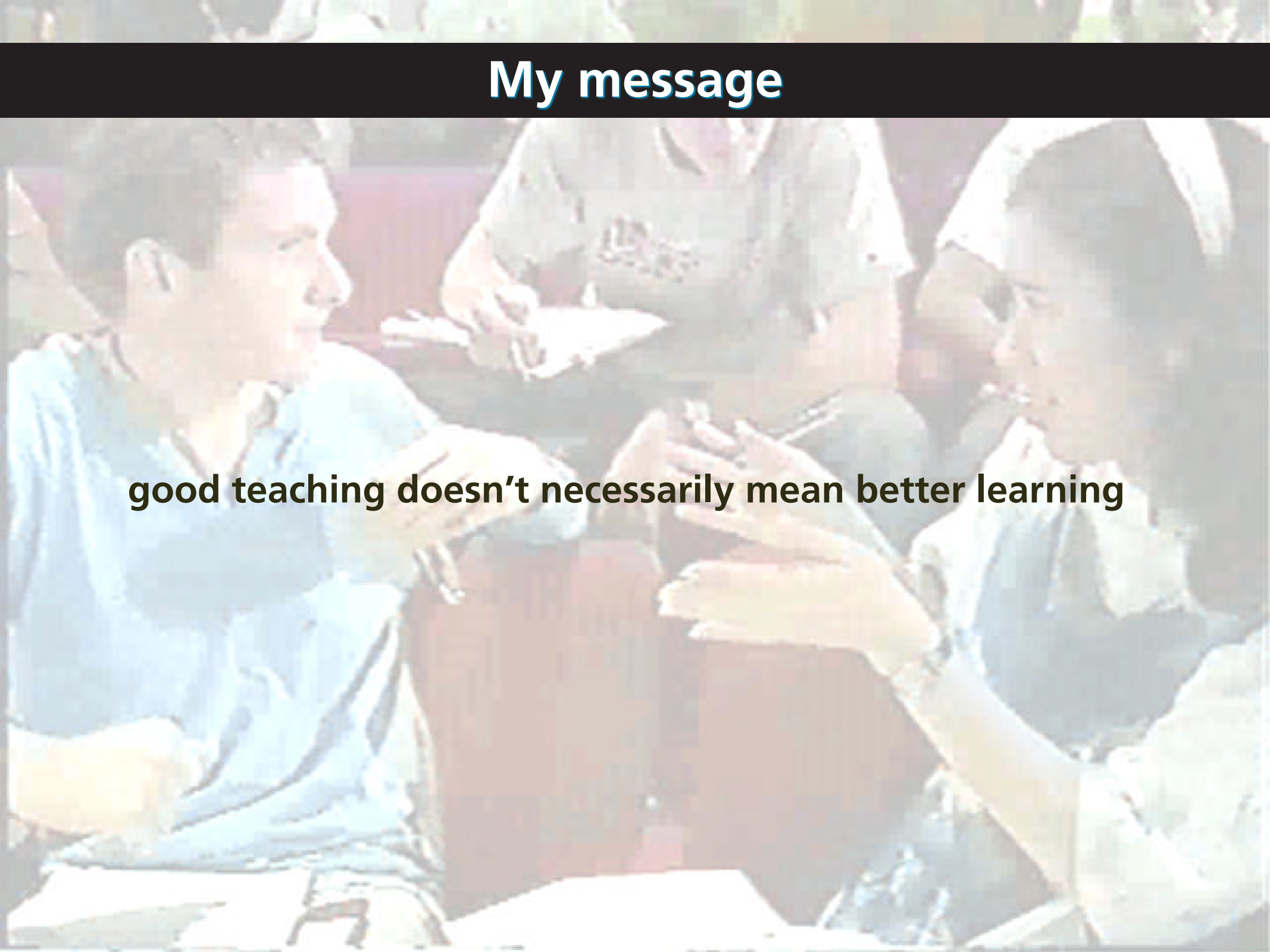
Assessing science teaching: are we teaching the right thing?

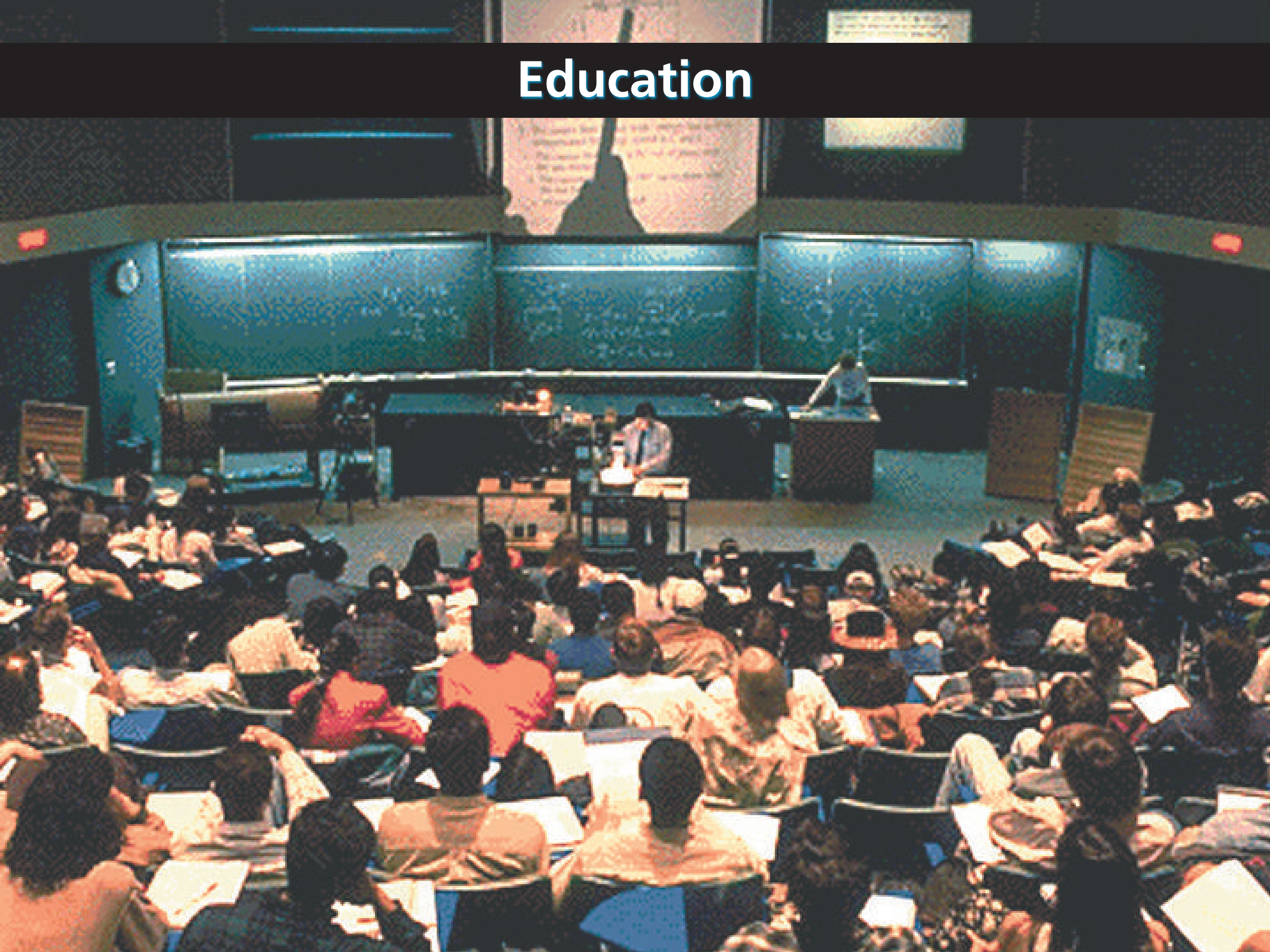
Teaching & Learning Lunch
Amherst College
Amherst, MA, 5 October 2007

My message

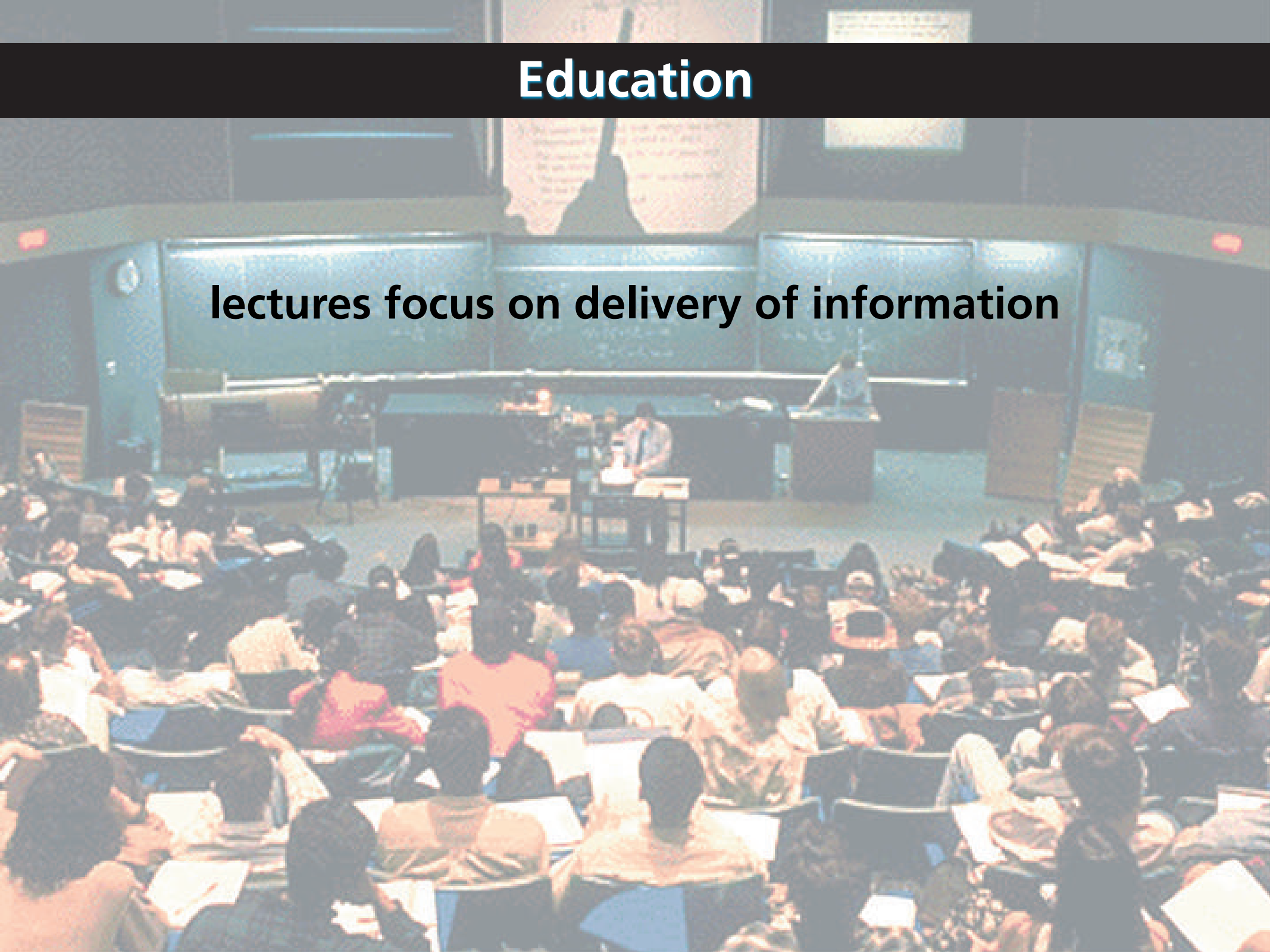


good teaching doesn’t necessarily mean better learning

Education



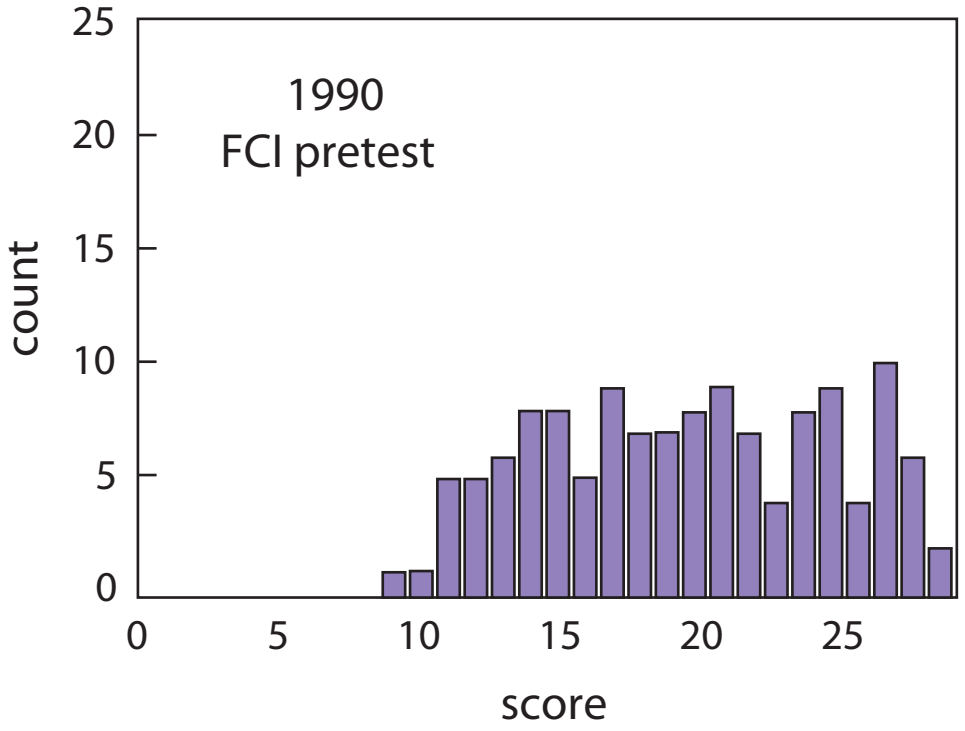
Education



lectures focus on delivery of information

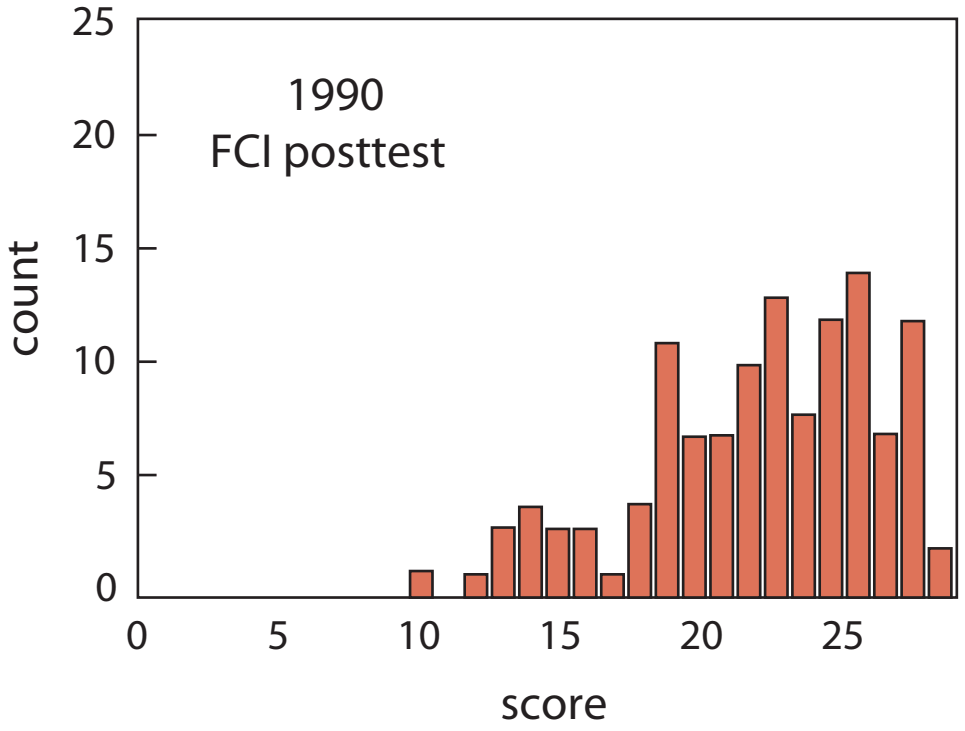
Education

education is not just information transfer



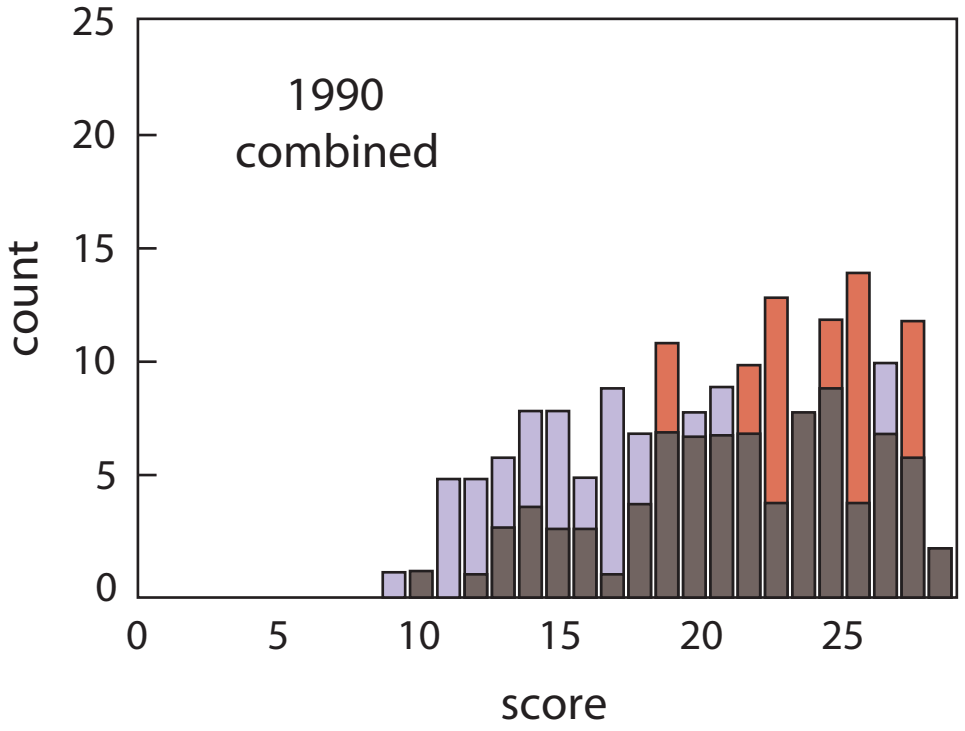
Education

education is not just information transfer

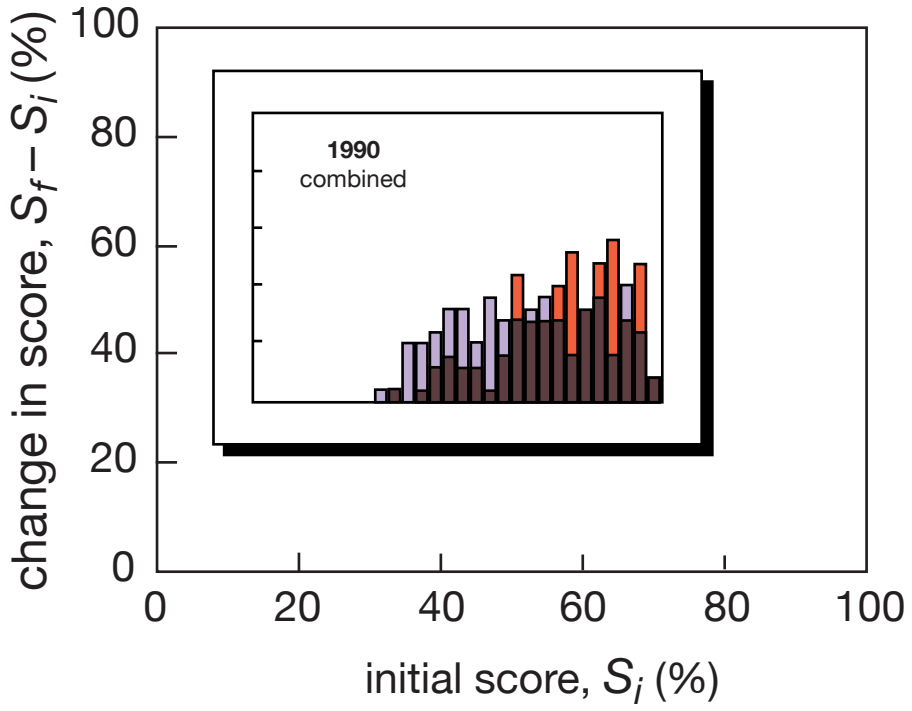


Education

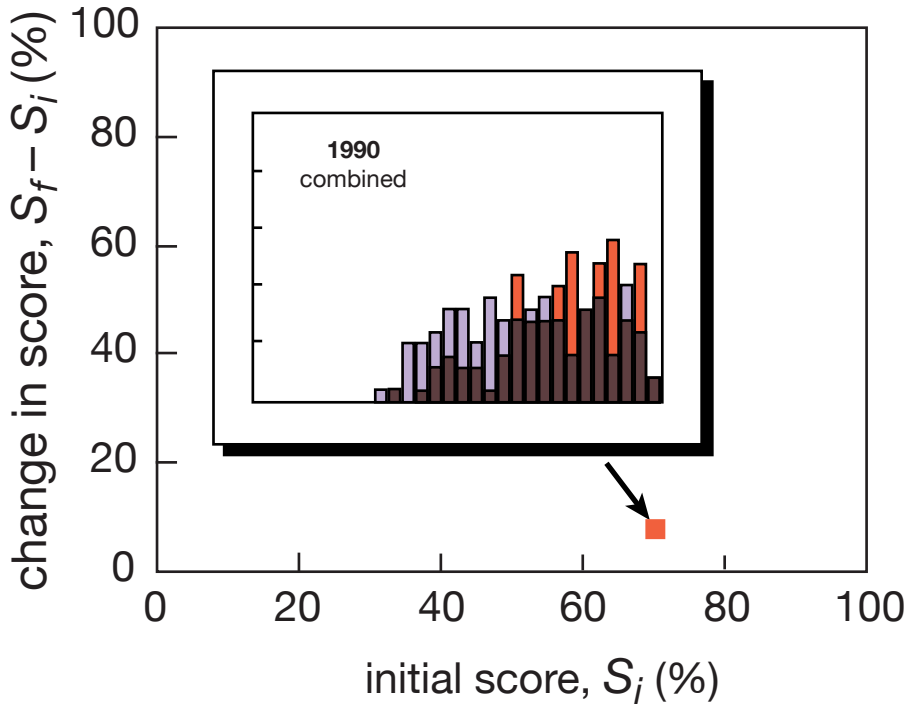
education is not just information transfer



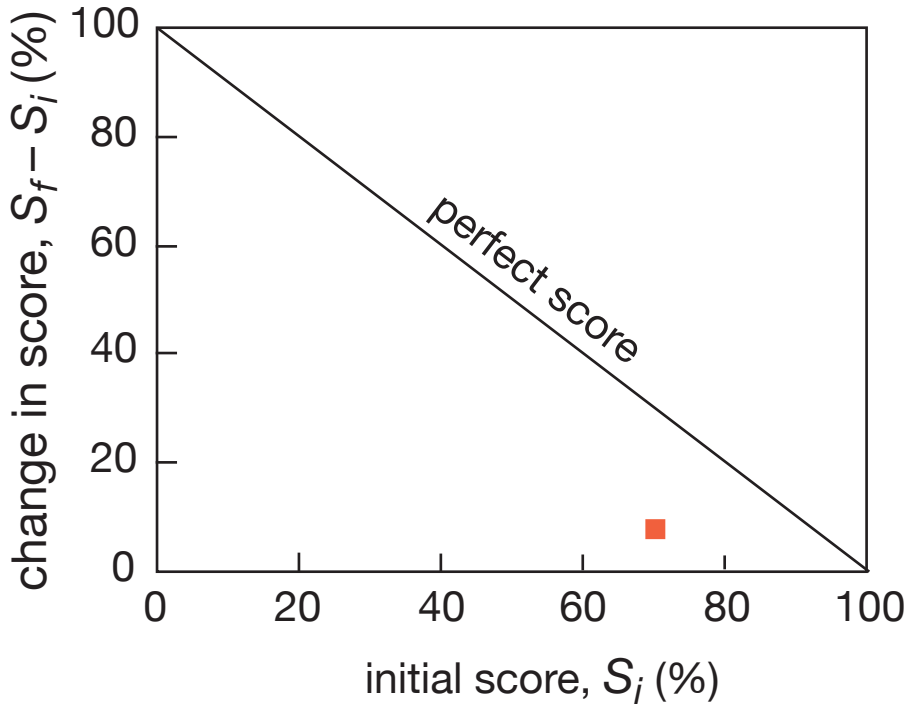
Education


1990
combined
change in score, $S_f - S_i$ (%)
initial score, S_i (%)
0
20
40
60
80
100

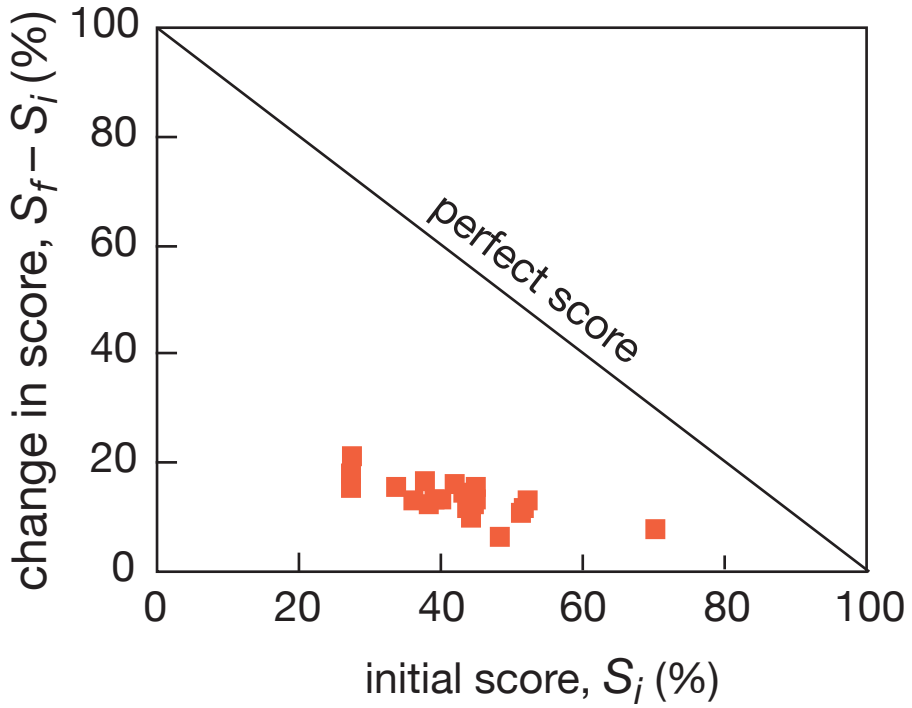
Education


1990
combined
change in score, $S_f - S_i$ (%)
initial score, S_i (%)
0
20
40
60
80
100

Education


change in score, $S_f - S_i$ (%)
100
80
60
40
20
0
0
20
40
60
80
100
initial score, S_i (%)
perfect score

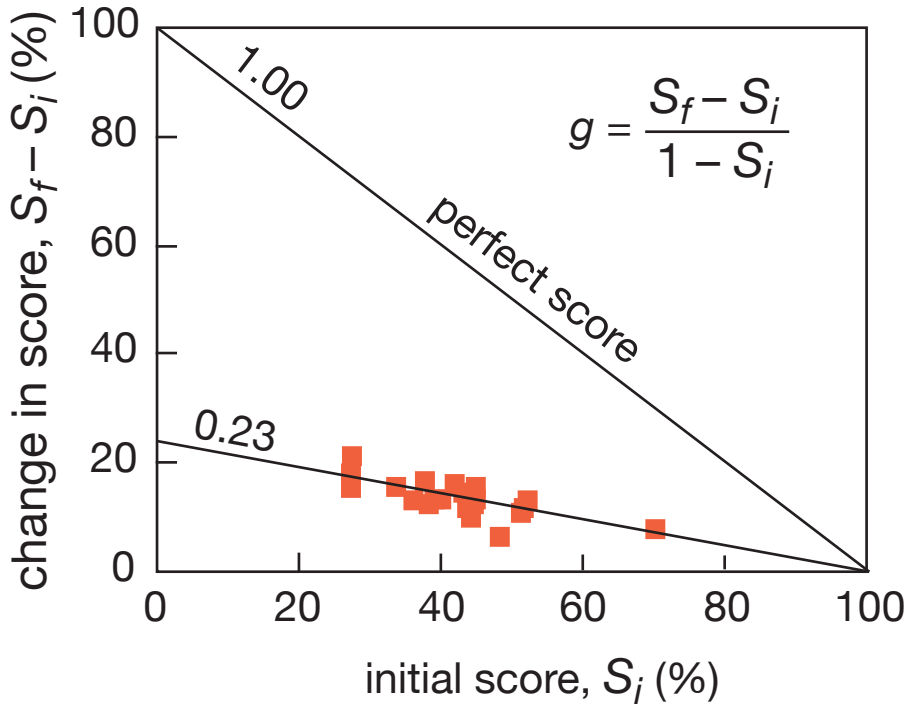
Education



R.R. Hake, *Am. J. Phys.* 66, 64 (1998)

Education

only one quarter of maximum gain realized



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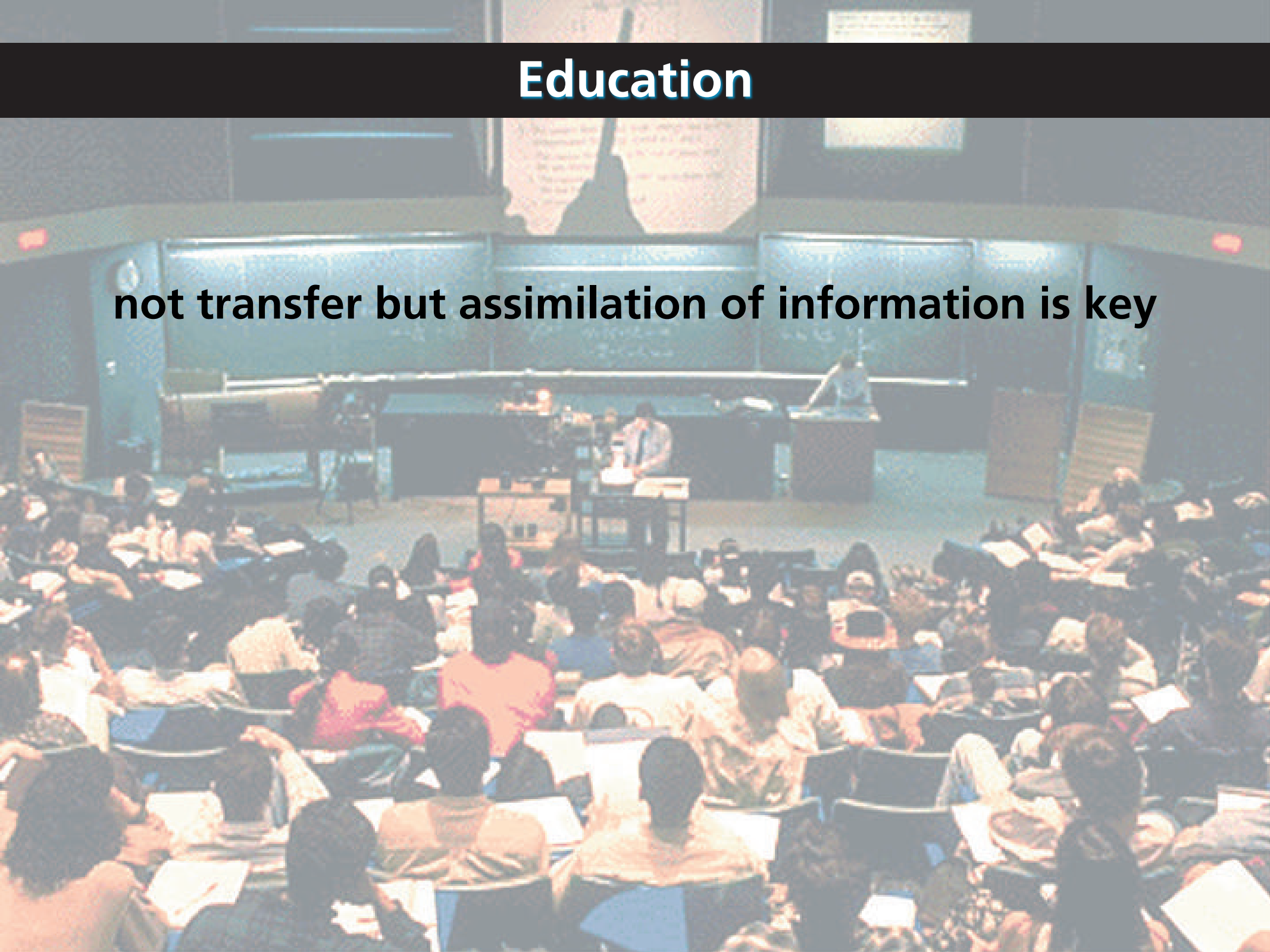
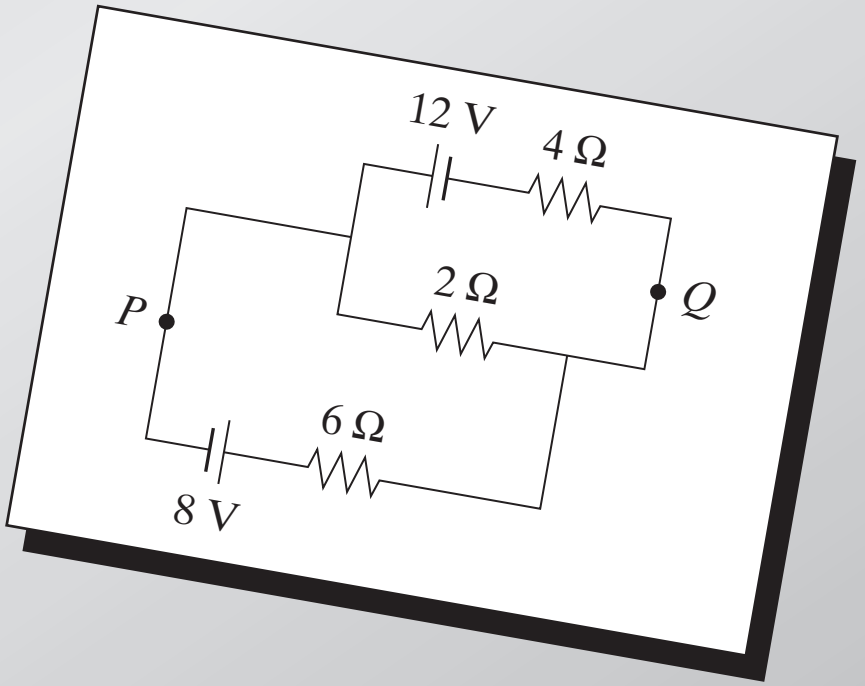
Education



not transfer but assimilation of information is key

Education

conventional problems misleading



Education

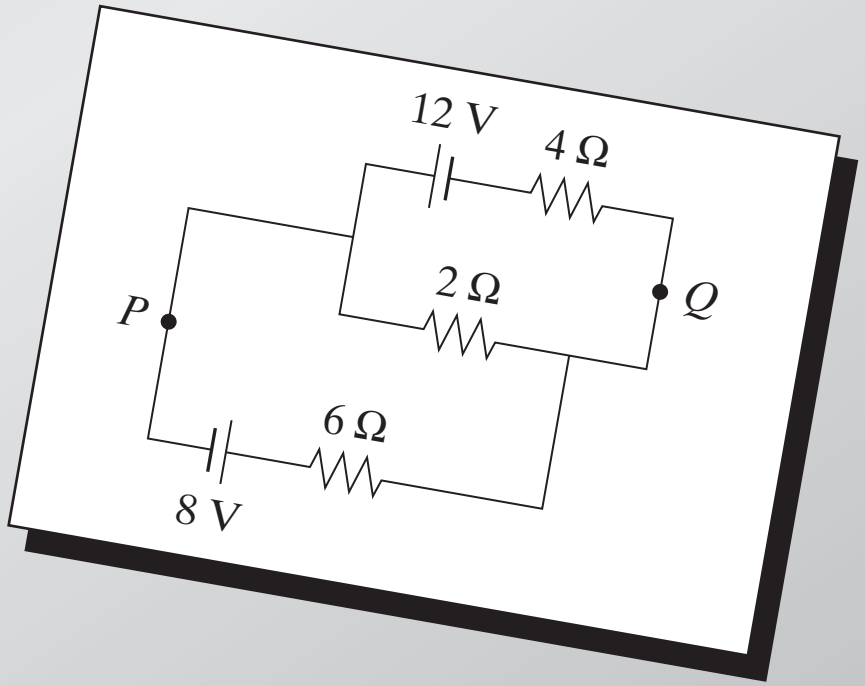
conventional problems misleading

Calculate:

(*a*) current in 2-W resistor

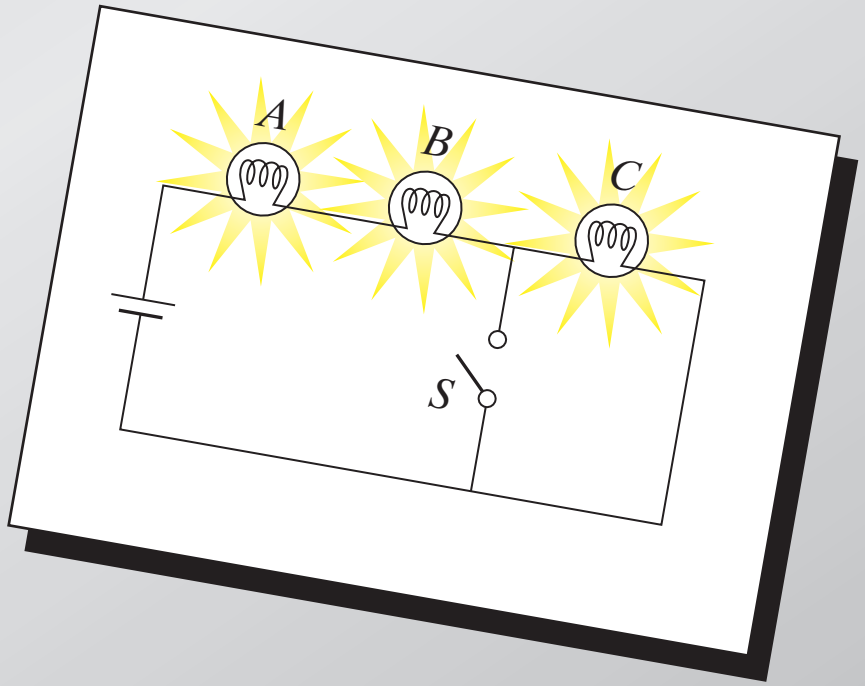
(*b*) potential difference

between *P* and *Q*



Education

are the basic principles understood?



Education

are the basic principles understood?

When *S* is closed, what happens to:

(*a*) intensities of A and B?

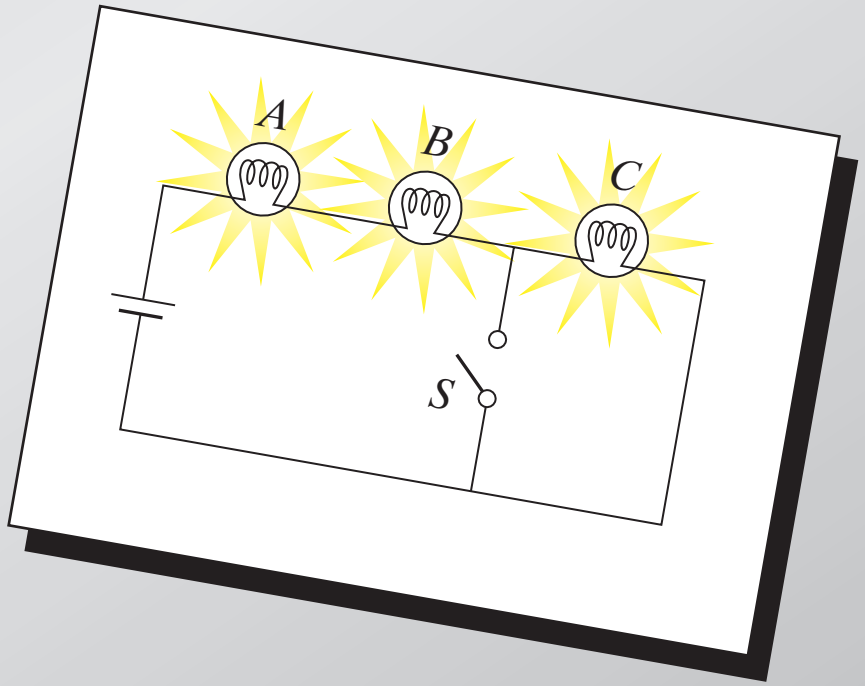
(*b*) intensity of C?

(*c*) current through battery?

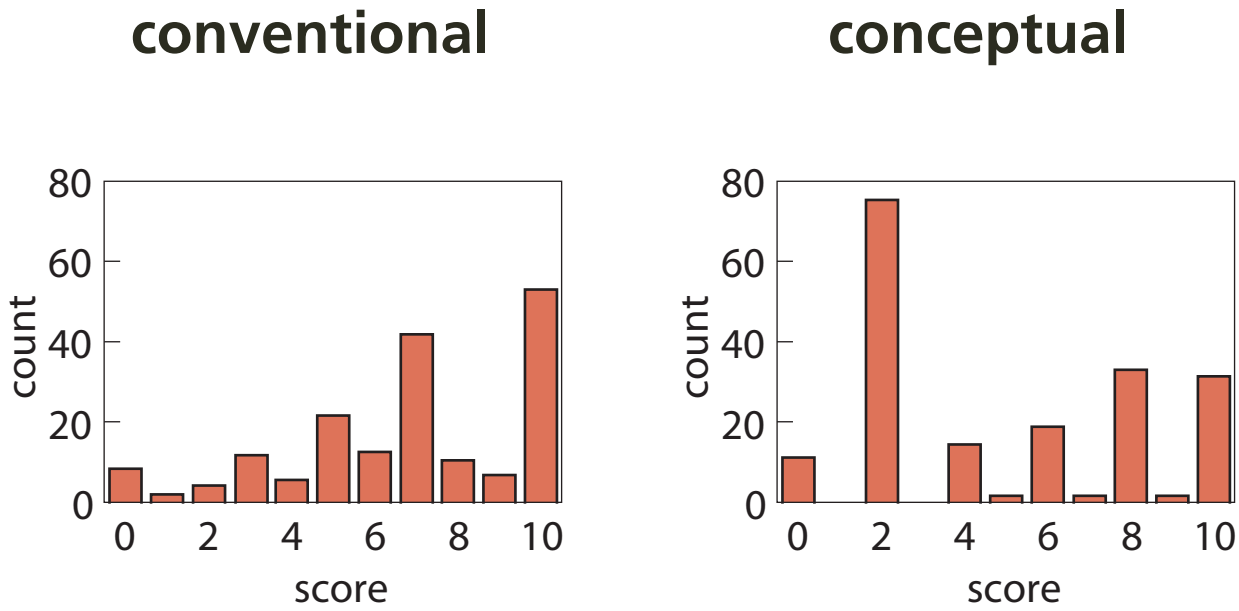
(*d*) potential difference across

A, *B*, and *C*?

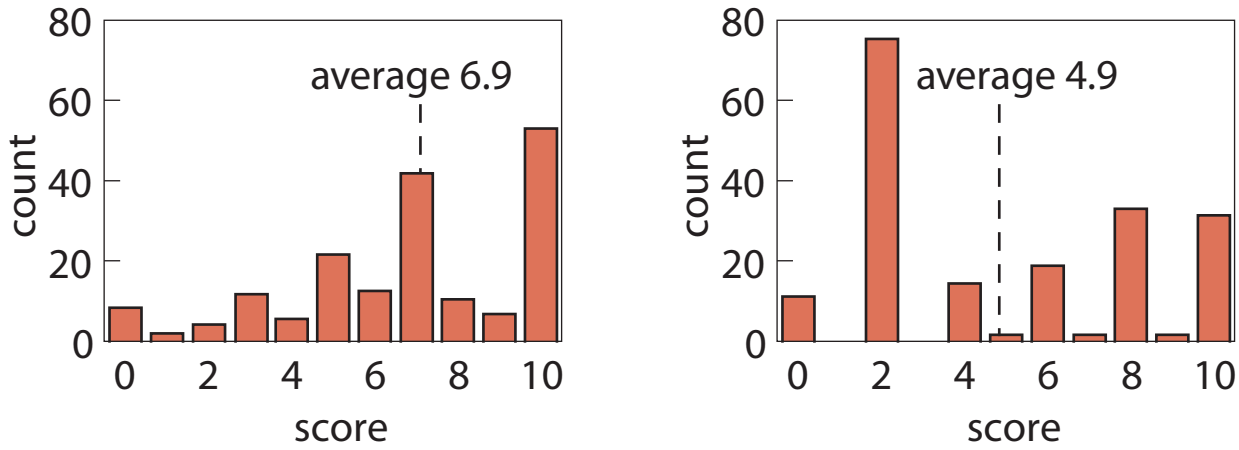
(*e*) the total power dissipated?



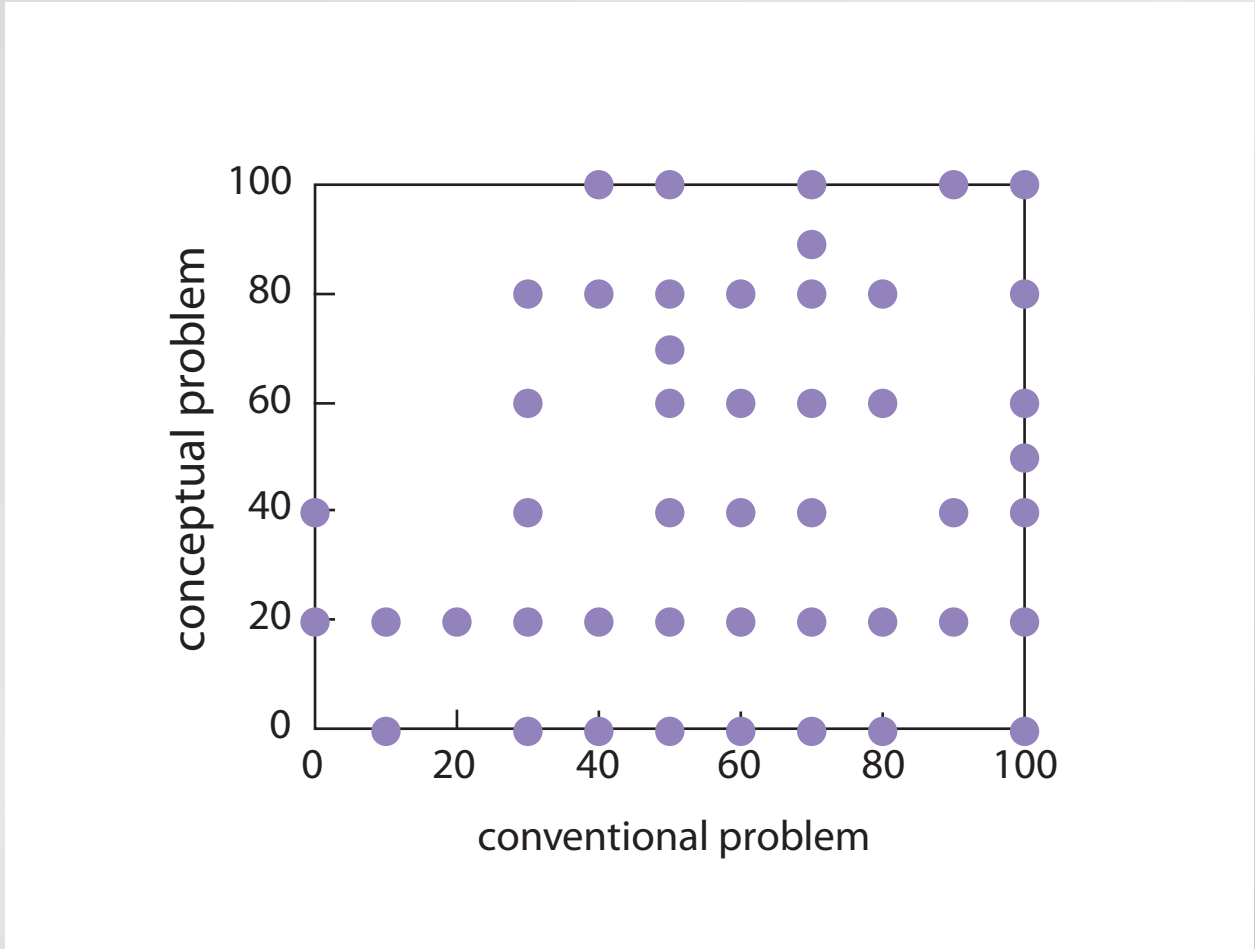
Education


conventional
conceptual
80
60
40
20
0
count
0
2
4
6
8
10
score
80
60
40
20
0
count
0
2
4
6
8
10
score

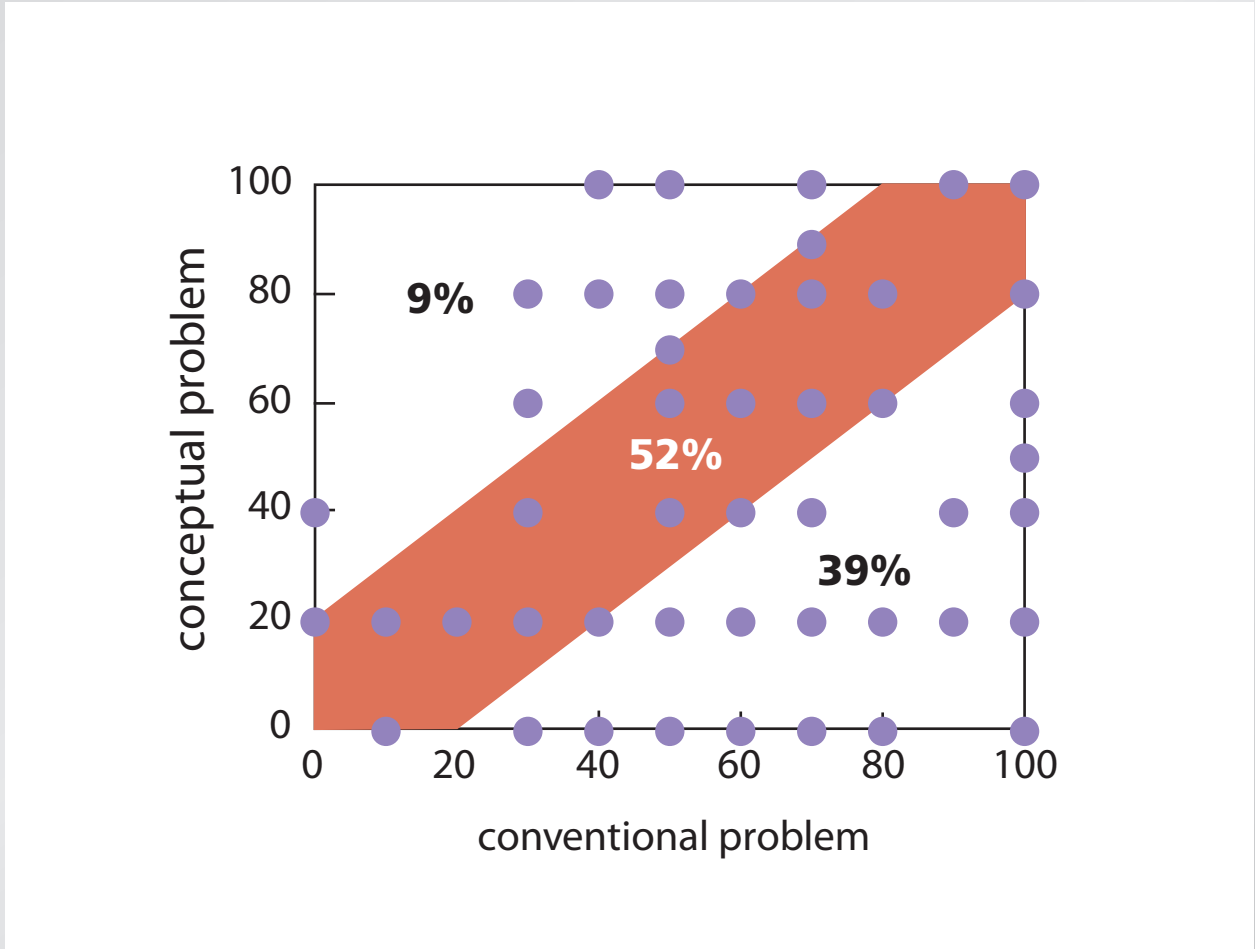
Education


conventional
conceptual
80
60
40
20
0
count
average 6.9
average 4.9
0
2
4
6
8
10
score

Education


100
80
60
40
20
0
conceptual problem
0
20
40
60
80
100
conventional problem

Education


100
80
60
40
20
0
conceptual problem
9%
52%
39%
0
20
40
60
80
100
conventional problem

Summary

- traditional indicators often misleading
- education more than transfer of information

Summary

“The plural of anecdote is not data”

Lee Shulman

Funding:

National Science Foundation

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