Introduction to Peer Instruction

@eric__mazur

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College Park, MD, 17 June 2013
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Peer Instruction…

1. Never heard of it.
2. Heard of it, but don’t really know what it is.
3. Quite familiar with it.
4. I heard you speak about it so often, I could give your talk!
Quick survey...

Peer Instruction...

1. Never heard of it.
2. Don’t use it in my classes, but I’m open to it.
3. Considering using it in my classes.
4. I have used it in my classes a few times.
5. I use it regularly in my classes.
Think of something you are good at — something that you know you do well.
Think of something you are good at — something that you know you do well.

*How did you become good at this?*
How do we learn?

Became good at it by:

1. trial and error
2. lectures
3. practicing
4. apprenticeship
5. other
Some people talk in their sleep.
Some people talk in their sleep.

Lecturers talk while other people are sleeping.

Albert Camus
lectures focus on information transfer...
education is not just information transfer
education is not just information transfer

**1991–1994**
FCI pretest

<table>
<thead>
<tr>
<th>score</th>
<th>count</th>
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<tbody>
<tr>
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<td>10</td>
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<tr>
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<td>11</td>
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</tbody>
</table>
education is not just information transfer
change in score, $S_f - S_i$ (%) vs initial score, $S_i$ (%)
change in score, $S_f - S_i$ (%) vs. initial score, $S_i$ (%)
only one quarter of maximum gain realized

\[ g = \frac{S_f - S_i}{1 - S_i} \]

not transfer but assimilation of information is key
conventional problems misleading
Calculate:

(a) current in 2-Ω resistor
(b) potential difference between $P$ and $Q$
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?
The diagram compares conventional and conceptual teaching methods. The conventional method shows an average score of 6.9, while the conceptual method shows an average score of 4.9.
Education

![Graph showing comparison between conceptual and conventional problems.](image-url)
So what should we do?
Give students more responsibility for gathering information...
Give students more responsibility for gathering information... so we can better help them assimilate it.
Main features:

• pre-class assignment

• in-class: depth, not ‘coverage’

• ConcepTests
Peer Instruction

ConcepTest:

1. Question

2. Thinking

3. Individual answer

4. Peer discussion

5. Revised/Group answer

6. Explanation
is it any good?
Results

first year of implementing PI

1991
FCI pretest

score

count
Results

first year of implementing PI

![1991 FCI posttest chart](image-url)
Results

first year of implementing PI

![Graph showing data distribution for 1991 combined]
Results

The graph shows the relationship between the initial score, $S_i$, and the change in score, $S_f - S_i$, as a percentage. The equation for calculating $g$, the change in score, is given by:

$$g = \frac{S_f - S_i}{1 - S_i}$$

The graph includes a perfect score line and a trend line with a slope of 0.23.
Results

\[ g = \frac{S_f - S_i}{1 - S_i} \]

<table>
<thead>
<tr>
<th>change in score, ( S_f - S_i ) (%)</th>
<th>initial score, ( S_i ) (%)</th>
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</thead>
<tbody>
<tr>
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<td>20</td>
<td>80</td>
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<tr>
<td>0</td>
<td>100</td>
</tr>
</tbody>
</table>

perfect score

0.23
Results

\[ g = \frac{S_f - S_i}{1 - S_i} \]

Results

\[ g = \frac{S_f - S_i}{1 - S_i} \]

what about problem solving?
Results

1985 exam scores
Results

1991 exam scores

Exam score (%)

Count
Results

1985/91 exam scores

<table>
<thead>
<tr>
<th>Exam Score (%)</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 20</td>
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<td>20 - 40</td>
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<td>40 - 60</td>
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</tr>
<tr>
<td>60 - 80</td>
<td></td>
</tr>
<tr>
<td>80 - 100</td>
<td></td>
</tr>
</tbody>
</table>
Conclusion

So better understanding leads to better problem solving!
Conclusion

So better understanding leads to better problem solving!

(but “good” problem solving doesn’t always indicate understanding!)
Traditional indicators of success misleading
Summary

Traditional indicators of success misleading

Education is no longer about information
Traditional indicators of success misleading

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