Learning results from what the student does and thinks, and only from what the student does and thinks. 

*Herbert A. Simon*
Active learning in Structure of Materials
Peer instruction — Concept questions

1. Instructor presents multiple-choice concept question
2. Students vote, individually, on the correct answer
3. Students discuss the question in pairs or small groups
4. Students vote again on the correct answer
5. Instructor reveals correct answer and comments as necessary.
The figure shows data for Au-Ni at 900 °C. At lower temperatures, an alloy of 50/50 composition will...

(A) Remain a single phase solid solution at all temperatures
(B) Phase separate into Au-rich and Ni-rich solid solutions below some critical temperature
(C) Form an ordered compound below some critical temperature
(D) Not enough information to say for sure

B.L. Averbach et al., Acta Metall. 2, 92 (1954)
Does active learning work better?

Lectures: 32.5 → 53.1 (+63%)
Active learning: 30.8 → 61.5 (+100%)

Acknowledgements: Mike Reese (CER), NSF
Peer instruction — pros

1. Students learn more
2. More effective feedback to instructor
3. More fun (at least for me)

Peer instruction — cons

1. Can be difficult to “cover the material”
2. Significant time commitment in the early stages (coming up with and evaluating concept questions)