

Education is what happens to the other person,
not what comes out of the mouth of the
educator.

- (*Miles Horton*)

Making the Transition to Active Learning

Mike Prince

Chemical Engineering

Bucknell University

Getting Started

- Why I'm here
- What I hope to do
- What I'm not trying to do

Active Learning: Defining Terms

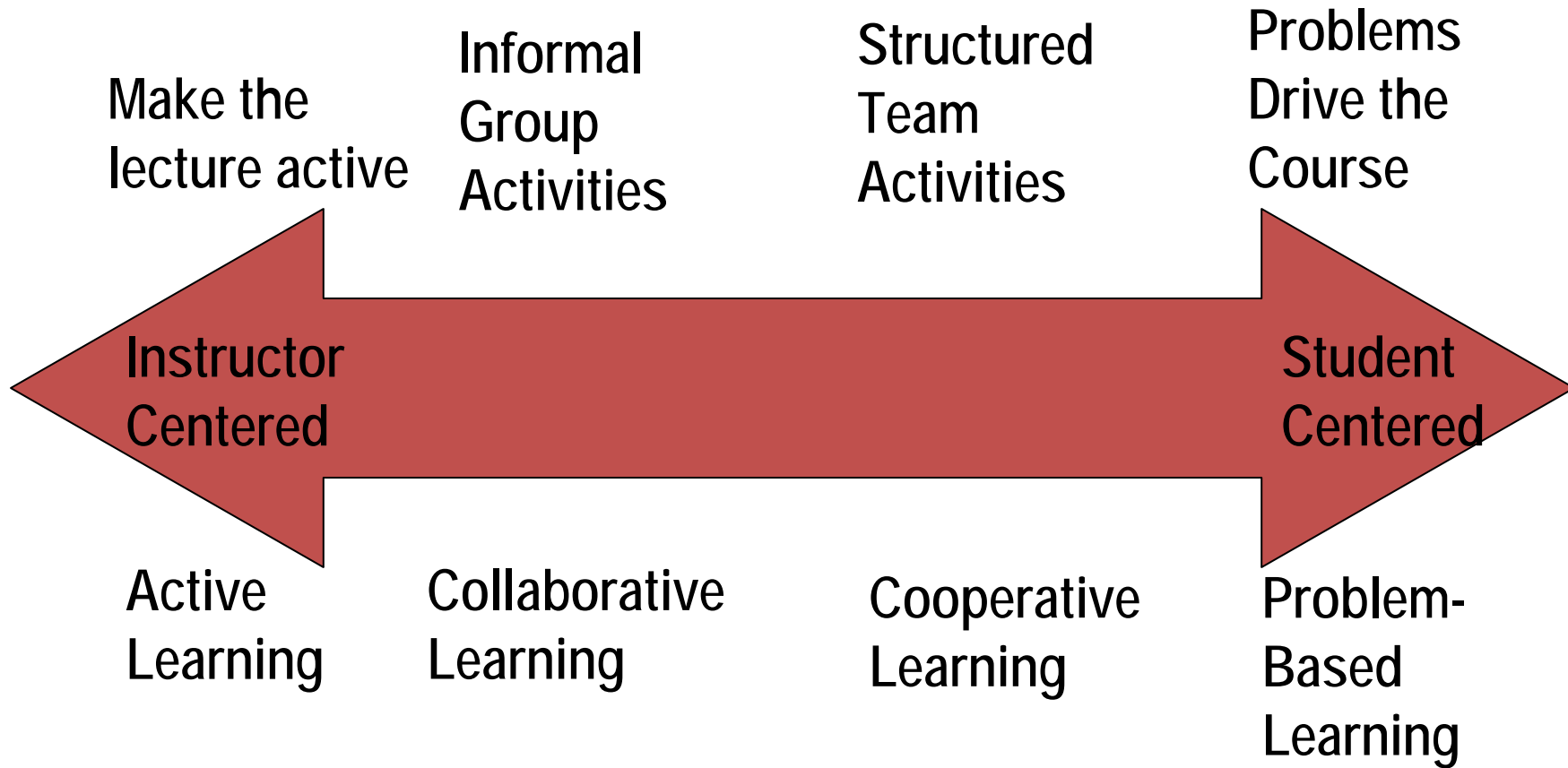
- Definition: Any instructional method that engages students in the learning process.
- Operational definition: Any focused learning activity that has students doing something in class other than listening to lectures and taking notes.



POP

QUIZ!

The Active Learning Continuum



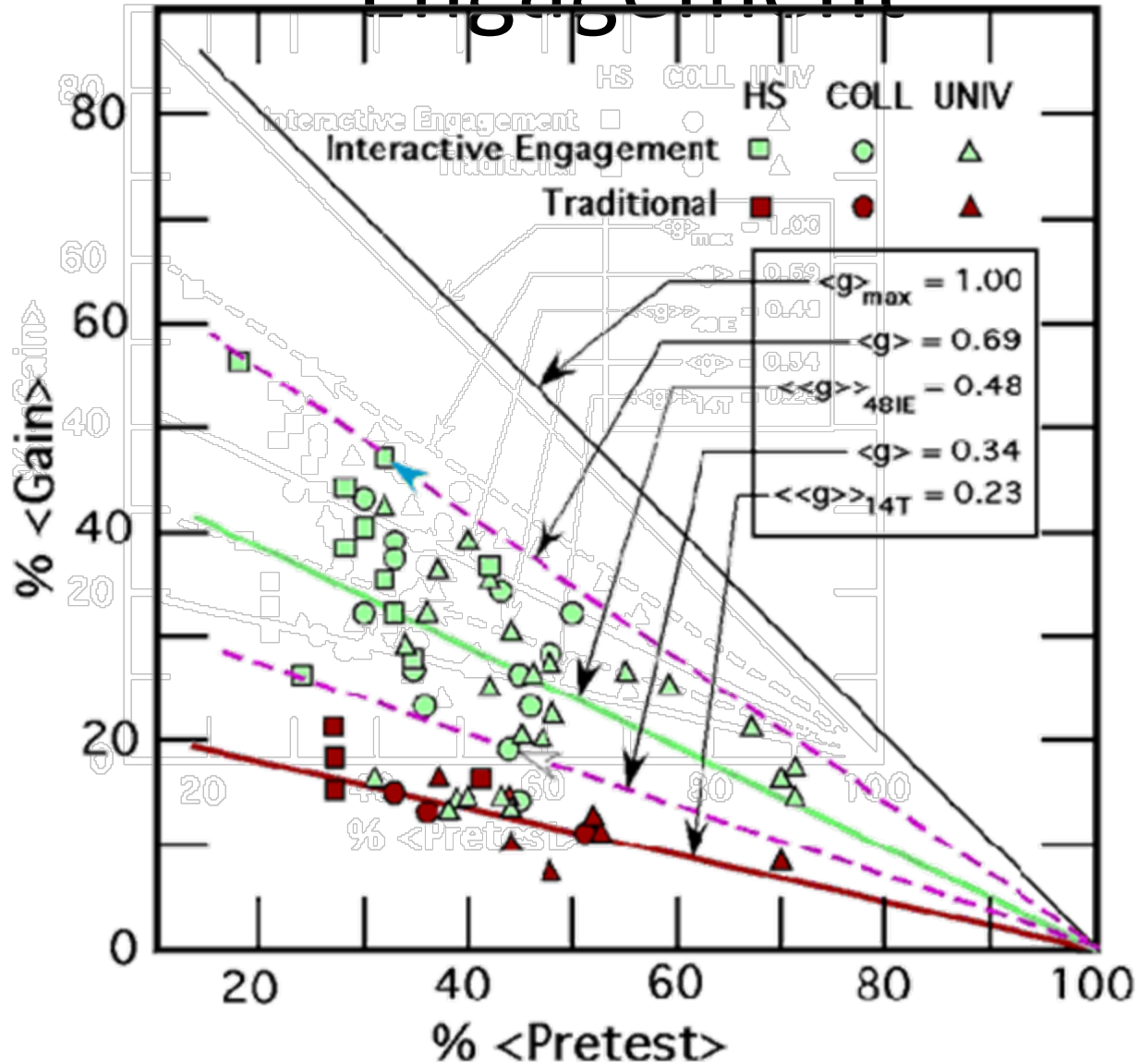
Simple and Easy Active Learning Exercises

- One minute paper
- Brainstorm applications of class material
- Summarize (clarify) lecture notes
- Have students generate test questions or homework problems from lecture material
- Non-rhetorical questions
 - Predict what will happen if.....
 - Explain in your own words, why...
 - What if in the real world the theory doesn't work

Effectiveness of Short Activities

	With Pause	Without Pause
Short term recall	108 correct facts recalled after lecture	80 correct facts recalled after lecture
Long term recall	Average exam score = 84.9	Average exam score = 76.7

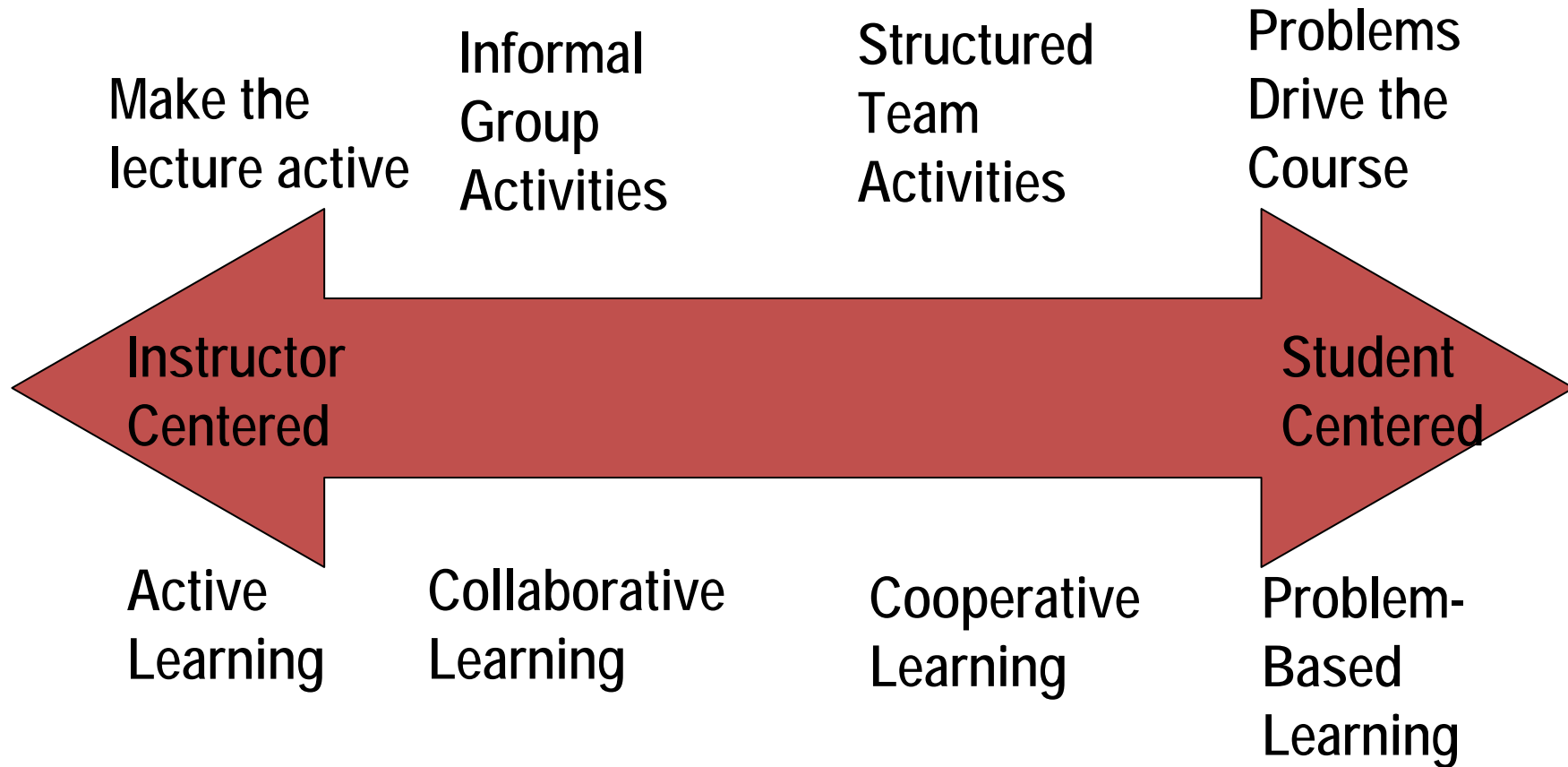
Effectiveness of Active Engagement



Summarizing

- Active learning *can* be quick and easy to do
- *Extensive* research support

PBL: Adopting More “Student-Centered” Approaches



What is PBL?

- "Problem-based learning is an instructional strategy in which students confront contextualized, ill-structured problems and strive to find meaningful solutions."
- PBL puts the problem *first*, and uses problems to drive the learning

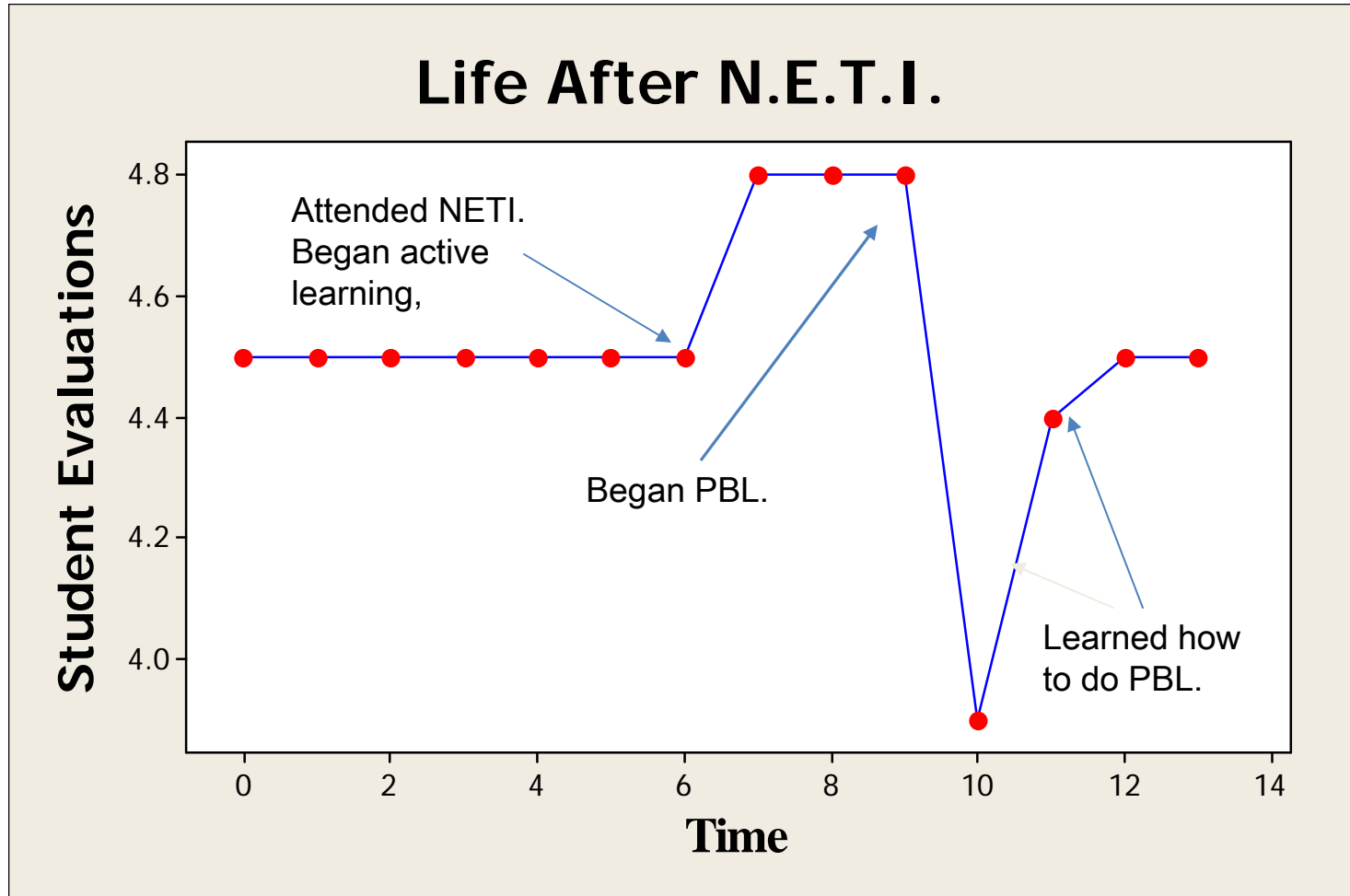
Introduction to PBL

- Traditional Instruction: There are 3 types of heat transfer; conduction, convection and radiation...
- PBL instruction: Design a heating system for this classroom.

Effectiveness of PBL

- PBL has been found to:
 - Improve student attitudes about their educational experience
 - Improve long-term retention of information
 - Promote deeper approach to learning and better study habits
 - Improves a range of higher order thinking skills and ability to apply course material in realistic settings
- PBL does not improve academic achievement as measured by test scores

Student Response to Different Active Learning Methods



Locating Yourself on the Active Learning Spectrum

- Where are you now?
- Where would you like to be?
- What help/support do you need to get from one to the other?

Summary

- Active learning is umbrella term
 - Spans “quick and safe” to “time consuming and risky”
 - Solid research support for range of methods
 - Choose an approach based:
 - Your educational goals
 - Your experience with active learning and course material
 - Your teaching environment

If You Want to Learn More

Reading

- Prince, M. 2004, “Does active learning work? A review of the research”, *JEE* 93 (3): 223–31.
- Prince, M., and R.M. Felder. 2006, “Inductive teaching and learning methods: Definitions, comparisons, and research bases”, *JEE* 95 (2): 123–38.

Workshops

- Local Teaching and Learning Centers
- National Effective Teaching Institute - ASEE
- How to Engineer Engineering Education - Bucknell