

# Capitalizing on Context: Effective Integration of CTE and Academics

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# NRCCTE Partners



# Four Main Activities

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

[www.nrccte.org](http://www.nrccte.org)

# 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

# Curriculum Integration Research

- Math-in-CTE: complete
  - Technical Assistance moving to 8<sup>th</sup> year
- Literacy-in-CTE: complete
  - TA-PD moving to 3<sup>rd</sup> year
- Science-in-CTE:
  - Study concluded; data analysis underway

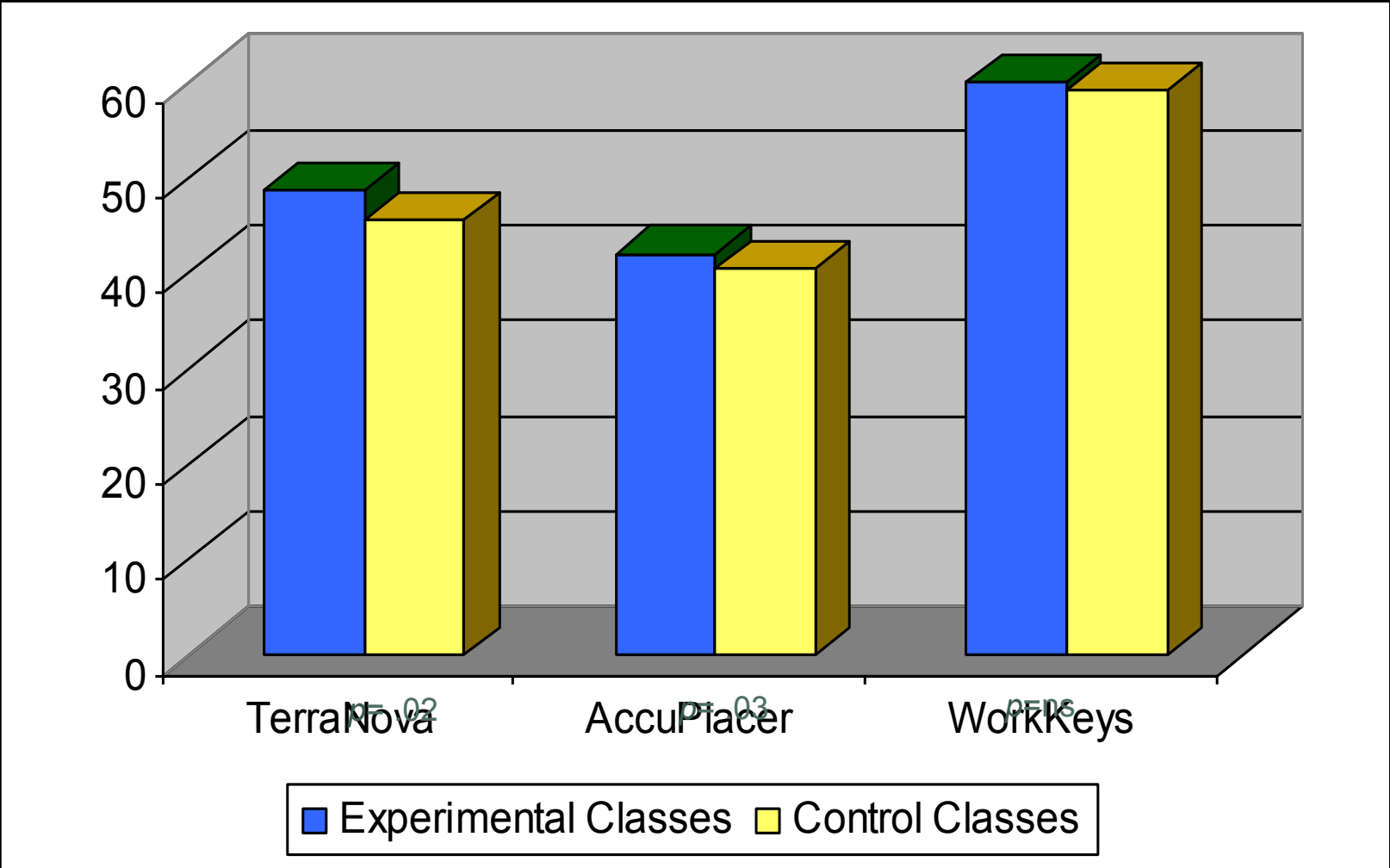
# Math-in-CTE

# 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 CTE<sub>x</sub> vs. All CTE<sub>c</sub>  
Post test % correct controlling for pre-test





# Science-in-CTE

## Some Preliminary Findings



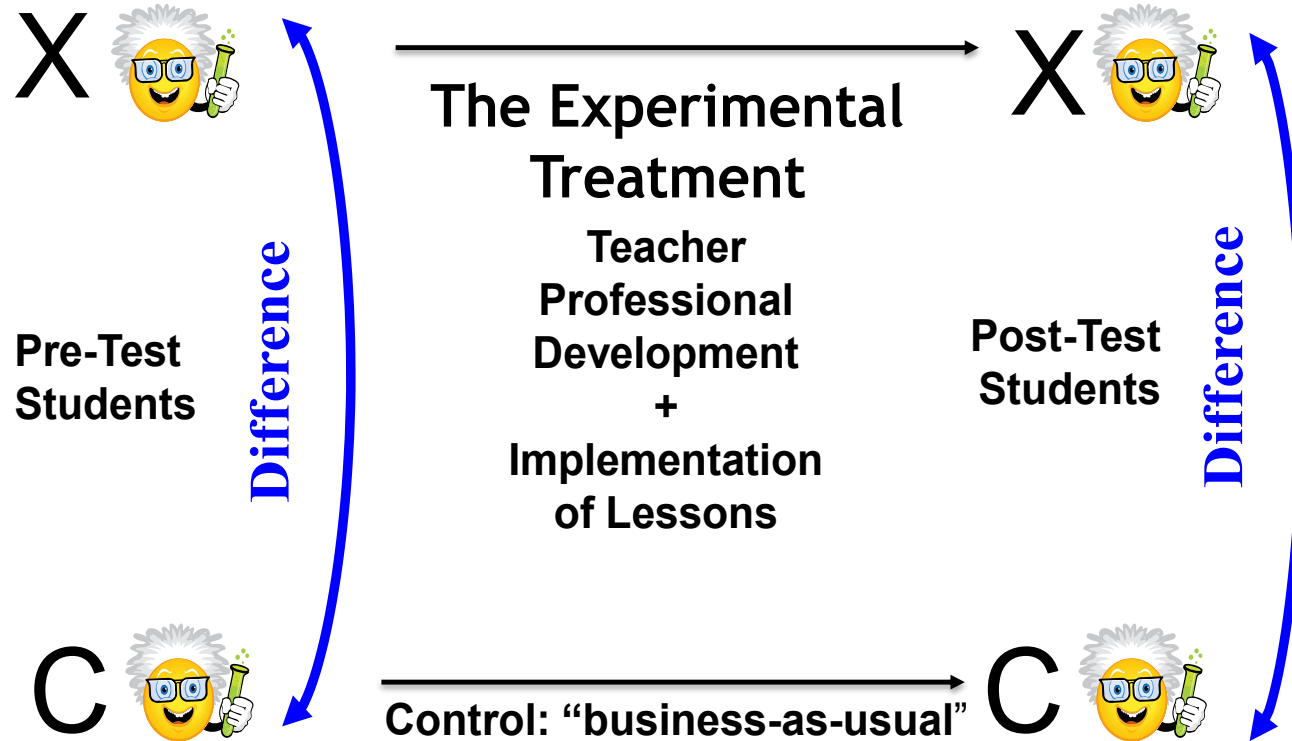
# The Science-in-CTE Study

An adaptation of the Math-in-CTE model

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



# The Research Design



On-going fidelity of treatment measures

# The Science-in-CTE Experimental Treatment:

## Professional Development—one semester

- Dec PD (2 days) – Mapping and lesson creation
- Jan PD (2 days) – Lesson creation; scope and sequence
- Early Spring PD (2 days) – Lesson critique
- Ongoing support; pre- and post teaching reports

## Pedagogic framework

The 6 Elements adapted for development science enhanced CTE lessons



## “Six Elements” Pedagogic Framework Revised

1. Introduce the CTE lesson
2. Assess students’ pre-understandings of CTE and the embedded science
3. Walk through the CTE content and the *embedded science* within it
4. Students participate in an *authentic application* of the CTE using inquiry approach
5. Students demonstrate what they have learned about the *explicit science*
6. Formal assessment of CTE and science knowledge and skills

# Summary of Preliminary Analysis

Preliminary HLM analyses did not reveal a statistically significant effect of the treatment.

However, analyses of both quantitative and qualitative data are ongoing...

# *Continuing Analyses*

- Test sensitivity: *Did the test measure what students actually learned?*
  - Less than 50% match; Item analysis is underway
- Fidelity: *To what extent did teachers implement?*
  - Teaching reports
  - Video teaching tapes
  - Focus groups
  - Artifacts
- Teacher experience: *What were challenges, benefits, successes?*

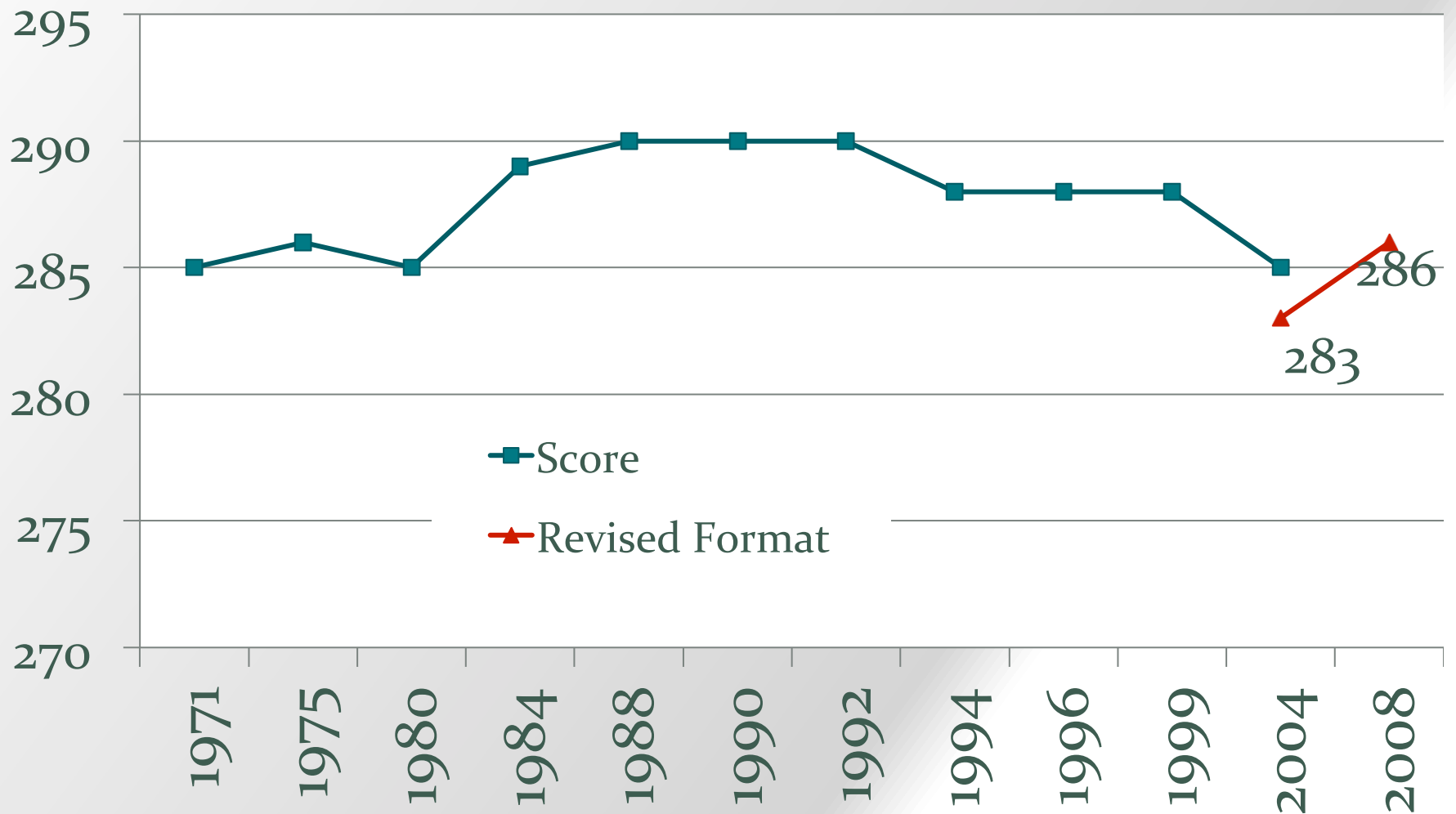
# Literacy-in-CTE



# Nation of Poor Readers

- 12<sup>th</sup> grade: 26% cannot read at a basic level (NCES, 2010)
  - Females outperform males in all 3 reading tasks
    1. Reading for literary experience
    2. Reading for information
    3. Reading to perform a task
- Only 38% of 12<sup>th</sup> graders are proficient readers
- Bare majority (51%) of ACT completers are ready for college reading (ACT, 2006)

# NAEP Scores of 17-Year Olds



# Research Purposes

- Purpose
  - Determine impact of reading strategies on comprehension and vocabulary for students enrolled in CTE
- Objective
  - Compare the effects of reading strategy instruction under a control condition and two models of content-area reading interventions: Ash Framework and MAX Teaching

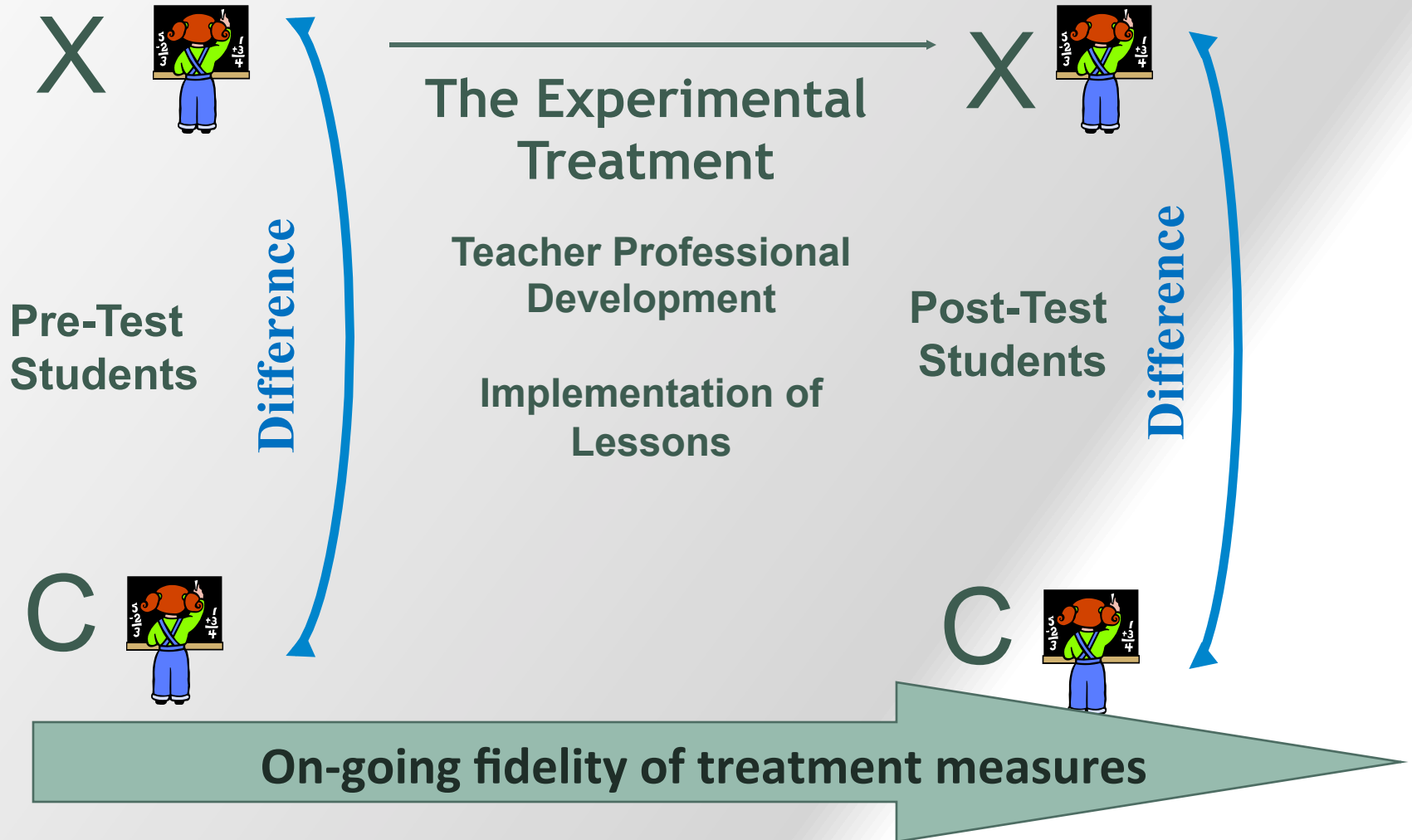
# Literacy-in-CTE

- 96 teachers in 3 groups
  - 15 returning teachers
- Prof Dev: 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 (~50 min)
    - Grade level 7-9
    - Forms S & T

# The Research Design



# Teachers

<b>Group</b>	<b><u>NY</u></b>	<b><u>SC</u></b>	<b><u>Total</u></b>
<b>X</b> 1. MAX	14	14	<b>28</b>
<b>X</b> 2. Ash	13	12	<b>25</b>
<b>X</b> 3. MAX Y2	15	---	<b>15</b>
<b>X</b> 4. Control	9	19	<b>28</b>
<b>Total</b>	<b>51</b>	<b>45</b>	<b>96</b>

# Students

Demographic	Overall	Control	MAX	Ash	MAX Y2
NY	57.0	28.1	51.8	63.3	100.0
SC	43.0	71.9	48.2	36.7	---
Female	56.9	63.9	56.7	47.8	72.3
11-12 <sup>th</sup> grade	69.6	67.9	58.9	62.7	97.5
White	61.1	55.2	58.3	55.1	84.3
FRPL	38.8	40.4	44.0	34.9	36.6
Mother $\leq$ HS	32.0	31.3	33.4	27.7	38.7
Father $\leq$ HS	35.6	33.0	36.6	32.7	43.7



# Coop Learning & Skills Acquisition

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

# 6 Essential Elements for Adolescent Literacy Instruction (Ash)

- 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

# Strategies

- ▶ Think–Pair–Share
- ▶ Anticipation Guide
- ▶ List–Group Label
- ▶ Pre/Post Check

▶ DRTA

Think–Pair–Share

▶ Pre/Post Check

- ▶ 3–Level SG
- ▶ Cornell Notes
- ▶ Jigsaw
- ▶ Stump the Teacher

▶ Cube It!

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▶ Focused Free–Write

▶ Focused Free–Write  
▶ RAFT

- ▶ Guided Rdg Proc
- ▶ Preview NF Text

- ▶ Paired Reading
- ▶ I–Charts
- ▶ Hunt for Main Ideas

▶ PRep

Before  
Motivation

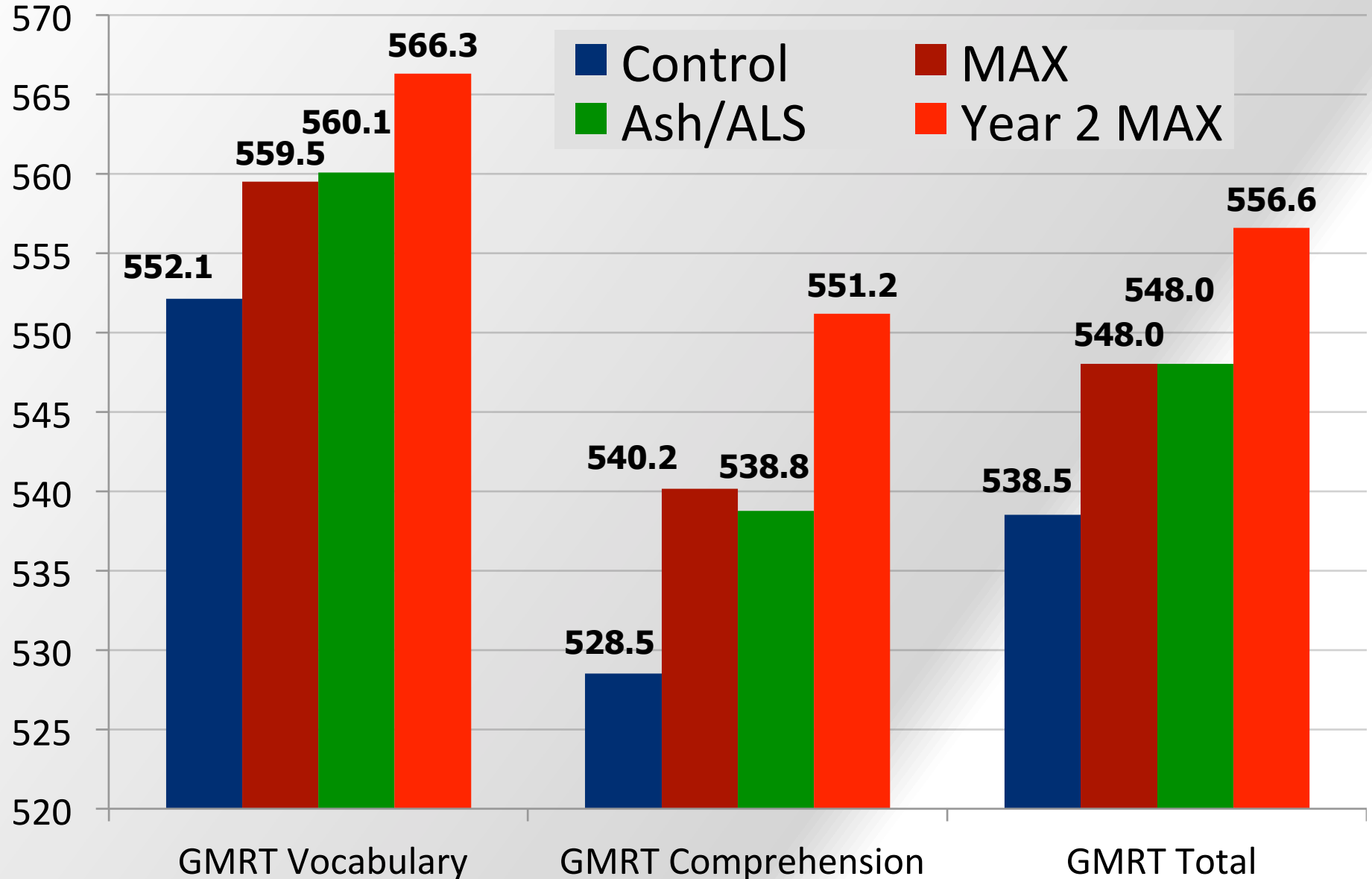
During  
Acquisition

After  
eXtension

# Full Year Analysis

Null Hypothesis	ANCOVA
$H^{\circ}_{1a}$ : NSD GMRT total score of MAX v. CTRL	fail to reject
$H^{\circ}_{1b}$ : NSD GMRT total score of Ash v. CTRL	reject
$H^{\circ}_{1c}$ : NSD GMRT total score of MAX Y2 v. CTRL	reject
$H^{\circ}_{2a}$ : NSD GMRT vocab score of MAX v. CTRL	reject
$H^{\circ}_{2b}$ : NSD GMRT vocab score of Ash v. CTRL	reject
$H^{\circ}_{2c}$ : NSD GMRT vocab score of MAX Y2 v. CTRL	reject
$H^{\circ}_{3a}$ : NSD GMRT comp score of MAX v. CTRL	fail to reject
$H^{\circ}_{3b}$ : NSD GMRT comp score of Ash v. CTRL	reject
$H^{\circ}_{3c}$ : NSD GMRT comp score of MAX Y2 v. CTRL	reject

# Posttest – ESS Means



## *HLM 2: Effects of Treatment and Baseline GMRT on Posttest GMRT Total ESS*

Fixed Effects	Est	SE	df	<i>t</i>	<i>p</i>
Intercept	149.67	10.42	1675.98	14.37	<0.001
MAX vs. Control	6.16	3.80	87.10	1.62	0.109
<b>Ash vs. Control</b>	8.52	3.82	79.97	2.23	<b>0.028</b>
<b>MAX Y2 vs. Control</b>	17.89	4.35	81.34	4.12	<b>&lt;0.001</b>
Baseline GMRT ESS	0.71	0.02	1870.37	38.39	<0.001
Covariance Parameters	Est	SE	Wald Z		<i>p</i>
Residual	710.42	23.75	29.92		<0.001
Random Intercept (Teacher)	145.92	28.52	5.12		<0.001

## *HLM 6: Effects of Treatment and Baseline GMRT on Posttest GMRT Vocabulary ESS*

Fixed Effects	Est	SE	df	t	p
Intercept	166.39	11.44	1624.14	14.54	.000
<b>MAX vs. Control</b>	6.95	4.10	82.86	1.69	<b>.094</b>
<b>Ash vs. Control</b>	8.13	4.10	75.28	1.98	<b>.051</b>
<b>MAX Y2 vs. Control</b>	16.44	4.68	76.86	3.52	<b>.001</b>
Baseline GMRT ESS	.70	.02	1850.15	34.65	<0.001
Covariance Parameters	Est	SE	Wald Z		p
Residual	971.43	32.51	29.89		<0.001
Random Intercept (Teacher)	161.39	33.93	4.76		<0.001

## *HLM 9: Effects of Treatment and Baseline GMRT on Posttest GMRT Comprehension ESS*

Fixed Effects	Est	SE	df	t	<i>p</i>
Intercept	210.79	11.43	1603.78	18.44	.000
MAX vs. Control	7.01	4.82	88.40	1.45	.150
<b>Ash vs. Control</b>	8.92	4.83	80.77	1.85	<b>.069</b>
<b>MAX Y2 vs. Control</b>	20.43	5.51	82.29	3.71	<b>.000</b>
Baseline GMRT ESS	.59	.02	1876.25	28.86	<0.001
Covariance Parameters	Est	SE	Wald Z		<i>p</i>
Residual	1190.97	39.80	29.93		<0.001
Random Intercept (Teacher)	231.33	45.46	5.10		<0.001



# 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

## Ash

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

# Teachers' use of strategies

## How?

- Used strategies more early in week
- Asked students for feedback about which strategies worked best
- ↑ assigned reading:  
↑ student engagement
- 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

# ELA Common Core

- Reading
- Writing
- Speaking and Listening
- Language
- Media and Technology

# ELA Common Core

- “Staircase” of increasing complexity
- Diverse array of reading
- Write logical arguments based upon claims, reasoning, evidence
- Research is emphasized
- Students gain, evaluate, present complex info, ideas, evidence
- Prepare students for real life, college, careers

# Examples of CI in CCSS

*Claim #1* - Students can read closely and analytically to comprehend a range of increasingly complex literary and informational texts.

**1. SUPPORTING EVIDENCE:** Cite specific textual evidence to support conclusions drawn from the text(s)

Anticipation Guides, Hunt for main ideas, Directed Reading-Thinking Activity

**8. KEY DETAILS:** Cite explicit text evidence to support inferences made or conclusions drawn about texts

Previewing Non-fiction text, 3-Level Study Guide, Extreme Paired Reading, Jigsaw, Cubing, Think-Pair-Share, Inquiry Charts

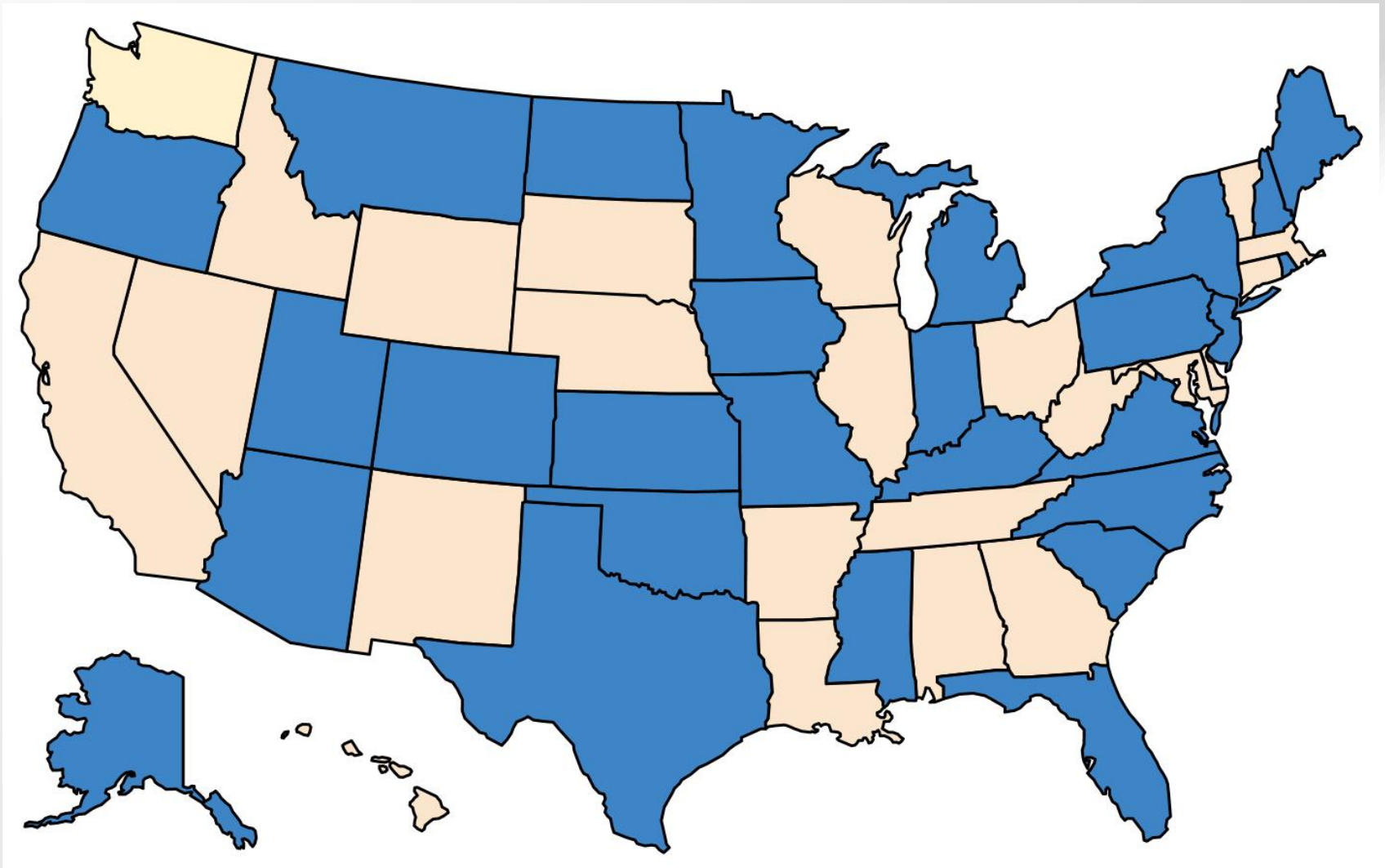
**9. CENTRAL IDEAS:** Summarize central ideas, topics/subtopics, key events, or procedures using supporting ideas and relevant details

GIST strategy, Hunt for main ideas, Previewing non-fiction text, Focused Free Writes, Journaling, Cornell Notes

# What Makes Integration Work?

Common Findings Among  
the NRCCTE Studies...

# Curriculum Integration Sites



# 3 levels of integration

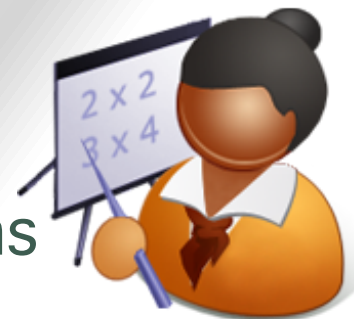
## System

- Administrative commitment
- Funding support
- Logistical support



## Curricular

- Opportunities in courses
- Coherence through programs



## Instructional

- Pedagogic framework
- Teacher skill/performance



# Core Principles

- Foster and Sustain a Community of Practice
- Approach academics as essential workplace skills
- Begin with the CTE curricula, not with academics
- Maximize the academics in CTE
- Support CTE teachers as “teachers of academics-in-CTE”; not as academic teachers

# Process and Pedagogy

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

# Changing the Paradigm in Practice

## *Old Models*

- A *box* of curriculum
- Short term “training”
- Little or no support after the “sage on the stage” goes away
- Replicable by individual teachers (assumed)

## *New Models*

- Process not an event
- Built on communities of practice
- On-going support – the learning curve
- Requires teams of committed teachers working together over time

# CI Professional Development

- 10 days (60+ hours)
  - Summer = 5 days
  - Fall = 2 days
  - Winter = 2 days
  - Spring = 1 day
- $\leq$  40 teachers
- Variety of CTE areas, but clusters of 5+ teachers/area
- Bi-monthly accountability

# Thank you!!!

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