Science is becoming increasingly important
International comparisons show American students are behind many peer nations
Attitudes and orientations to science begin in elementary school
State of the Art

- Reviews of inquiry teaching, cooperative learning, and other topics focus mostly on secondary schools
Review Methods

- Exhaustive literature search
- Outcomes in effect sizes
- Criteria for study inclusion
  - Compared experimental to control group
  - Experimental–control pretest differences <0.5 ES
  - Dependent measures not inherent to treatment
  - Duration at least 4 weeks
Methodological Issues

- Artificial, non-replicable treatments
- Dependent variables inherent to treatments
- Brief treatments
Categories of Treatments

- Inquiry–oriented instructional process programs without science kits
- Inquiry–oriented instructional process programs with science kits
- Technology applications
Overall Findings

- 17 qualifying studies
- Grades 3–6
- Diverse treatments, outcomes
Inquiry–Oriented Instructional Process Programs Without Science Kits

- 8 qualifying studies
- Weighted mean ES = +0.30
- Professional development for inquiry teaching
- Cooperative learning
- Science IDEAS (combining science and reading)
Inquiry–Oriented Instructional Process Programs With Science Kits

- 4 qualifying studies
- Weighted mean ES = +0.02 (near zero)
- Pine et al. (2005) study of insights, FOSS, STC
- Leach (1992) study of FOSS
- G. Borman et al. (2008) study of SCALE
- K. Borman et al. (2009) study of Teaching SMART
Technology Applications

- 5 qualifying studies
- Weighted mean ES = 0.37
- BrainPOP
- The Voyage of the Mimi
- Web-based labs
Surprising findings on science kits
Successful programs focused on improving teaching all year
Extensive professional development is essential
More development and evaluation are needed