The NRCCTE Curriculum Integration Studies

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Disclaimer:

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Located at the University of Louisville
College of Education and Human Development
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
## Research Design: Participants

<table>
<thead>
<tr>
<th>Participants</th>
<th>Primary Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Ag Ed teachers</td>
<td>Implement the science enhanced lessons</td>
</tr>
<tr>
<td>Science teachers</td>
<td>Provide support for the Ag Ed teacher</td>
</tr>
<tr>
<td>Control Ag Ed teachers</td>
<td>Teach their regular curriculum</td>
</tr>
</tbody>
</table>
NAEP Science Scores – High School

- New Scale
- 150
- 147*
- 305
- 295*
- 1.5 Credits
- 3.2 Credits

Years: 1970 to 2005
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?
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.
Science Study Questions

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

X

The Experimental Treatment

Teacher Professional Development

Implementation of Lessons

Post-Test Students

On-going fidelity of treatment measures

C

Pre-Test Students

Difference

Difference

C
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*
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
Fidelity of the Treatment

- Pre and post teacher questionnaires
- Science Teacher Pre-Teaching Reports
- CTE Teacher Post-Teaching Reports
- Instructional Artifacts
- Focus Groups
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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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 CTE\textsubscript{x} vs. All CTE\textsubscript{c}
Post test % correct controlling for pre-test

- TerraNova: $p = .02$
- AccuPlacer: $p = .03$
- WorkKeys: $p = \text{ns}$
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

Math in CTE Use 1 Year Later

- Math teacher Partners: 65%
- Experimental CTE Teachers: 75%
- Control CTE Teachers: 27%

Total Surprise!
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

<table>
<thead>
<tr>
<th>State</th>
<th>CTRL</th>
<th>ALS/ASH</th>
<th>MAX</th>
<th>Total</th>
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<tbody>
<tr>
<td>NY</td>
<td>12</td>
<td>15</td>
<td>16</td>
<td>43</td>
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<tr>
<td>SC</td>
<td>19</td>
<td>21</td>
<td>18</td>
<td>58</td>
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<tr>
<td><strong>Subtotal</strong></td>
<td><strong>31</strong></td>
<td><strong>36</strong></td>
<td><strong>34</strong></td>
<td><strong>101</strong></td>
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<tr>
<td>Year 3</td>
<td></td>
<td></td>
<td>15</td>
<td>15</td>
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<tr>
<td>Grand Total</td>
<td></td>
<td></td>
<td>49</td>
<td>116</td>
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<tr>
<td></td>
<td>MAX</td>
<td>SAM</td>
<td>Coop Learning</td>
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<tr>
<td>----------------------</td>
<td>------------------------------------------</td>
<td>-----------------------------------------------</td>
<td>---------------------------------------------------</td>
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<tr>
<td><strong>Before Reading</strong></td>
<td><strong>M</strong>otivation</td>
<td>Introduction and modeling of the skill</td>
<td>Written commitment and small-group discussion</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reducing the anxiety and improving the probability of success in reading</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>During Reading</strong></td>
<td><strong>A</strong>cquisition</td>
<td>Guided practice in learning skill</td>
<td>Individual gathering of data for discussion</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Individual silent reading for personal interpretation</td>
<td></td>
<td></td>
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<tr>
<td><strong>After Reading</strong></td>
<td><strong>E</strong>xtension</td>
<td>Reflection on how the skill worked</td>
<td>Attempt to achieve small group and class consensus</td>
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</tr>
<tr>
<td></td>
<td>Cooperative construction of meaning through discussion, writing, etc.</td>
<td></td>
<td></td>
<td></td>
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</table>
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
## Full-Year Analysis

* = significantly different from control at $\alpha = .05$

<table>
<thead>
<tr>
<th>Group</th>
<th>Pretest ESS Mean</th>
<th>Raw Mean</th>
<th>Posttest ESS Mean</th>
<th>Raw Mean</th>
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<tbody>
<tr>
<td><strong>GMRT Vocabulary</strong></td>
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<tr>
<td>Control</td>
<td>554.48</td>
<td>30.31</td>
<td>552.10</td>
<td>29.28</td>
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<tr>
<td>MAX</td>
<td>554.94</td>
<td>30.55</td>
<td>559.48*</td>
<td>31.07</td>
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<td>553.83</td>
<td>30.24</td>
<td>560.05*</td>
<td>31.09</td>
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<tr>
<td>Year 2 MAX</td>
<td>555.00</td>
<td>30.44</td>
<td>566.30*</td>
<td>32.56</td>
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<tr>
<td><strong>GMRT Comprehension</strong></td>
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<tr>
<td>Control</td>
<td>537.06</td>
<td>29.94</td>
<td>531.22</td>
<td>27.25</td>
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<tr>
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<td>32.81</td>
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<td>30.82</td>
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<td>543.53</td>
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<td><strong>GMRT Total</strong></td>
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<tr>
<td>Control</td>
<td>544.16</td>
<td>60.24</td>
<td>538.50</td>
<td>56.53</td>
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<tr>
<td>MAX</td>
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<td>63.36</td>
<td>548.04*</td>
<td>61.80</td>
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<td>ALS/Ash</td>
<td>545.04</td>
<td>61.07</td>
<td>548.02*</td>
<td>61.28</td>
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<tr>
<td>Year 2 MAX</td>
<td>547.24</td>
<td>62.19</td>
<td>556.57*</td>
<td>65.87</td>
</tr>
</tbody>
</table>
Posttest – ESS Means

GMRT Vocabulary | GMRT Comprehension | GMRT Total

- **Control**
- **MAX**
- **Ash/ALS**
- **Year 2 MAX**
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**
- 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
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?
For more information

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