



National Center for **Research** on
Rural Education (R²Ed)

CSI: Coaching Science Inquiry in Rural Schools
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Jim Houston, Gina Kunz, Melissa Hall, Bruce Hayden,
Sandy Kendall, & SoonChun Lee

CSI: Coaching Science Inquiry in Rural Schools

- **CSI is a Research Study conducted by the National Center for Research on Rural Education (R²Ed) at the University of Nebraska-Lincoln**
 - Research study funded for 2 years by the U.S. Department of Education
 - Involves 120 teachers over two years
 - Consists of both experimental and control groups
 - Year 1 control group had first option for year 2 experimental group

CSI Research Study Research Question

*What is the impact of professional development on guided scientific inquiry with follow-up coaching (treatment) versus no professional development (control) on (a) **teacher** inquiry knowledge, skills, self-efficacy, and beliefs and (b) **student** inquiry knowledge, skills, engagement and science attitudes?*

CSI: Coaching Science Inquiry in Rural Schools

- **CSI Professional Development targets**
 - Nebraska State Standards for science inquiry
 - Science inquiry instructional strategies
 - Supports for classroom implementation
 - Student engagement in science inquiry

CSI: Coaching Science Inquiry in Rural Schools

- **CSI: Rural Schools is specifically designed for**
 - Middle and high school science teachers in rural schools (grades 6-12)
 - Teachers that are looking to expand their instructional tool box
 - Teachers that are looking for Professional Development readily transferrable to classroom practice

CSI Participants

- 57 Control Teachers
 - 44 Schools
- 82 Treatment Teachers
 - 74 schools

*Over 60,000 miles traveled by teachers for
Summer Institutes

PARTICIPATING TEACHER SITES



Participant Teacher Demographics

- 120 Teachers
 - 70% Female / 30% Male
- Years of teaching experience
 - 0-2 years 15.6%
 - 3-5 years 11.5%
 - 6-10 years 13.5%
 - 11-15 years 26.0%
 - 16-20 years 11.5%
 - 20+ years 21.9%

Participant Teacher Demographics

- Grades taught by teachers*
 - 29% Middle School Only (6th – 8th)
 - 33% High School Only (9th – 12th)
 - 33% Both Middle and High School

*4 teachers did not respond

Participant Teacher Demographics

- Courses taught
 - Physical Science 53%
 - Chemistry 39%
 - Physics 38%
 - Life Science 48%
 - Biology 48%
 - Anatomy/Physiology 37%
 - Earth Science 43%
 - General Science 34%
 - Environmental Science 19%

Students of CSI Participants

- Approximately **3,700** Students from Nebraska and Iowa schools
- ~1,850 High School Students (9-12)
- ~1,850 Middle School Students (6-8)

CSI Instructional Coaches

- 4 experienced science teachers trained as instructional coaches
 - Nearly 100 years of classroom experience in both the middle and high school classrooms

CSI Coach: Peg Coover



- I have a unique opportunity to work with rural science teachers to improve student learning. Beginning with the Summer Professional Development, teachers were immersed in the process of science inquiry and their excitement about the prospect of ongoing PD and support during the school year was encouraging! During the school year, the teacher-coach partnership focuses on desired student outcomes to plan inquiry lessons and teaching strategies to achieve those goals. I look forward to working with all of the teachers this year!

CSI Coach: Melissa Hall



- At many times during my teaching career, I wished I'd had the luxury of a confidant who knew what it was like to be in a science classroom. Simply having someone to bounce ideas off of would have improved my outlook and impacted student achievement positively. I believe this program provides that rare opportunity to Science teachers the opportunity to connect with someone that understands your position and is there to provide meaningful feedback.

CSI Coach: Bruce Hayden, Jr.



- As a CSI coach, I have the opportunity to interact with many wonderful science teachers.... Supporting them in their effort to increase student achievement in the area of inquiry, is a highlight of my professional career. I hope to provide for them what I wish had been available to me.



CSI Coach: Sandy Kendall



- After 30 years of teaching using “Hands On” activities, I thought I knew all about inquiry....I have learned that inquiry has different meanings. During the past few months I have learned what works best with kids! I am excited to share some of these new ideas with teachers in and around Nebraska.



Quotes from Treatment Teachers During Coaching Sessions

- ...it has forced me to be very purposeful and...I am growing as a teacher: How do you NOT use it in other classes?
- I get a little tense about how much time it's taking, but we are taking a deep drink and it's been good.
- I watched myself on video and I look...and sound...like a *real* teacher.

Quotes from Treatment Teachers During Coaching Sessions

- I find that I'm using this method more and more in my other classes. The kids ask me a question and I think, don't give them an answer...I ask them a question.
- I had the desks set up differently (for an activity). Kids started coming in and said, "Oh, this is different." People walking by in the hall stopped in and said, "Oh, this is different." A principal stepped in just to observe because the kids were up moving around - wow, isn't this novel.

Quotes from Treatment Teachers During Coaching Sessions

- The kids actually had a chance to show me that they saw relationships instead of necessarily proving it by answering a question.
- The kids did a good job of inferring and coming up with new ideas. They were also good at analyzing the questions.
- ...They (the students) are getting good at this process so it's hard to find areas to improve...it's the way we do things now...it's what we do!

Year 1 Findings: Overall Teacher Results

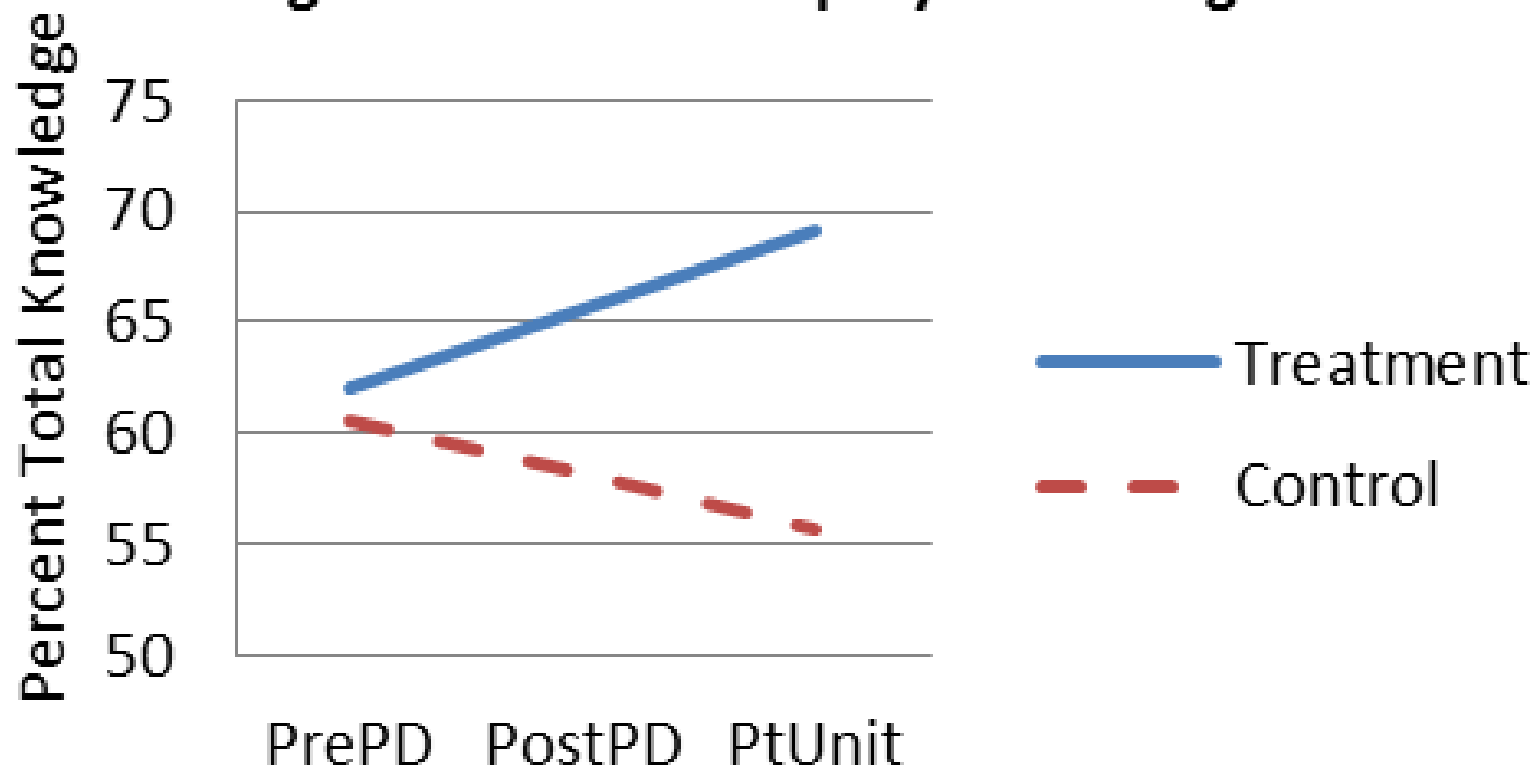
- 47 treatment teachers; 43 control teachers
- Pre-Summer Institute – Post-Summer Institute for treatment teachers:

Significant gains in:

- knowledge of scientific inquiry,
- beliefs about scientific inquiry, and
- self-efficacy in teaching scientific inquiry

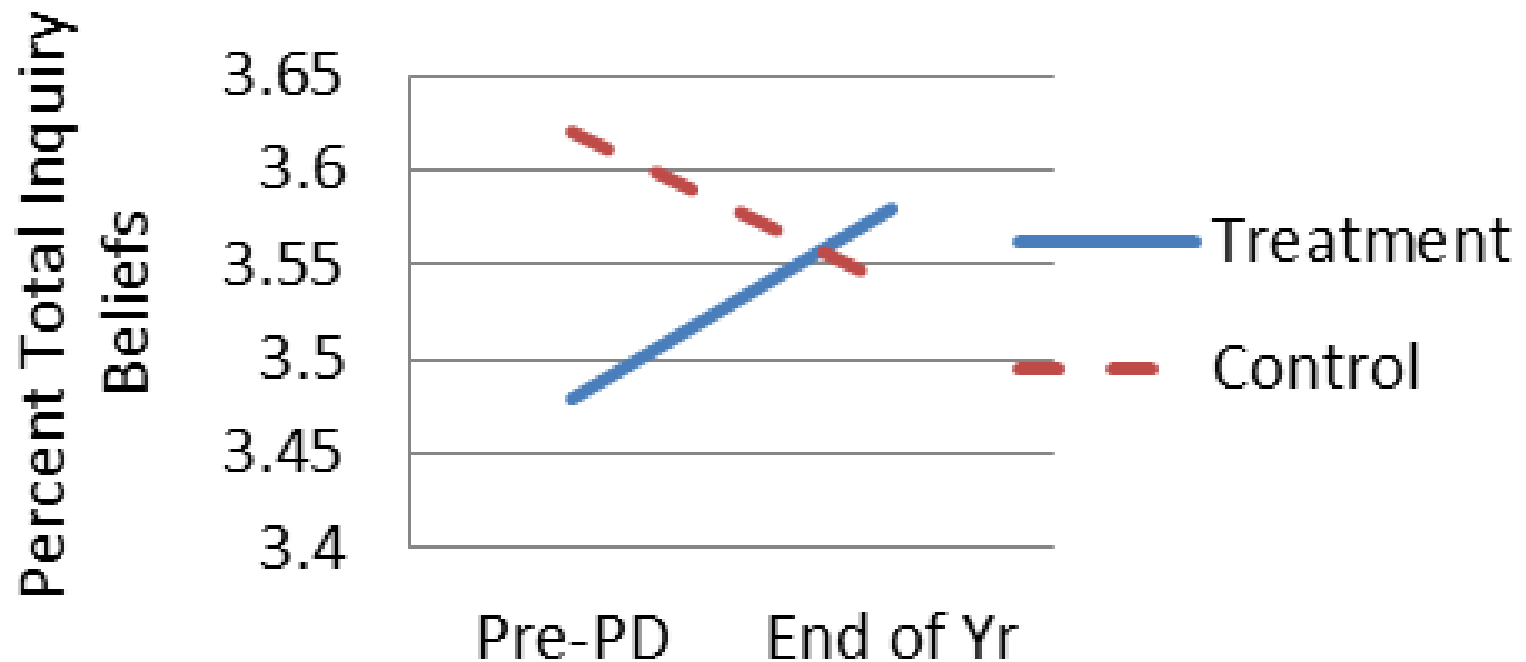
Teacher Inquiry Knowledge

Figure 1. Teacher Inquiry Knowledge



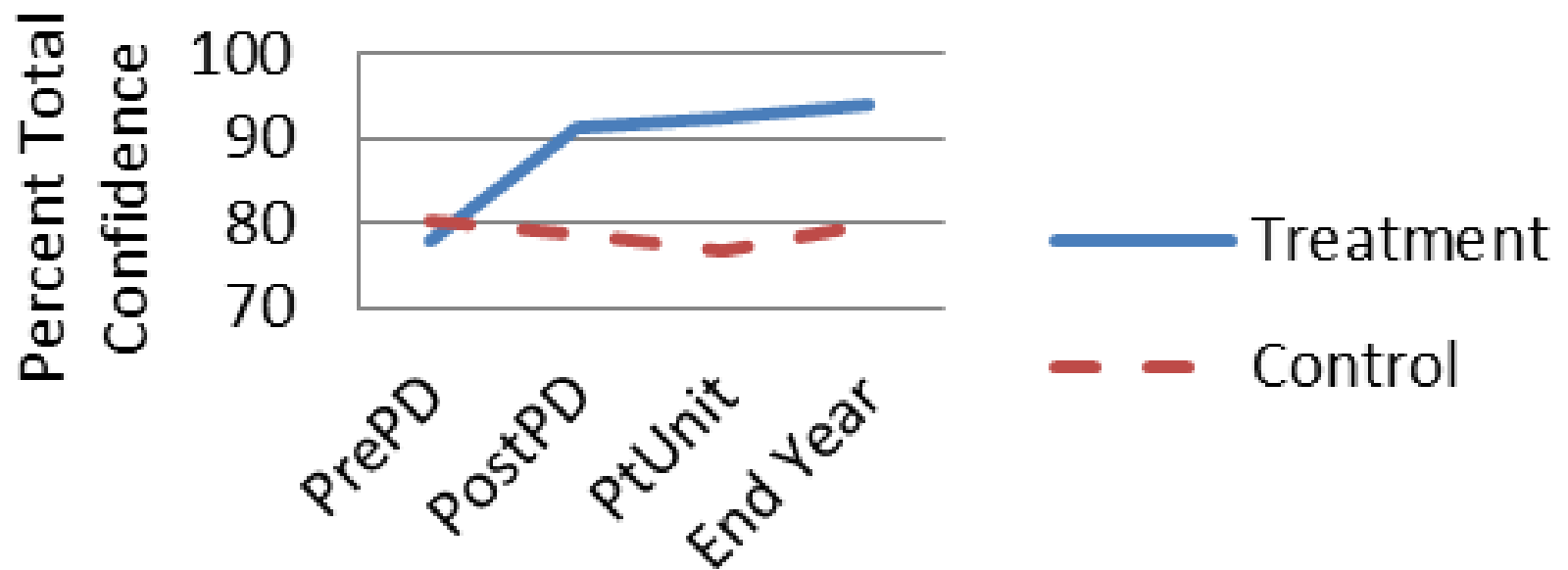
Teacher Inquiry Beliefs

Figure 2. Teacher Inquiry Beliefs



Teacher Self-Efficacy

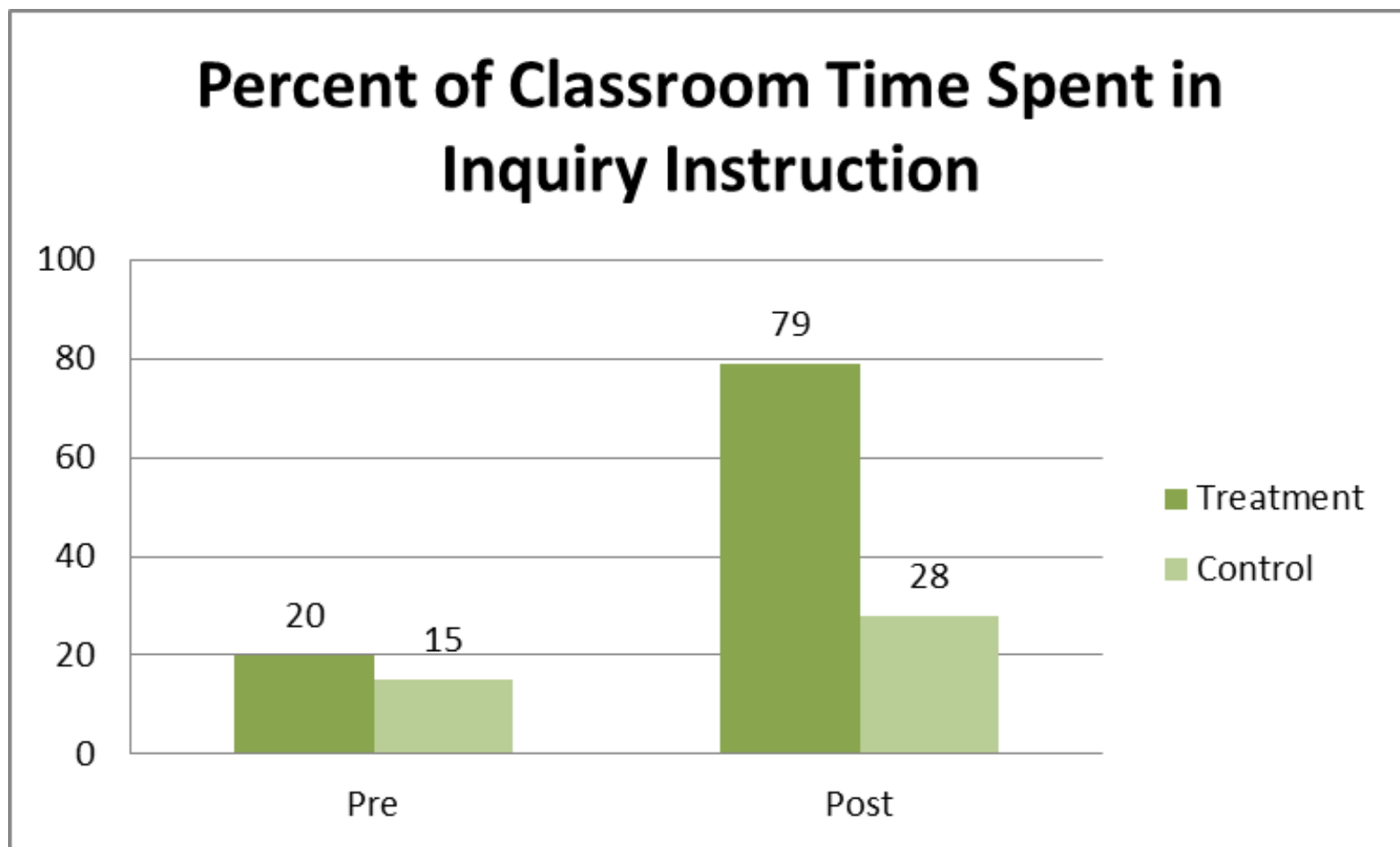
Figure 4. Teacher Self-Efficacy in Teaching Scientific Inquiry



Observations of Teacher Practice: Teacher Inquiry Rubric (TIR) & EQUIP

	Pre-Inquiry	Developing	Proficient	Exemplary
Treatment				
Control				

Observations of Teacher Practice: Partial Interval Classroom Observation-Teacher (PICI-T)



Student Findings: Inquiry Skills (Student Inquiry Rubric)

Higher performance for the treatment group compared to control group in the key inquiry skills:

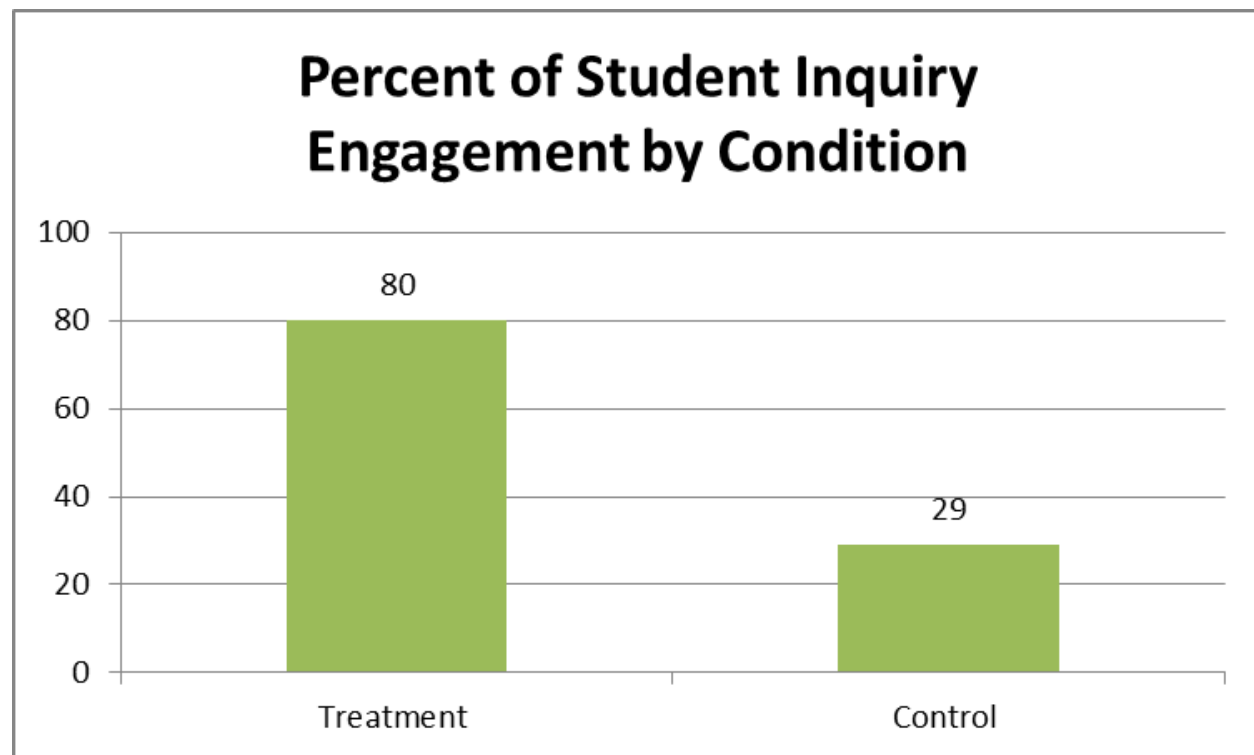
- questioning
- collecting data
- conducting an investigation
- developing an explanation from evidence
- communicating results

Student Inquiry Knowledge, Self-Efficacy, and Attitudes

- No significant effects, although middle school results favored the treatment group.
- These results suggest, as indicated by previous research, that student impacts may not be realized until the second year of teacher experience and practice in delivering science instruction using a guided scientific inquiry approach.

Observations of Student Practice: Partial Interval Classroom Observation-Student (PICI-S)

- 15 treatment classrooms and 15 control classrooms
- Showed the percent of student inquiry engagement
- Treatment (post-only) = 80%
- Control (post-only) = 29%



Contact Information

Jim Houston, Ed.S.
CSI Project Manager
jhouston2@unl.edu
402-472-5996

National Center for Research on Rural Education
162 Whittier Research Center
Lincoln, NE 68583-0858
CSIRuralSchools.unl.edu

