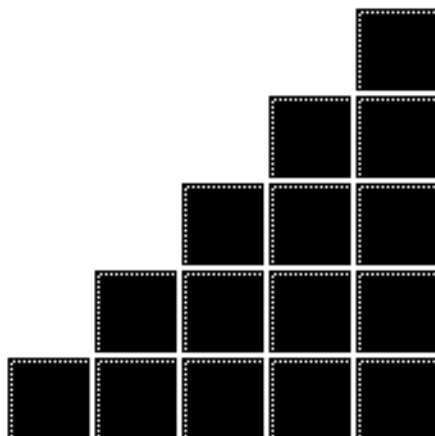




COLLABORATIVE LEARNING AT HARVARD UNIVERSITY: PEER INSTRUCTION

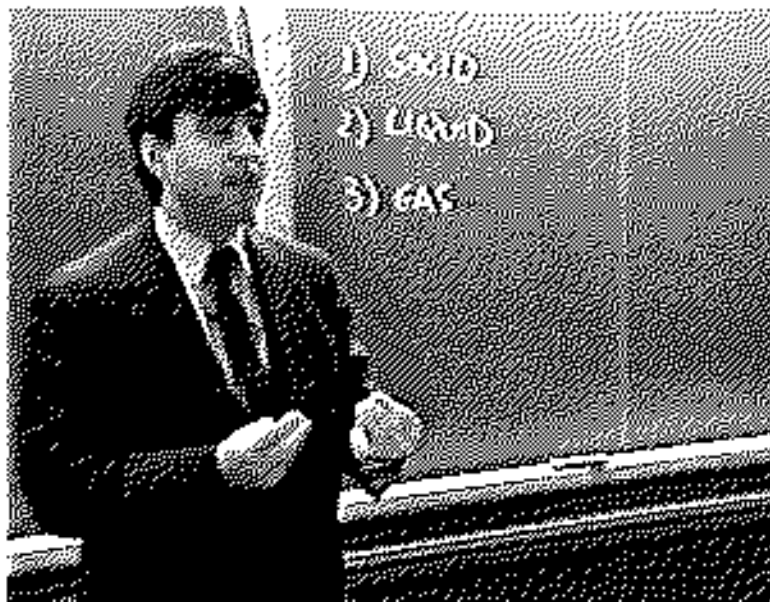
Eric Mazur
Harvard University

NSF Shaping the Future Conference
11–13 July 1996
Washington, DC



THE CAUSE

Are we teaching the right thing...?

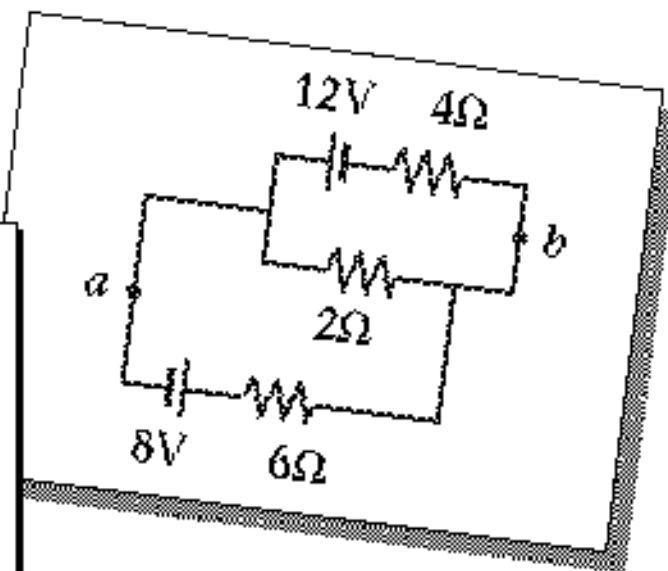


THE CAUSE

Traditional question:

Calculate:

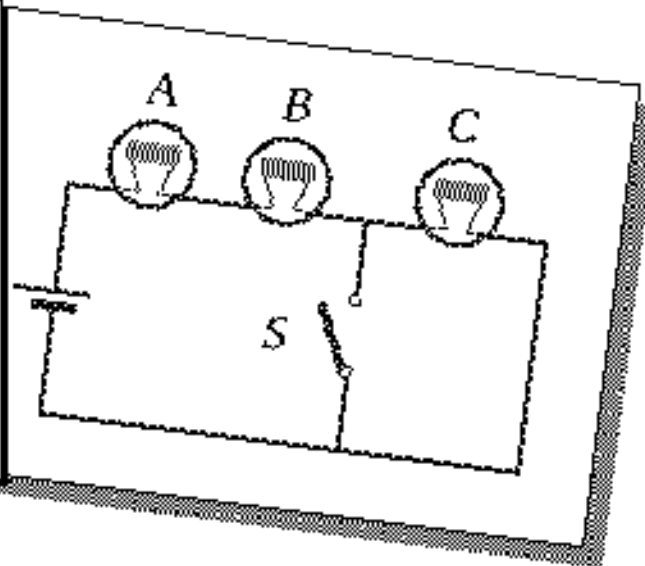
- (a) the current in the $2\text{-}\Omega$ resistor, and
- (b) the potential difference between points a and b .



THE CAUSE

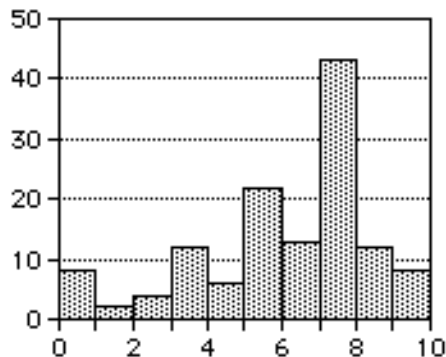
When S is closed, what happens to the:

- (a) intensities of A and B?
- (b) intensity of C?
- (c) current through battery?
- (d) voltage drop across A, B, and C?
- (e) total power dissipated?

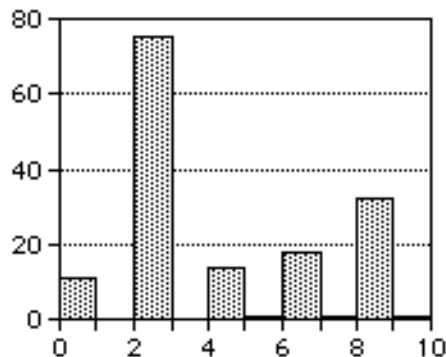


THE CAUSE

Results



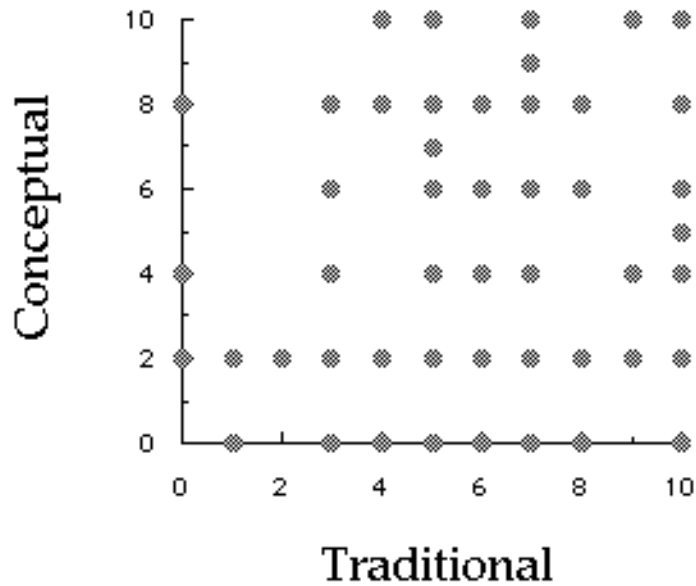
Traditional



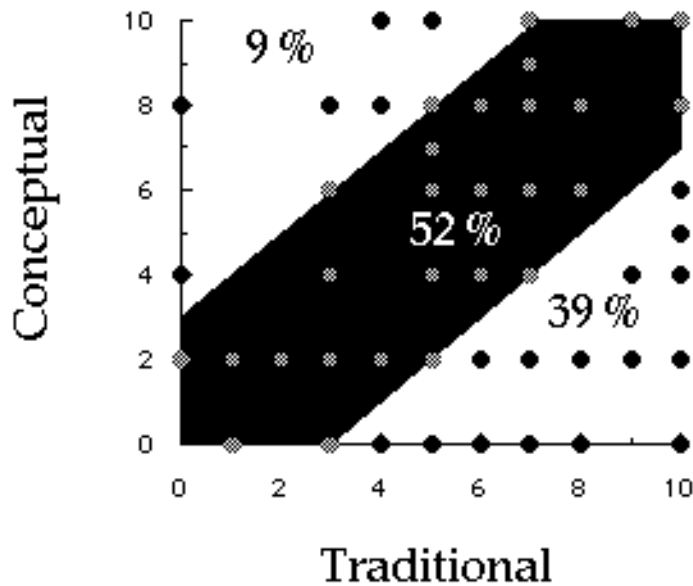
Conceptual



THE CAUSE

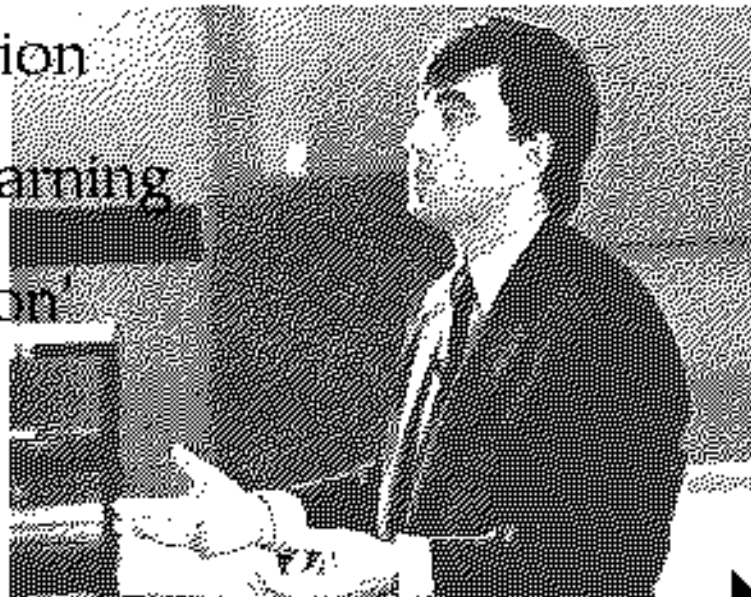


THE CAUSE




THE REMEDY

- 1-on-1 instruction
- small group learning
- 'Peer Instruction'



THE REMEDY



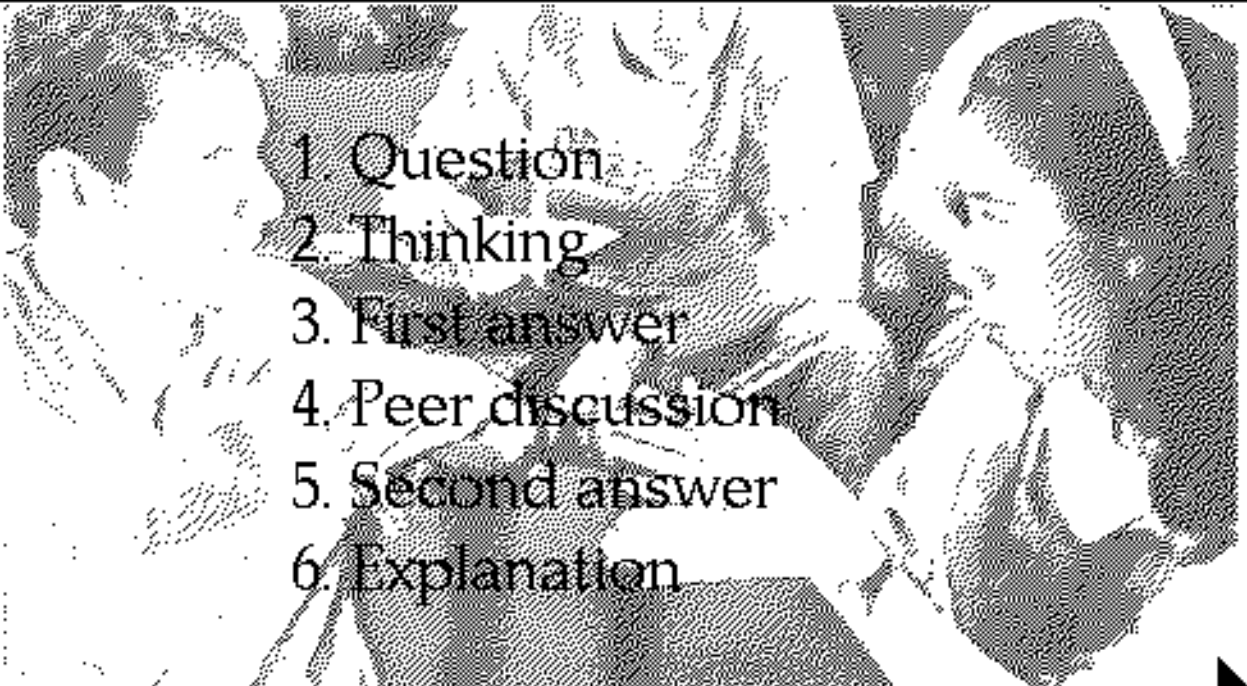
Why peer instruction?

THE REMEDY

Peer Instruction:

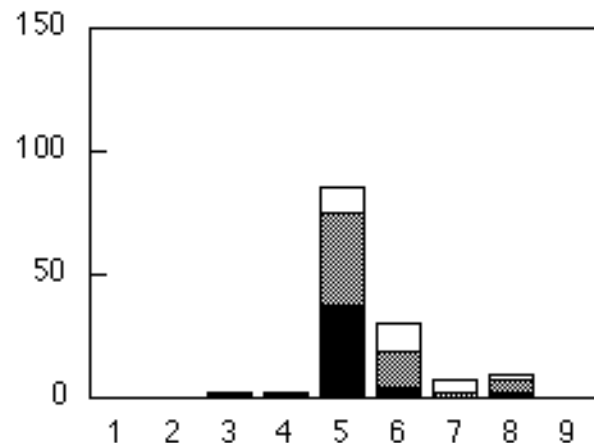
- prerequisites
- lectures
- 'ConceptTests'
- feedback

PEER INSTRUCTION

- 
1. Question
 2. Thinking
 3. First answer
 4. Peer discussion
 5. Second answer
 6. Explanation

PEER INSTRUCTION

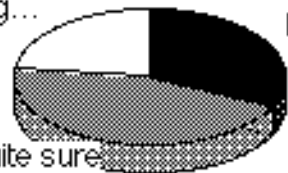
before:



Just guessing...

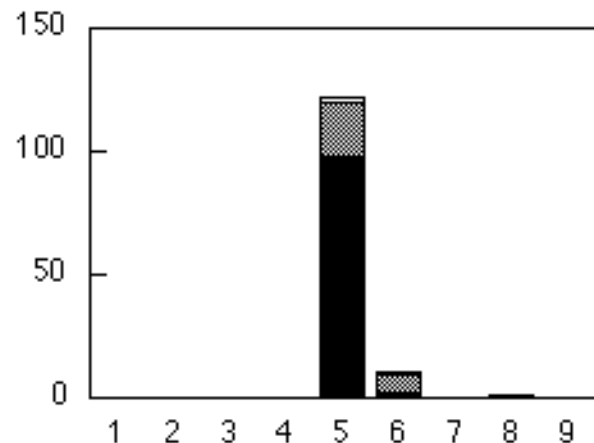
Pretty sure

Not quite sure



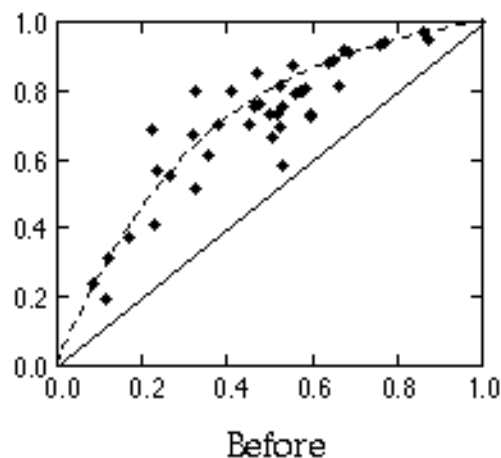
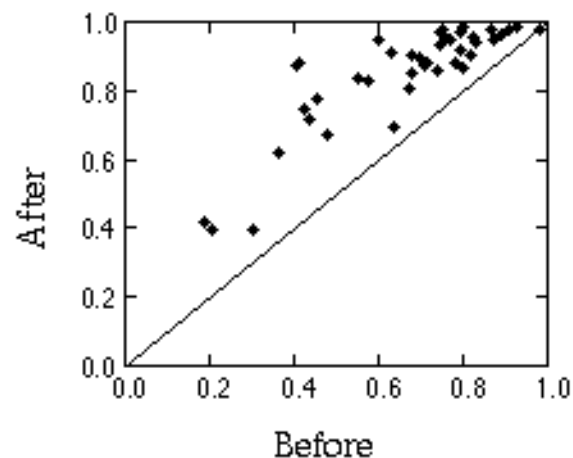
PEER INSTRUCTION

after:



PEER INSTRUCTION

% correct answers (weighted)



THE REMEDY

Peer Instruction:

- prerequisites
- lectures
- 'ConceptTests'
- feedback

FEEDBACK

Methods:

- show of hands
- scanning forms
- hand-held computers
- computer testing



FORMS

Design:

- test single concept
- test confidence

The image shows a sample 'CONCEPT TEST' form. It is divided into several sections, with numbered callouts 1 through 5 pointing to specific areas:

- 1. Instructions:** A box containing a list of instructions: "1. Select your answer", "2. Mark all answers correctly", "3. Mark all false/incorrect data".
- 2. Question:** A box containing a question: "What is the capital of France?" with handwritten answers "Paris" and "France".
- 3. Answer:** A box containing a question: "What is the capital of France?" with handwritten answers "Paris" and "France".
- 4. Answer:** A box containing a question: "What is the capital of France?" with handwritten answers "Paris" and "France".
- 5. Answer:** A box containing a question: "What is the capital of France?" with handwritten answers "Paris" and "France".

The form also includes a header section with the title 'CONCEPT TEST' and a footer section with the text 'Page 1 of 1'.

CLASSTALK

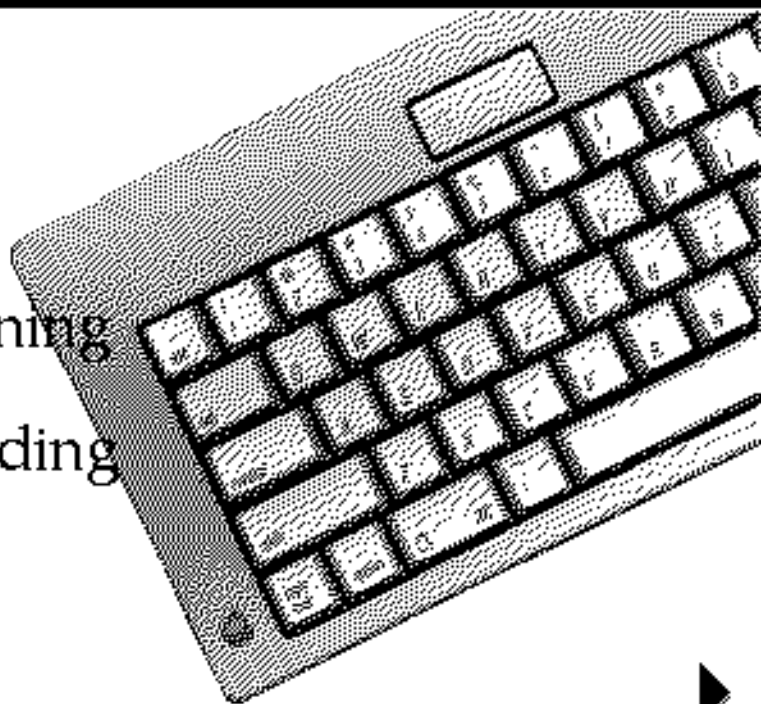
HP95LX



COMPUTER TESTING

Purpose:

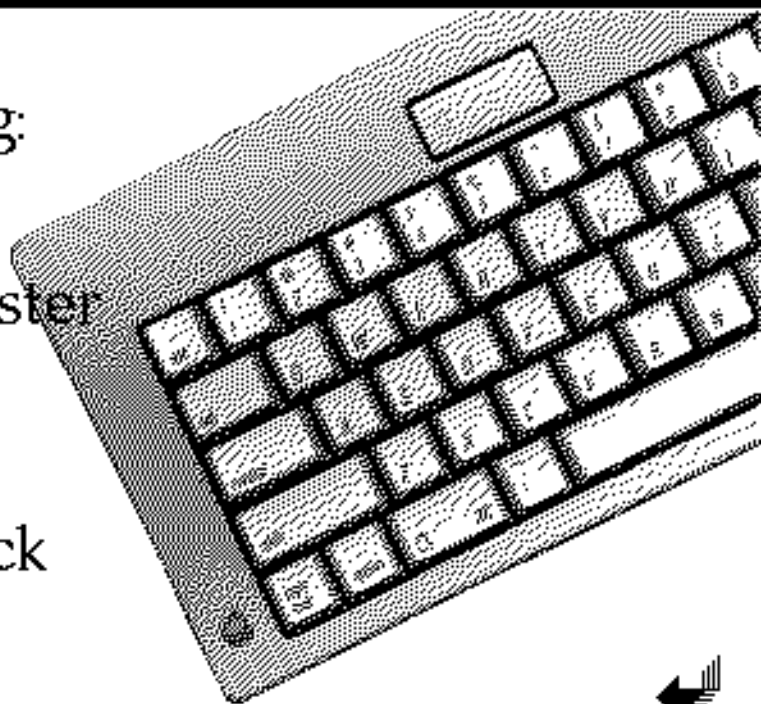
- 'measure' learning
- test understanding



COMPUTER TESTING

Automate testing:

- Easy to administer
- Instant results
- Instant feedback

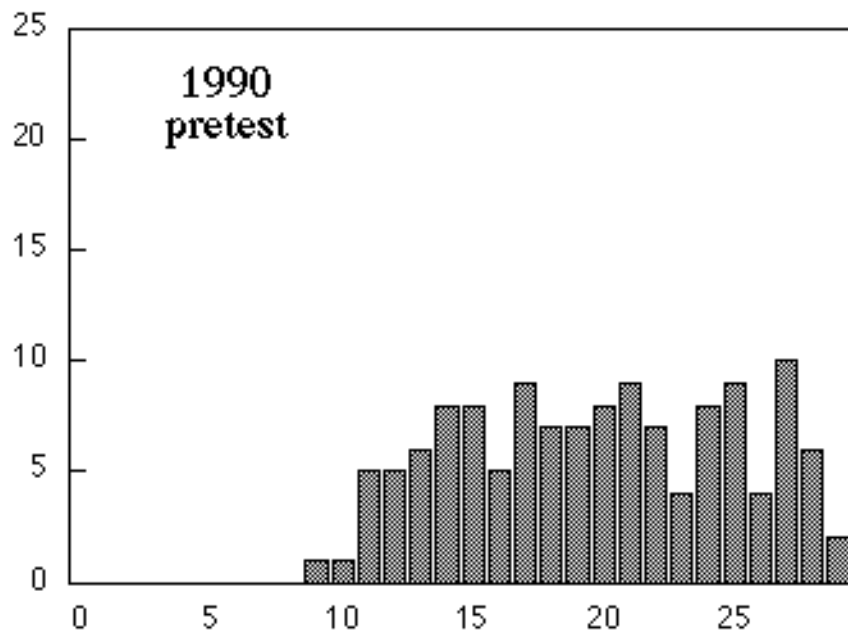


Is it any good...?

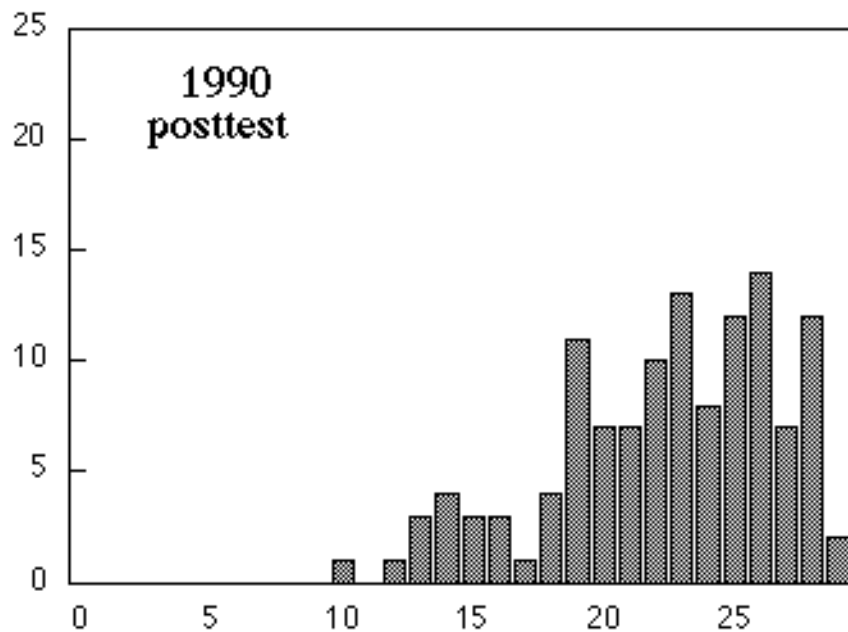
- ➊ Results
- ➋ Student reactions



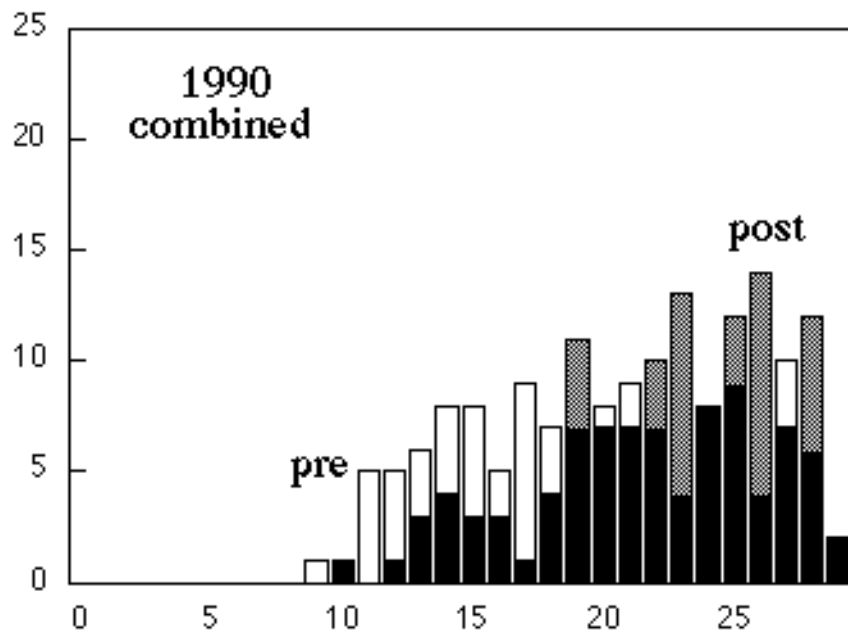
Results



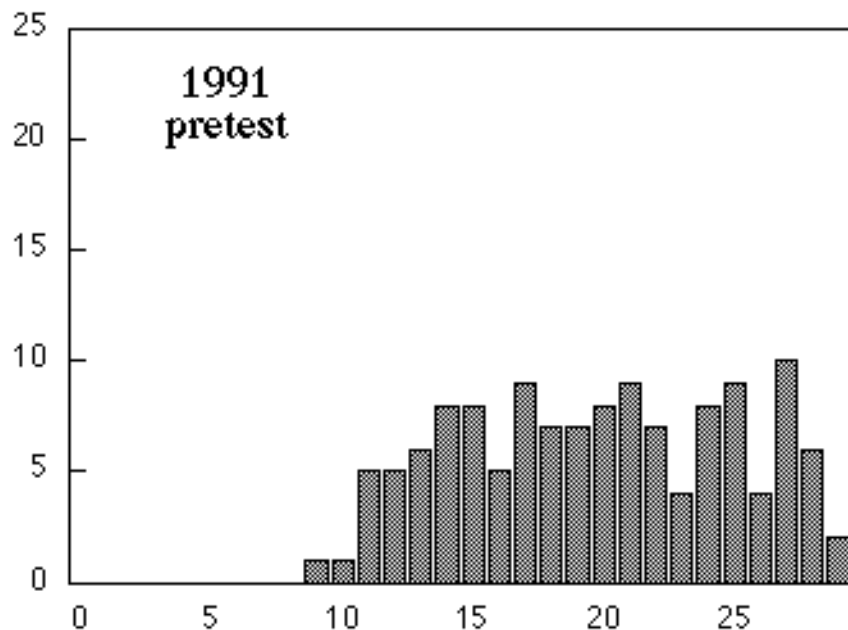
Results



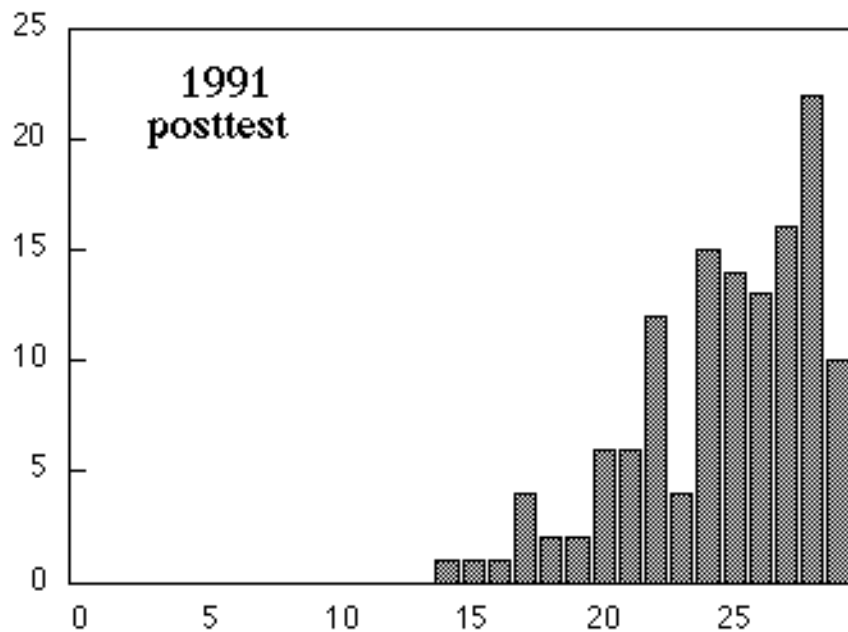
Results



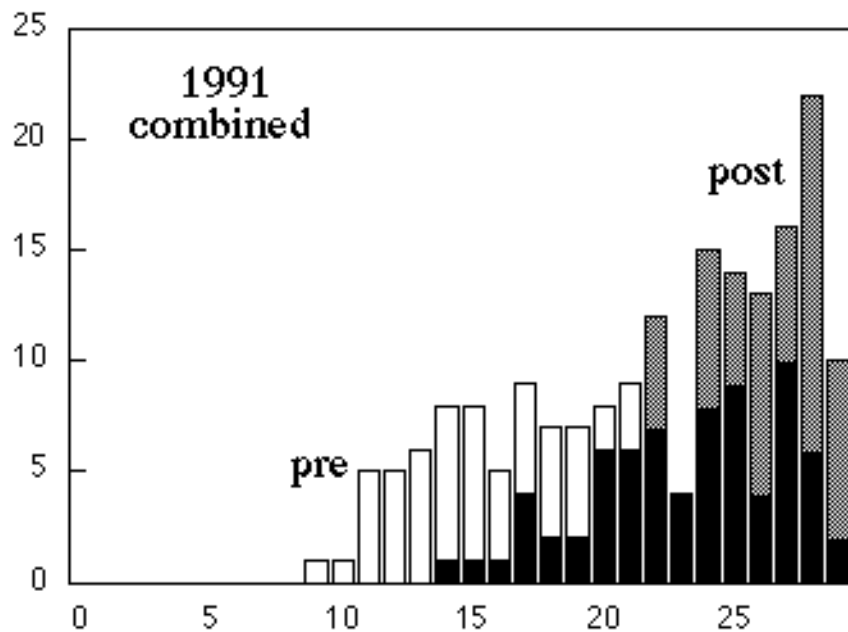
Results



Results



Results

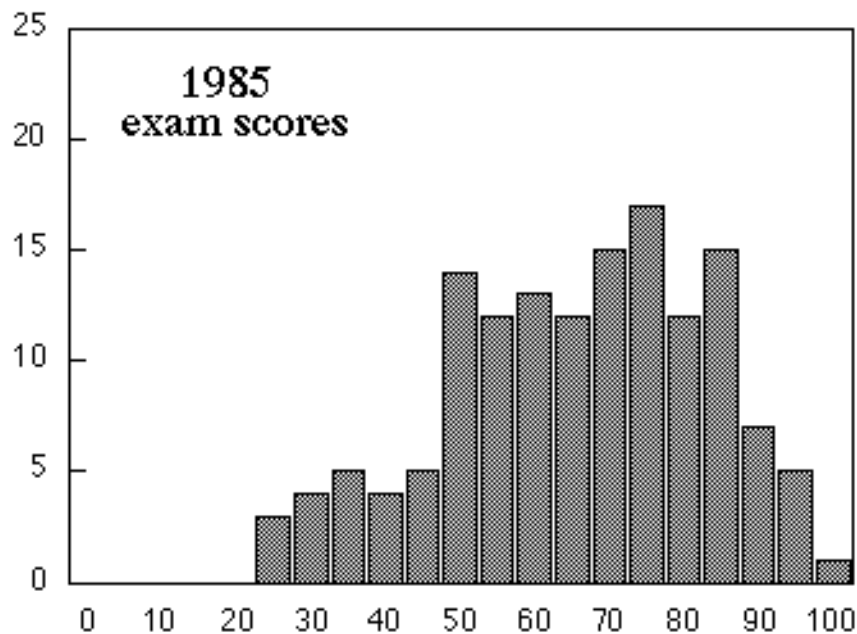


Results

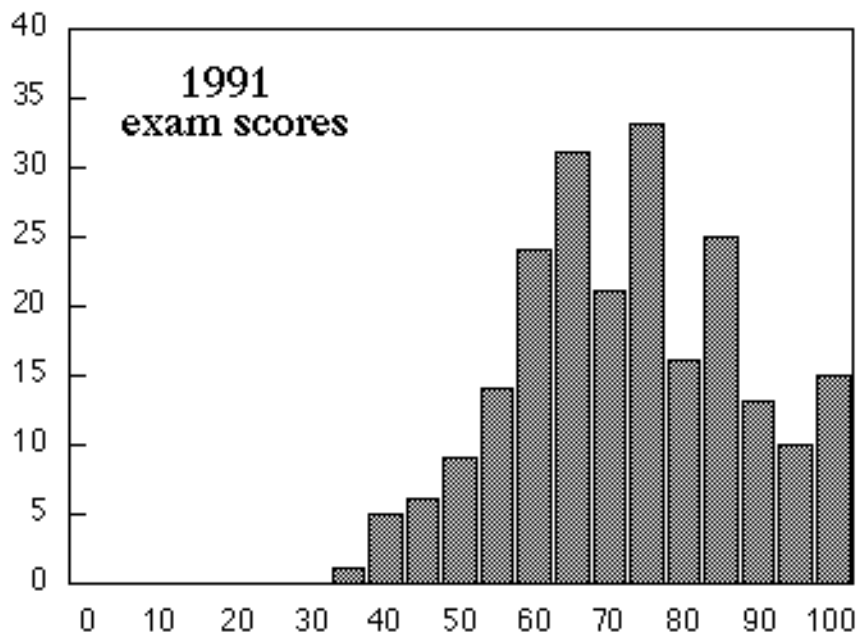
What about problem solving...?



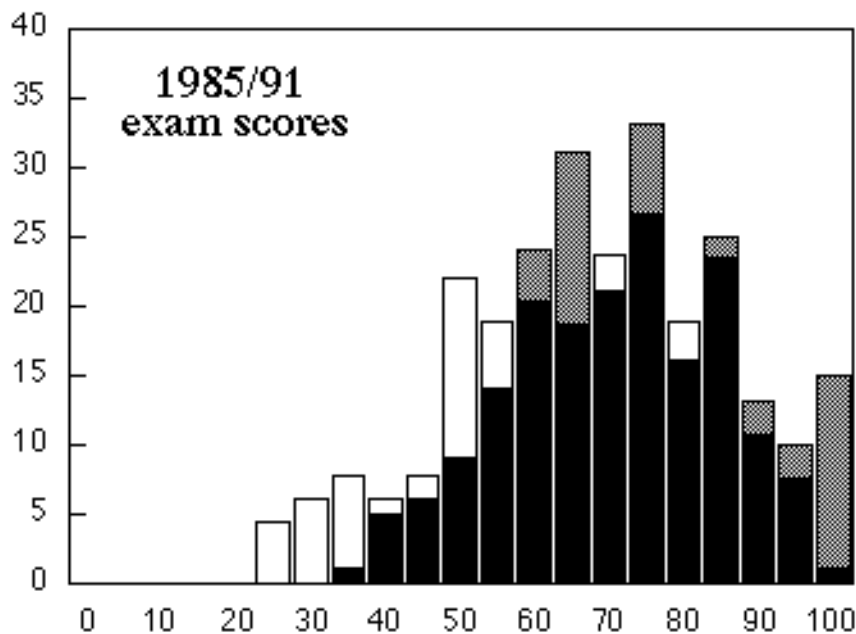
Results



Results



Results



Acknowledgments

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Andrew McKinney (Harvard)

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Web Site: <http://mazur-www.harvard.edu>



Thank you!