

Does a Psychology Research Methods Course Enhance Critical Thinking?

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Background and Introduction

- Joined the Quality Enhancement Plan in Summer 2014
- This presentation examines how my psychology research methods class was designed to improve student critical thinking.

Course Components

- Website for syllabus

<http://bstephe.people.clemson.edu/>



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Prez Barker

Me

Guy trying to take
back my award

Research Interests ([C.V.](#)) ([Google Scholar](#))

[Topics](#)

[Student Collaboration](#)

Teaching

[PSYCH 310](#)

[PSYC 498 - CI Teams](#)

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[Distributed Competencies](#)

[Pic of Caleb](#)

[Pic of Josh](#)

[Jen and boys](#)

Course Components

- Website for syllabus
- Description of course components to enhance critical thinking

Critique of Research

This section of PSYC 3100 is participating in Clemson's [CT2 Quality Enhancement Plan](#), designed to enhance critical thinking in undergraduate education.

This CT2 component of PSYC 3100 is consistent with the long-established student learning goals for a course on research design in psychological science.

Critique of research involves multiple critical thinking skills and understandings, and is involved in each of the [main features of research methods](#):

- ◆ Design and execution of research requires critical thinking to anticipate and prevent alternative explanations.
- ◆ Communication of research requires critical thinking to clearly identify, apply, and communicate features of research (e.g. research design) that anticipates critical review by others.
- ◆ Statistical analysis of results requires critical thinking to select, apply and interpret the correct data analysis technique for a given research design.

What are specific critical thinking skills in PSYC 3100?

- ◆ Determine the relevance of information for evaluating claims made in a scientific study.
- ◆ Recognize and prevent flaws in scientific methods
- ◆ Evaluate competing causal explanations through experimental designs
- ◆ Evaluate hypotheses for consistency with scientific methods and results
- ◆ Evaluate the appropriateness of scientific procedures for investigating a question of causation
- ◆ Evaluate the appropriateness of statistical procedures for a given hypothesis and data set.
- ◆ Evaluate scientific results for consistency with established facts, hypotheses, or methods

Student Critical Thinking Learning Outcomes

- ◆ Explore and analyze alternative methodological designs for research questions
- ◆ Analyze methodologies and identify how they limit results and conclusions, e.g. quasi-experimental designs versus true experimental designs
- ◆ Apply research design concepts to novel contexts, e.g. identify measured versus experimental operational definitions in research reports
- ◆ Synthesize alternative solutions to multi-dimensional challenges, e.g. derive multiple hypotheses to evaluate psychological theory/explanations
- ◆ Communicate research projects effectively, e.g. apply APA guidelines to produce complete, precise, concise and compelling scientific reports and oral presentations

Teaching/Learning Strategies

- ◆ Homework review: contrasting cases method will be used to identify and compare student critical thinking responses, assessment of knowledge integration, and identification of critical thinking skills
- ◆ Group experimental designs: contrasting cases method to compare problem solving processes and solutions
- ◆ Participation grade: students will demonstrate and identify critical thinking skills (e.g. application of concepts, identification of alternative explanation) in class discussions and activities as part of their daily participation grade
- ◆ Modeling critical thinking and Socratic/discussion method for key concepts: e.g. application of concepts to novel situations
- ◆ Student artifacts / Web site
 - ◆ Students will post all assignments on their course websites
 - ◆ Each assignment will require a critical thinking reflective statement, indicating how the assignment provides (or does not provide) an example of one (or more) of the student critical thinking skills and learning outcomes

You will take the Critical Thinking Assessment Test (CAT) at the beginning and end of the course. CAT scores will be used by the CT2 program to assess how well you learned to think critically (while you also learned material on psychological research methods). You will receive 10 HW assignment points for participating in each assessment.

What are specific critical thinking skills in PSYC 310?

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- Recognize and prevent flaws in scientific methods
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Course Components

- Website for syllabus
- Description of course components to enhance critical thinking
- **Day 1 - Description of critical thinking skills**

Course Components

- Website for syllabus
- Description of course components to enhance critical thinking
- Description of critical thinking skills
- **Homework and Participation**

Course calendar- Daily topics, HW, Student sites

Dr. Ben Stephens Psych 310-Advanced Experimental Psychology SummerI 2018
TA - [Drew Morris](#) [Student Sites](#)

Course Calendar

Date	Topic in class	Read before class	Due: Posted to Website by 9:00 a.m. before Class	Lab: Post website by end of lab period or as instructed
5/15	Scientific Method Participation scoring	Ch 1 Demo Coffee Laptop study	CH1 HW - Define three terms, give example in a baseball study 10 HW pts	10 pts Create Google Website post SPSS output as excel file (call it LAB15May) post HW CH 1 (call it HW15May)
5/16	Validity, Reliability and Measurement http://www.ted.com/talks/ben_goldacre_battling_bad_science	Ch 3 L.O.S. Want More Money? (optional - full pdf report)	HW Ch 3 Define three terms, give example in a baseball study (10 HW pts)	10 pts 1) Design EX 1, Post Method Protocol 2) Practice data set tasks CH 3, p 101 https://statistics.laerd.com/spss-tutorials/cronbachs-alpha-using-spss-statistics.php
5/17	Describing your sample Water Eye Witness	Ch 5 DUI	HW Ch 5 Define three terms, give example in a baseball study (10 HW pts)	Mock data analysis https://statistics.laerd.com/spss-tutorials/independent-t-test-using-spss-

Practice in-class analysis of research

Psych 310-Advanced Experimental Psychology SummerI 2018
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Cigarette Smoking Linked To Cancer in High Degree

American Society Makes Final Report on Study of 187,783 Men—Industry Disputes Statistical Studies

By HAROLD M. SCHMECK Jr.

A report to the American Medical Association yesterday showed a high degree of association between cigarette smoking and total death rates. It added that there was an "extremely high" association between cigarette smoking and death from lung cancer.

It was a final major report on the American Cancer Society's massive statistical study of

Texts of report and industry statement are on Page 24.

smoking and death rates. It confirmed earlier interim reports from the same study.

In addition to noting a high degree of association between cigarette smoking and total death rates, the report said "extremely high" associations were found between cigarette smoking and deaths from cancer of

the lung, larynx and esophagus. A similarly high association was noted between cigarette smoking and death attributed to gastric ulcers.

A far lower degree of association was found between total death rates and cigar smoking and a "small degree" of association between total death rates and pipe smoking.

Shortly after the report was presented the Tobacco Industry Research Committee issued a statement reasserting its view that "the causes of cancer and heart disease are not yet known to medical science." The statement said the current report does nothing to change this fact and added that statistical studies do not prove cause and effect relationships.

The cancer report was based

Continued on Page 25. Column 1



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Laptop multitasking hinders classroom learning for both users and nearby peers

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ABSTRACT

Laptops are commonplace in university classrooms. In light of cognitive psychology theory on costs associated with multitasking, we examined the effects of in-class laptop use on student learning in a simulated classroom. We found that participants who multitasked on a laptop during a lecture scored lower on a test compared to those who did not multitask, and participants who were in direct view of a multitasking peer scored lower on a test compared to those who were not. The results demonstrate that multitasking on a laptop poses a significant distraction to both users and fellow students and can be detrimental to comprehension of lecture content.

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Daily Participation grade (10 pts)

- Frequency (3pts)
- Quality (4 pts)
- Engagement (3 pts)
 - Multitasking?
- TA monitoring
- Self-monitoring

Psyc 3100 Classroom Participation Rating Scale

Frequency 0 = no questions/comments, 1 = one comment, 2 = two comments, 3 = three comments

Quality 0=no comment, 1 = repeat info, 2-4 = clarification with nature of confusion, 3-4 = expand/apply/critique

Engagement 0=no engagement, 1= mostly distracted. 2= sometimes distracted, 3 consistently engaged

Date	Frequency (0-3)	Best Ave Quality (0-4)	Engagement (0-3)	Total (out of 10)	Notes (list your BEST comments 1,2,3,etc be very brief)
15-May					
16-May					
17-May					
18-May					
21-May					
22-May					

How to rate engagement???



Listening and taking notes....



Hmmmm....









Practice exam application items

Jack and Jill are conducting a study to determine if “Go Tigers” lapel buttons increase enjoyment of a Clemson football home game. They believe that wearing a “Go Tigers” button reminds fans that they are, well, Clemson fans, and so will make them appreciate the game no matter what the outcome. They take positions on opposite sides of the stadium, near the entrance gates, in order to avoid approaching the same fan twice. They ask each fan who is walking into the stadium for their email address in order to “email you later to ask about your satisfaction with the game”. Before the game, they flipped a coin to determine that Jack would be positioned at the East gate and hand out “go Tigers” buttons as he asked for email addresses. Jill would be positioned at the West gate and would not hand-out buttons when she asked for email addresses. After the game, they emailed all of the fans asking them to rate “how much they liked the game” on “a ten point scale, where 0= not at all and 10 = a great deal”. They found that the fans who received the “Go Tigers” button rated the game as significantly higher in likeability ($X=8.2$) compared to the fans that did not get the button ($X=4.3$). They concluded that wearing a “Go Tiger’s button caused fans to enjoy the game more.

What is the hypothesis? (2pts)

What are the main variables? (2pts)

What are the operational definitions of the main variables? (2pts)

Is there a scenario manipulation in this study? (2pts)

What is the design of this study? (2pts)

Is there a ratio scale employed in this study? (2pts)

Describe one critique of the conclusion (not external validity or the validity of the operational definition.) Be sure to indicate how your critique would provide a possible alternative explanation of the results. (8pts)

Discussion Section Paragraphs Outline (2 x 2 Factorial)

1) Describe main findings

2) Conclusion if study methods are valid

Why main effect (or not) of Variable One?

Why main effect (or not) of Variable Two?

Why effect (or not) of Interaction?

3) Alternative #1

Describe flaw

How explain observed finding(s)

4) Alternative #2

Describe flaw

How explain observed finding(s)

5) Which alternative(s) most plausible? Why?

Plausibility of 2)

Plausibility of 3)

Plausibility of 4)

Graded work

- Exams –
 - Multiple choice (20 @ 2 pts)
 - Short answer (10 @ 4 pts)
 - Application – Analysis and critique (20 pts)
- Short papers (APA subsections) on group research projects
- Final independent research project and full report (APA)
- Homework and lab work
- Participation – discussion of Homework
 - Practice application of concepts
 - Practice analysis and critique

Did it work?

Did it work?

- Sure!

Did it work?

- Sure!
- Evidence from exams, papers, participation etc show dramatic improvements
- But CCTST scores?

Methods

Sample

Several sections of my Advanced Experimental Psychology class (class size=17-19; total n = 98) over several semesters

Assessment

Students' critical thinking skills were assessed at the beginning and the end of the course using the California Critical Thinking Skills Test (CCTST), administered through the Thinks2 online system.

The overall score of the CCTST is equal to the sum of the Analysis, Evaluation, and Inference subscales, or the sum of the Induction and Deduction subscales.

Before posttest, students were told that a bonus point would be added to the final grade if a student's posttest score was higher than their pretest score.

CT Subscales

Analysis: ability to identify assumptions, reasons, claims, and attention to pattern and detail

Evaluation: ability to assess credibility of information and determine strength or weakness or arguments

Inference: ability to draw thoughtful conclusions from reasons and evidence

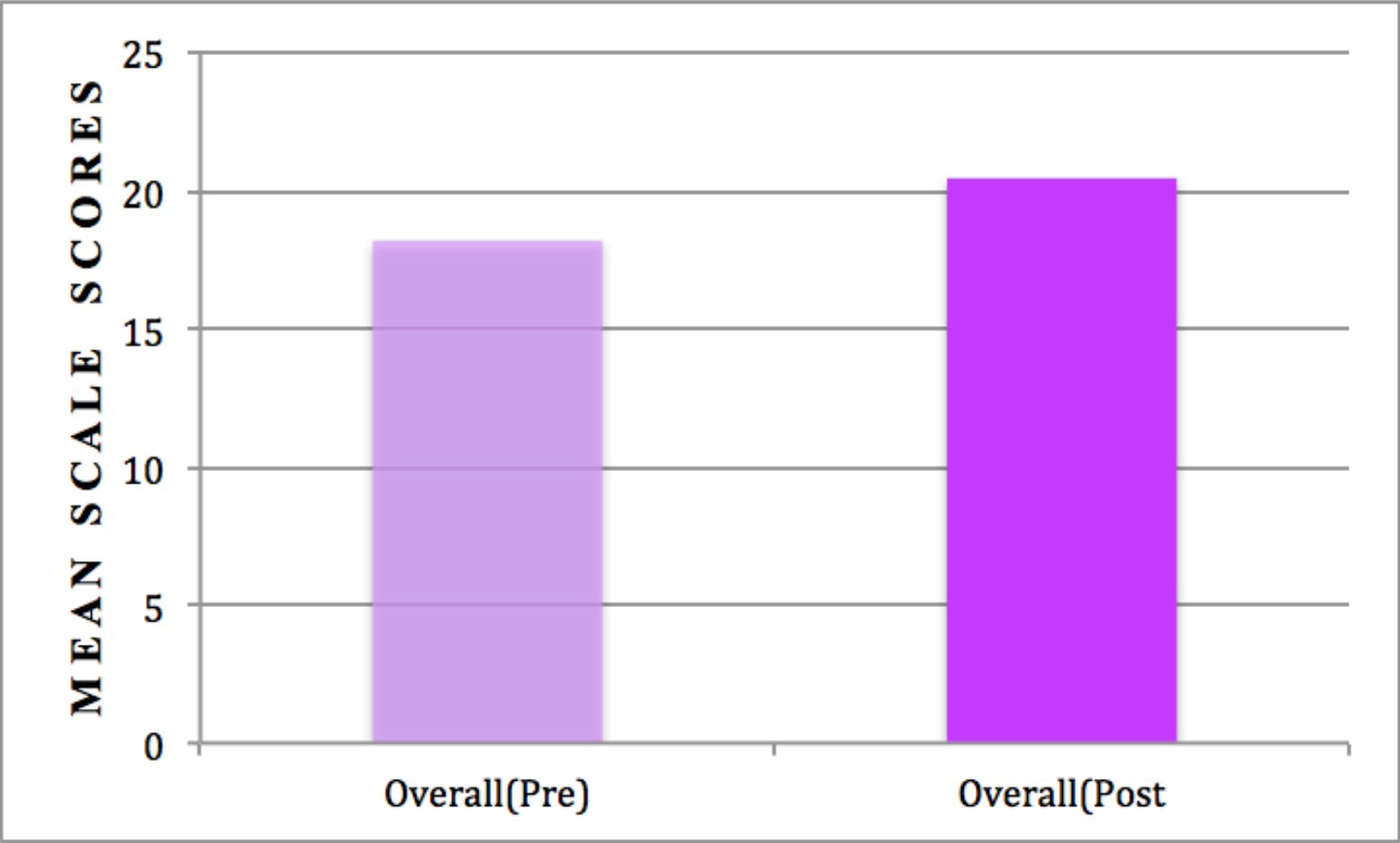
Or

Deduction: ability to make decisions where rules, operating conditions, core beliefs, values, policies, procedures, and terminology completely determine the outcome

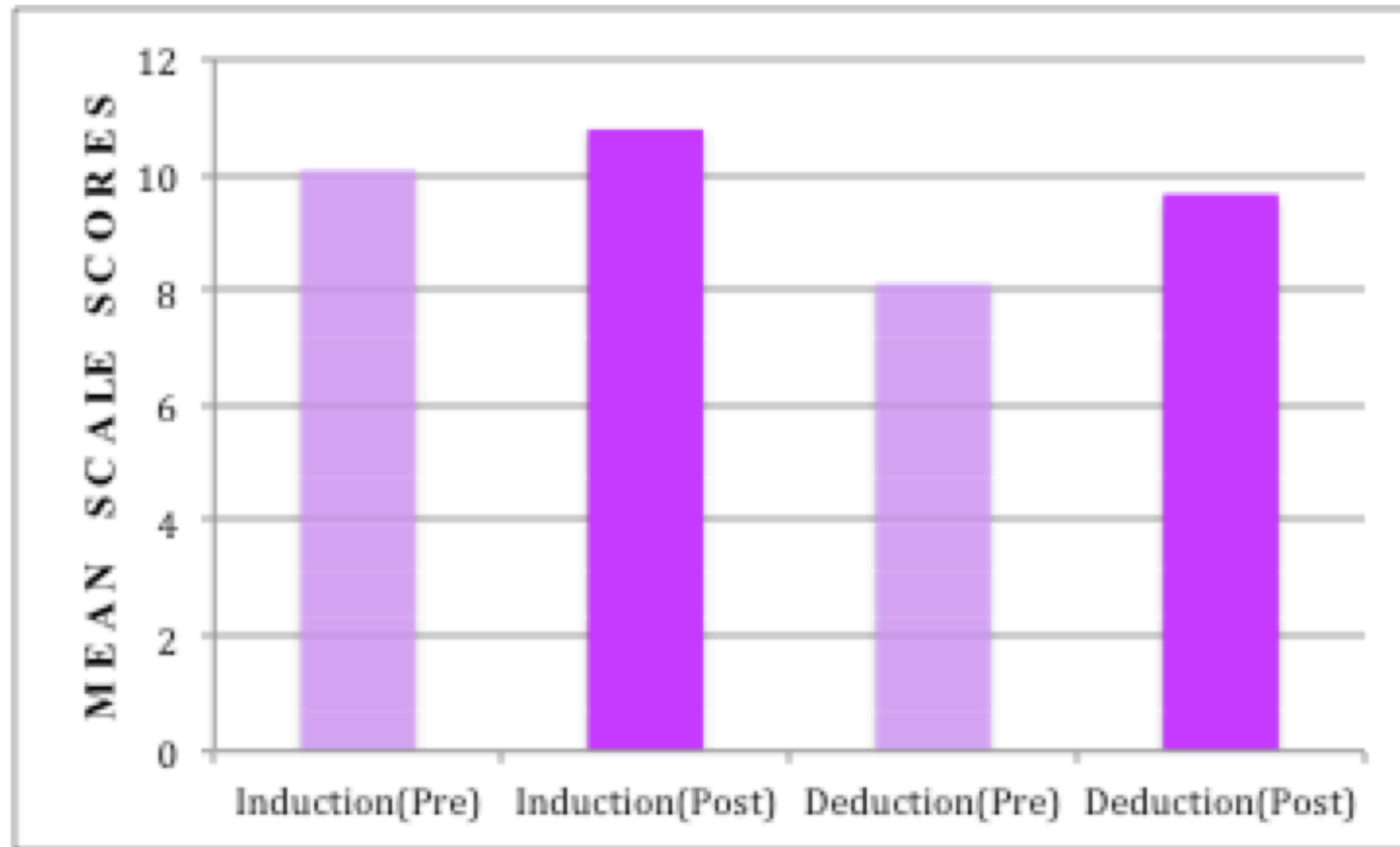
Induction: ability to make decisions in uncertain or loosely defined contexts

Results

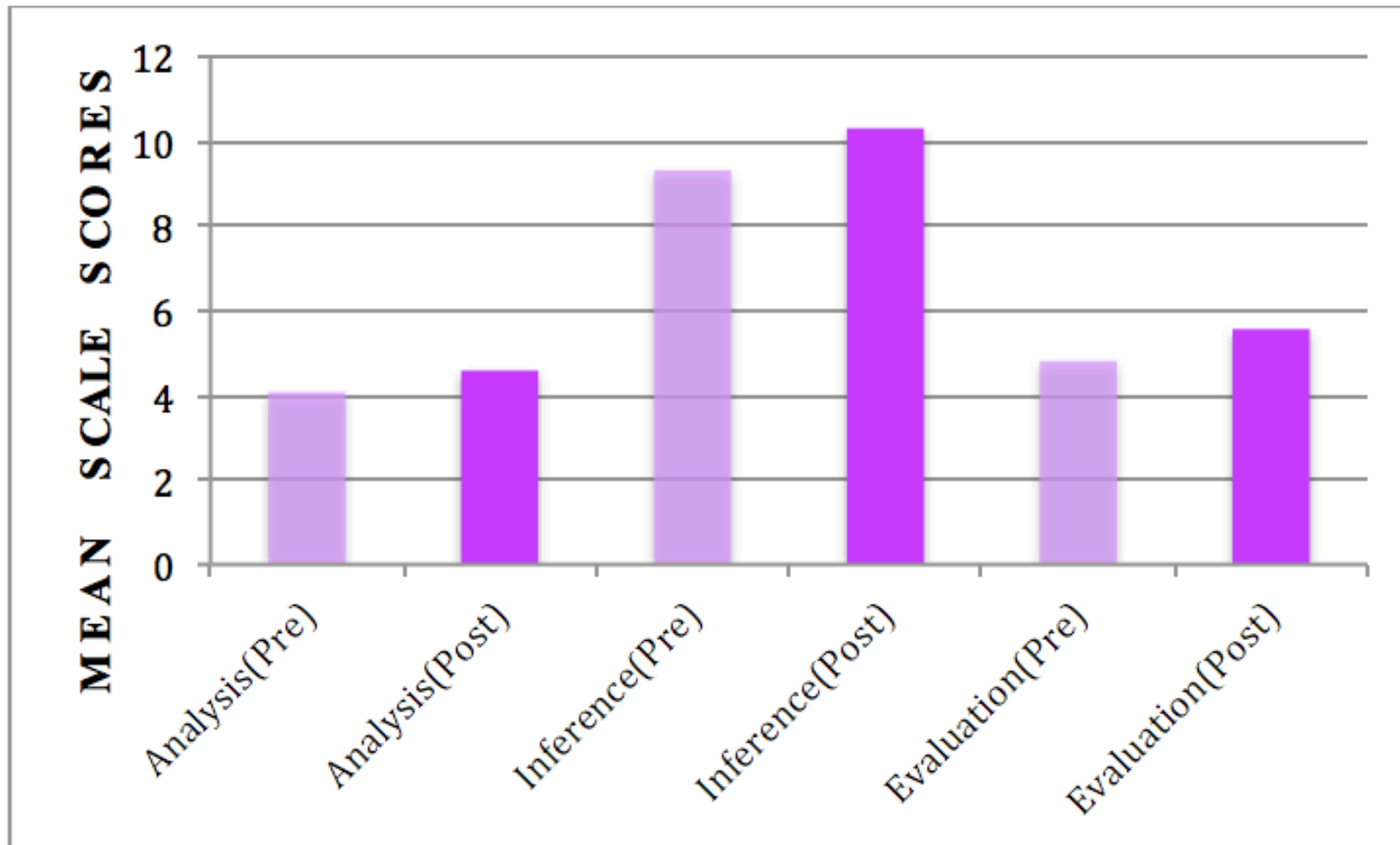
Total scores improved (2.26 points) significantly from pretest to posttest ($p < 0.001$)



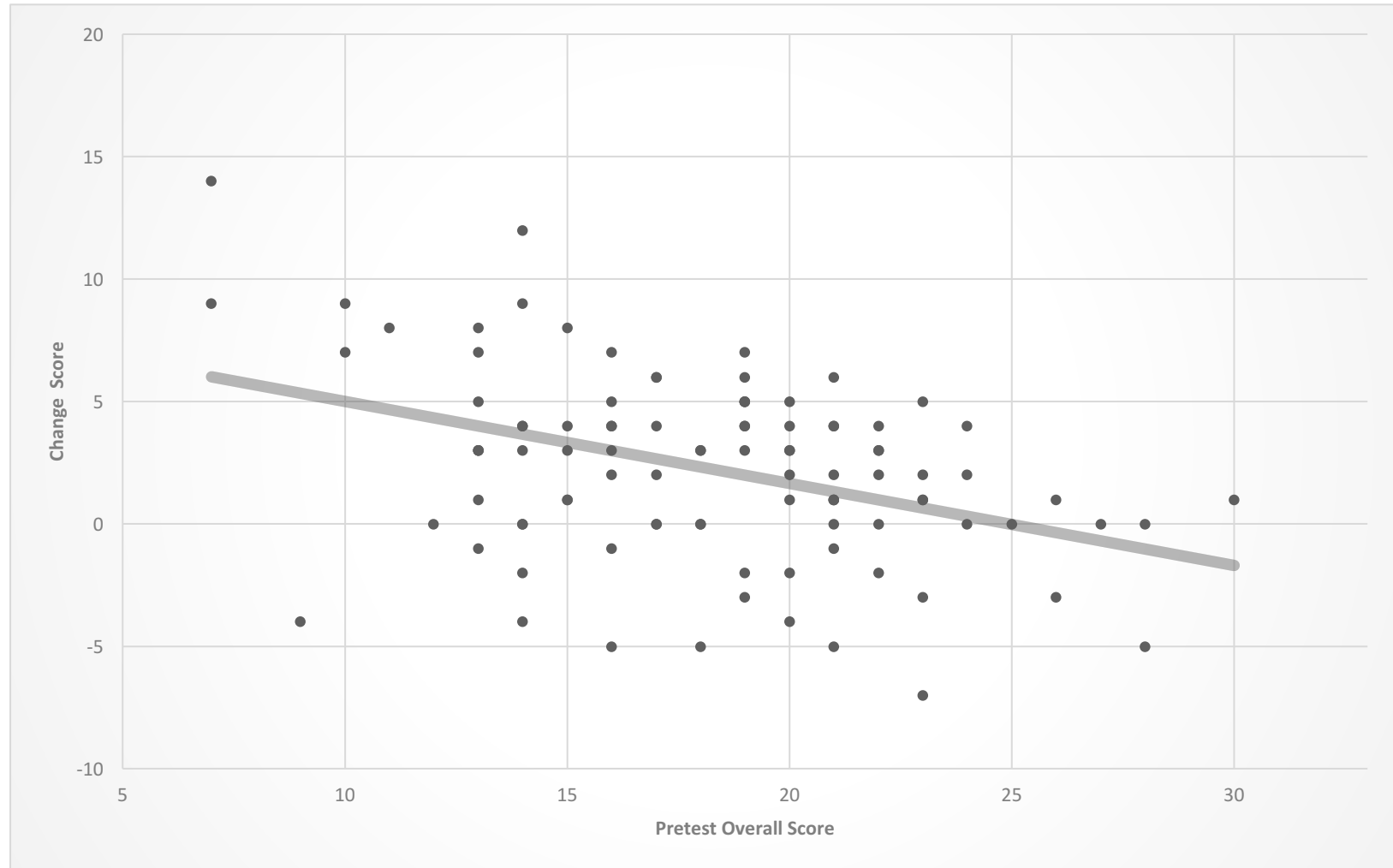
Both Induction and Deduction scores improved significantly ($p = 0.002$ and $p < 0.001$ respectively). The stronger improvements were seen for subscale Deduction



Analysis, Inference, and Evaluation improved significantly. The stronger improvements were seen for Inference



Scatter Plot – Pretest Overall Score v Change Score ($r=-0.405$, $p < 0.001$)



Conclusions

These results are consistent with the hypothesis that the modifications to the psychology research methods course can improve the critical thinking skills of the students enrolled in such a course.

Confirmed by other performance measures (exams, papers, etc.)

The improvement of some subscales were stronger than others. For example, the Inference subscale in the first group and Deduction subscale in the second group had the most improvement from pretest to posttest. This result could be due to the focus of the course.

Improvements in all subscales were significant, but modest. Modest improvements could be due to the different context of the course versus the assessment test (i.e. psychology versus multiple domains). Metacognitive development tends to be domain specific.

There was a significant negative correlation between pretest scores and change scores. Lower performing students had a higher change score than higher performing students. Lower performing students may have more room to improve (and higher performing students don't have as much room to improve).

However.....

- Pretest – Posttest design is suggestive, not conclusive
 - Many other factors may have improved critical thinking skills other than CT teaching components?
- Will improvements persist over time?
- Are improvements additive?
- Thorny issues for Dr. Knox et al.....

Questions?