Capitalizing on Context: Effective Integration of CTE and Academics

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NRCCTE Partners

UNIVERSITY OF LOUISVILLE

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SREB - SOUTHERN REGIONAL EDUCATION BOARD

NOCTI

AED - Academy for Educational Development

ACTEonline

STATE DIRECTORS
National Association of State Directors of Career Technical Education Consortium
Four Main Activities

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

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 8th year
- Literacy-in-CTE: complete
  - TA-PD moving to 3rd 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 CTEx vs. All CTEc
Post test % correct controlling for pre-test

![Bar chart showing test results for TerraNova, AccuPlacer, and WorkKeys. The chart compares experimental classes (blue) and control classes (yellow) with p-values for each test (p=0.02, p=0.03, p=NS).]
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

Pre-Test Students

Difference

The Experimental Treatment
Teacher Professional Development + Implementation of Lessons

Post-Test Students

Difference

Control: “business-as-usual”

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\textsuperscript{th} 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\textsuperscript{th} graders are proficient readers
- Bare majority (51\%) of ACT completers are ready for college reading (ACT, 2006)
NAEP Scores of 17-Year Olds

Score

- Revised Format


Scores:
- 283
- 286
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
On-going fidelity of treatment measures
# Teachers

<table>
<thead>
<tr>
<th>Group</th>
<th>NY</th>
<th>SC</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. MAX</td>
<td>14</td>
<td>14</td>
<td>28</td>
</tr>
<tr>
<td>2. Ash</td>
<td>13</td>
<td>12</td>
<td>25</td>
</tr>
<tr>
<td>3. MAX Y2</td>
<td>15</td>
<td>---</td>
<td>15</td>
</tr>
<tr>
<td>4. Control</td>
<td>9</td>
<td>19</td>
<td>28</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>51</td>
<td>45</td>
<td>96</td>
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## Students

<table>
<thead>
<tr>
<th>Demographic</th>
<th>Overall</th>
<th>Control</th>
<th>MAX</th>
<th>Ash</th>
<th>MAX Y2</th>
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<tbody>
<tr>
<td>NY</td>
<td>57.0</td>
<td>28.1</td>
<td>51.8</td>
<td>63.3</td>
<td>100.0</td>
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<tr>
<td>SC</td>
<td>43.0</td>
<td>71.9</td>
<td>48.2</td>
<td>36.7</td>
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<tr>
<td>Female</td>
<td>56.9</td>
<td>63.9</td>
<td>56.7</td>
<td>47.8</td>
<td>72.3</td>
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<tr>
<td>11-12(^{th}) grade</td>
<td>69.6</td>
<td>67.9</td>
<td>58.9</td>
<td>62.7</td>
<td>97.5</td>
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<tr>
<td>White</td>
<td>61.1</td>
<td>55.2</td>
<td>58.3</td>
<td>55.1</td>
<td>84.3</td>
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<td>FRPL</td>
<td>38.8</td>
<td>40.4</td>
<td>44.0</td>
<td>34.9</td>
<td>36.6</td>
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<td>Mother ≤ HS</td>
<td>32.0</td>
<td>31.3</td>
<td>33.4</td>
<td>27.7</td>
<td>38.7</td>
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<td>Father ≤ HS</td>
<td>35.6</td>
<td>33.0</td>
<td>36.6</td>
<td>32.7</td>
<td>43.7</td>
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</table>
Coop Learning & Skills Acquisition

<table>
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<tr>
<th></th>
<th>MAX</th>
<th>SAM</th>
<th>Coop Learning</th>
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<tbody>
<tr>
<td><strong>Before Reading</strong></td>
<td><strong>Motivation</strong></td>
<td>Introduction and modeling of the skill</td>
<td>Written commitment and small-group discussion</td>
</tr>
<tr>
<td></td>
<td>Reducing the anxiety and improving the probability of success in reading</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>During Reading</strong></td>
<td><strong>Acquisition</strong></td>
<td>Guided practice in learning skill</td>
<td>Individual gathering of data for discussion</td>
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<tr>
<td></td>
<td>Individual silent reading for personal interpretation</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>After Reading</strong></td>
<td><strong>Extension</strong></td>
<td>Reflection on how the skill worked</td>
<td>Attempt to achieve small group and class consensus</td>
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<tr>
<td></td>
<td>Cooperative construction of meaning through discussion, writing, etc.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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
- Cube It!
- Focused Free–Write
- Guided Rdg Proc
- Preview NF Text
- PRep

- DRTA
- 3–Level SG
- Cornell Notes
- Jigsaw
- Stump the Teacher
- GIST
- Paired Reading
- I–Charts
- Hunt for Main Ideas

- Think–Pair–Share
- Pre/Post Check
- Cube It!
- Focused Free–Write
- RAFT

Before Motivation  During Acquisition  After eXtension
## Full Year Analysis

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<thead>
<tr>
<th>Null Hypothesis</th>
<th>ANCOVA</th>
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<td>$H_0^{1a}$: NSD GMRT total score of MAX v. CTRL</td>
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<td>$H_0^{1b}$: NSD GMRT total score of Ash v. CTRL</td>
<td>reject</td>
</tr>
<tr>
<td>$H_0^{1c}$: NSD GMRT total score of MAX Y2 v. CTRL</td>
<td>reject</td>
</tr>
<tr>
<td>$H_0^{2a}$: NSD GMRT vocab score of MAX v. CTRL</td>
<td>reject</td>
</tr>
<tr>
<td>$H_0^{2b}$: NSD GMRT vocab score of Ash v. CTRL</td>
<td>reject</td>
</tr>
<tr>
<td>$H_0^{2c}$: NSD GMRT vocab score of MAX Y2 v. CTRL</td>
<td>reject</td>
</tr>
<tr>
<td>$H_0^{3a}$: NSD GMRT comp score of MAX v. CTRL</td>
<td>fail to reject</td>
</tr>
<tr>
<td>$H_0^{3b}$: NSD GMRT comp score of Ash v. CTRL</td>
<td>reject</td>
</tr>
<tr>
<td>$H_0^{3c}$: NSD GMRT comp score of MAX Y2 v. CTRL</td>
<td>reject</td>
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</table>
Posttest – ESS Means

<table>
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<tr>
<th></th>
<th>Control</th>
<th>MAX</th>
<th>Year 2 MAX</th>
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<tbody>
<tr>
<td>GMRT Vocabulary</td>
<td>552.1</td>
<td>566.3</td>
<td>556.6</td>
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<tr>
<td>GMRT Comprehension</td>
<td>540.2</td>
<td>538.8</td>
<td>538.5</td>
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<tr>
<td>GMRT Total</td>
<td>528.5</td>
<td>548.0</td>
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### HLM 2: Effects of Treatment and Baseline GMRT on Posttest GMRT **Total** ESS

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<thead>
<tr>
<th>Fixed Effects</th>
<th>Est</th>
<th>SE</th>
<th>df</th>
<th>t</th>
<th>p</th>
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<tbody>
<tr>
<td>Intercept</td>
<td>149.67</td>
<td>10.42</td>
<td>1675.98</td>
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<td>MAX vs. Control</td>
<td>6.16</td>
<td>3.80</td>
<td>87.10</td>
<td>1.62</td>
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<td>Ash vs. Control</td>
<td>8.52</td>
<td>3.82</td>
<td>79.97</td>
<td>2.23</td>
<td><strong>0.028</strong></td>
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<td>MAX Y2 vs. Control</td>
<td>17.89</td>
<td>4.35</td>
<td>81.34</td>
<td>4.12</td>
<td><strong>&lt;0.001</strong></td>
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<tr>
<td>Baseline GMRT ESS</td>
<td>0.71</td>
<td>0.02</td>
<td>1870.37</td>
<td>38.39</td>
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</table>

<table>
<thead>
<tr>
<th>Covariance Parameters</th>
<th>Est</th>
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<th>Wald Z</th>
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<tbody>
<tr>
<td>Residual</td>
<td>710.42</td>
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<td>Random Intercept (Teacher)</td>
<td>145.92</td>
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<td>5.12</td>
<td><strong>&lt;0.001</strong></td>
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## HLM 6: Effects of Treatment and Baseline GMRT on Posttest GMRT Vocabulary ESS

### Fixed Effects

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<th>Fixed Effects</th>
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<th>p</th>
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</thead>
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<tr>
<td>Intercept</td>
<td>166.39</td>
<td>11.44</td>
<td>1624.14</td>
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<td>MAX vs. Control</td>
<td>6.95</td>
<td>4.10</td>
<td>82.86</td>
<td>1.69</td>
<td>.094</td>
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<tr>
<td>Ash vs. Control</td>
<td>8.13</td>
<td>4.10</td>
<td>75.28</td>
<td>1.98</td>
<td>.051</td>
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<tr>
<td>MAX Y2 vs. Control</td>
<td>16.44</td>
<td>4.68</td>
<td>76.86</td>
<td>3.52</td>
<td>.001</td>
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<tr>
<td>Baseline GMRT ESS</td>
<td>.70</td>
<td>.02</td>
<td>1850.15</td>
<td>34.65</td>
<td>&lt;0.001</td>
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</table>

### Covariance Parameters

<table>
<thead>
<tr>
<th>Covariance Parameters</th>
<th>Est</th>
<th>SE</th>
<th>Wald Z</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residual</td>
<td>971.43</td>
<td>32.51</td>
<td>29.89</td>
<td>&lt;0.001</td>
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<td>Random Intercept (Teacher)</td>
<td>161.39</td>
<td>33.93</td>
<td>4.76</td>
<td>&lt;0.001</td>
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### HLM 9: Effects of Treatment and Baseline GMRT on Posttest GMRT Comprehension ESS

<table>
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<th>Fixed Effects</th>
<th>Est</th>
<th>SE</th>
<th>df</th>
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<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>210.79</td>
<td>11.43</td>
<td>1603.78</td>
<td>18.44</td>
<td>.000</td>
</tr>
<tr>
<td>MAX vs. Control</td>
<td>7.01</td>
<td>4.82</td>
<td>88.40</td>
<td>1.45</td>
<td>.150</td>
</tr>
<tr>
<td>Ash vs. Control</td>
<td>8.92</td>
<td>4.83</td>
<td>80.77</td>
<td>1.85</td>
<td>.069</td>
</tr>
<tr>
<td>MAX Y2 vs. Control</td>
<td>20.43</td>
<td>5.51</td>
<td>82.29</td>
<td>3.71</td>
<td>.000</td>
</tr>
<tr>
<td>Baseline GMRT ESS</td>
<td>.59</td>
<td>.02</td>
<td>1876.25</td>
<td>28.86</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Covariance Parameters</th>
<th>Est</th>
<th>SE</th>
<th>Wald Z</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residual</td>
<td>1190.97</td>
<td>39.80</td>
<td>29.93</td>
<td>&lt;0.001</td>
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<tr>
<td>Random Intercept (Teacher)</td>
<td>231.33</td>
<td>45.46</td>
<td>5.10</td>
<td>&lt;0.001</td>
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</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>1. SUPPORTING EVIDENCE:</th>
<th>Cite specific textual evidence to support conclusions drawn from the text(s)</th>
<th>Anticipation Guides, Hunt for main ideas, Directed Reading-Thinking Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. KEY DETAILS:</td>
<td>Cite explicit text evidence to support inferences made or conclusions drawn about texts</td>
<td>Previewing Non-fiction text, 3-Level Study Guide, Extreme Paired Reading, Jigsaw, Cubing, Think-Pair-Share, Inquiry Charts</td>
</tr>
<tr>
<td>9. CENTRAL IDEAS:</td>
<td>Summarize central ideas, topics/subtopics, key events, or procedures using supporting ideas and relevant details</td>
<td>GIST strategy, Hunt for main ideas, Previewing non-fiction text, Focused Free Writes, Journaling, Cornell Notes</td>
</tr>
</tbody>
</table>
What Makes Integration Work?

Common Findings Among the NRCCTE Studies…
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

- ≤ 40 teachers
- Variety of CTE areas, but clusters of 5+ teachers/area
- Bi-monthly accountability
Thank you!!!

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