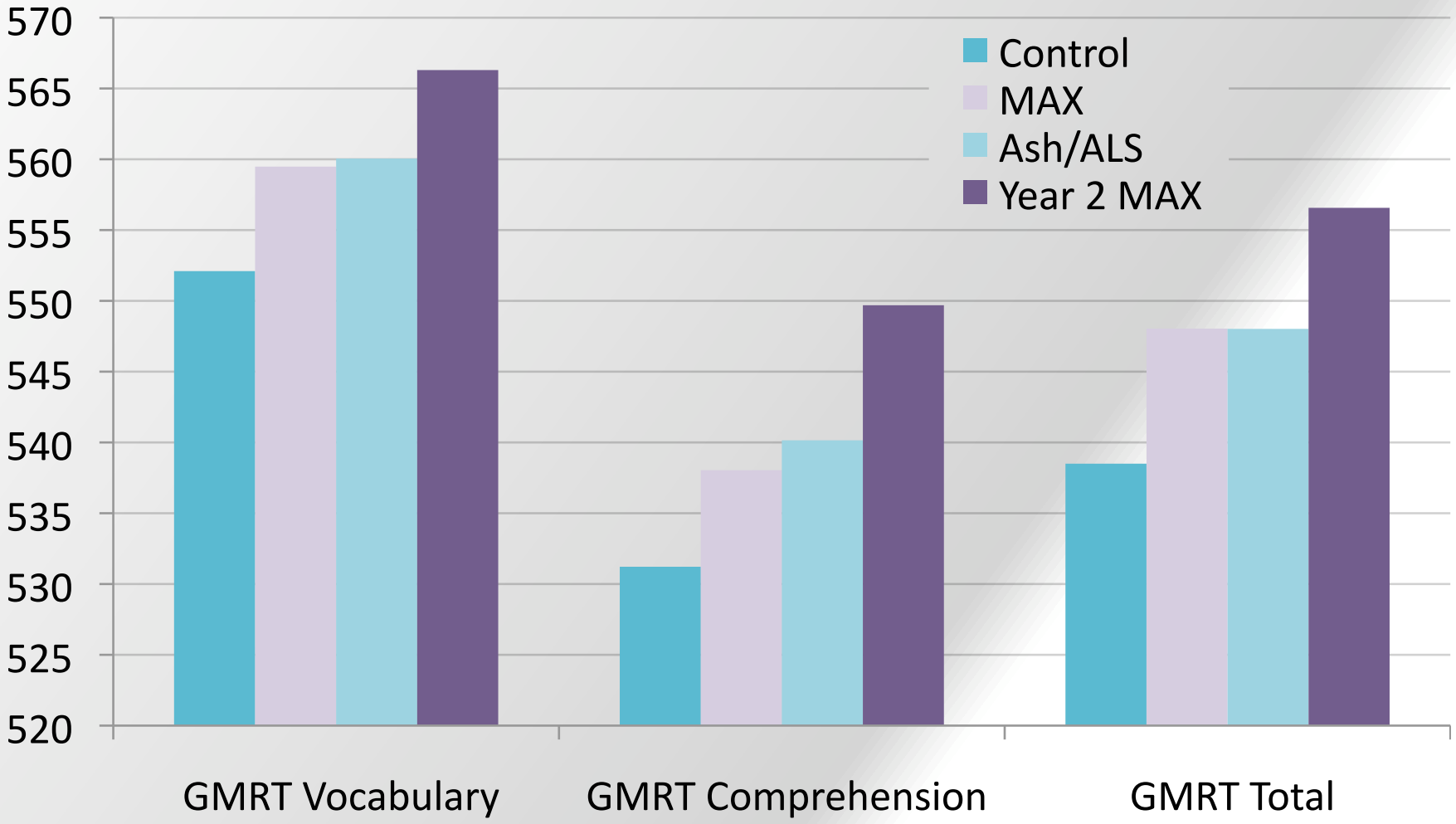
6.) Inquiry Learning

	Pretest		Posttest	
Group	ESS Mean	Raw Mean	ESS Mean	Raw Mean
GMRT Vocabulary				
Control	554.48	30.31	552.10	29.28
MAX	554.94	30.55	**559.48***	31.07
ALS/Ash	553.83	30.24	**560.05***	31.09
Year 2 MAX	555.00	30.44	**566.30***	32.56
GMRT Comprehension				
Control	537.06	29.94	531.22	27.25
MAX	546.34	32.81	**538.04***	30.73
ALS/Ash	539.38	30.82	**540.15***	30.24
Year 2 MAX	543.53	31.75	**549.69***	33.40
GMRT Total				
Control	544.16	60.24	538.50	56.53
MAX	549.02	63.36	**548.04***	61.80
ALS/Ash	545.04	61.07	**548.02***	61.28
Year 2 MAX	547.24	62.19	**556.57***	65.87

Full-Year Analysis

* = significantly different from control at α = .05

Posttest – ESS Means



Which strategies did teachers use?

MAX

- Cornell notes
- Hunt for main ideas
- Previewing nonfiction text
- Pre/Post learning concepts checks
- Focused free writes
- Paired reading
- Guided reading procedure
- Anticipation guide

ALS/Ash

- Anticipation guide
- Directed Reading-Thinking Activity
- Inquiry Charts
- Vocabulary from context
- List-Group-Label
- GIST

How and Why did teachers use strategies?

How?

- Used strategies more early in week
- Asked students for feedback about which strategies worked best
- ↑ assigned reading: ↑ student engagement in reading
- Adult learning approach
  - Learner feedback
  - Utility value

Why?

- Selected strategies that were easy to implement
- Strategies helped students learn
- Transitioned learning to students
- Teachers actually "taught" less

Post-Research Teacher Meeting

- Students
  - Mix of strategies is important
  - Treat CTE learners more like adult learners – check with students to see how strategies are working, give choices
  - Know reading is important, they just don't want to read
- Teachers
  - did not ask students to read more: but students read more productively
  - Want additional support
  - Required additional preparation time
  - Used 4-7 strategies regularly
  - Text ≈ content ≈ strategy
  - Try strategies ~3 times before "comfortable"

Teacher interviews

1. foster teacher confidence,
2. develop communities of practice,
3. utilize authentic texts,
4. commit to professional development,
5. adjust strategies for use in CTE,
6. adopt the framework where texts are used, and
7. encourage student receptiveness.

Student focus groups

1. students desired a utility value in their strategy use,
2. they understood the importance of reading to their career,
3. students engaged in reading if they could apply the information, and
4. they desired a social aspect from reading to foster motivation.

Curriculum Integration Studies

Learnings that Overlap

Similarities in CI Research

- RCT
- Not curriculum, but use opportunities within the curriculum
  - Teacher-generated lessons
- Teacher engagement with pedagogic framework and strategies
- Teachers integrate framework/strategies where it best fits within their curriculum
- Developmental process of integration

The Professional Development Paradigm in Practice

Old Models	***New Models***
• A *box* of curriculum	• Process not an event
• Short term "training"	• Built on communities of practice
• Little or no support after the "sage on the stage" goes away	• On-going support – the learning curve
• Replicable by individual teachers (assumed)	• Requires teams of committed teachers working together over time

Thinking about integration on 3 levels

- Systems/holistic
- Curricular/programmatic
- Instructional/pedagogic
  - What happens when the door closes, and the teacher begins to teach?

Common findings/themes

- Concepts → Principles → Relevant ROI
- Repeat volunteers – what's next?
- Integration on 3 levels
  - Systems
  - Curricular
  - Instructional/pedagogic
- Teachers have to think about "how" and "what" they're teaching
- Teacher-driven reform – value teacher's voice

Common findings/themes

- CTE teacher apprehensive of integration
  - feeling incompetent in front of students
  - lesson planning
- Challenge of changing teaching practice
- Time issues
- The “tipping point”
- Implementation → internalization
  - Space for innovation

Emergent Core Principles from CI studies

- Develop and sustain a community of practice
- Begin with the CTE curriculum and not the math/science/reading curriculum
- Understand that m/s/r is an essential workplace skill
- Maximize m/s/r in the CTE curriculum
- Recognize that CTE teachers are teachers of m/s/r-in-CTE, and not m/s/r teachers

Questions?

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