Memorization or understanding: are we teaching the right thing?

Shanghai Jiao Tong University
Shanghai, China, 15 December 2014
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@eric__mazur
education
1 education
2 PI
3 test
better pay attention!
What happens in a lecture?
education
some people talk in their sleep
some people talk in their sleep

lecturers talk while other people are sleeping

(Albert Camus)
education
education
The result?
Lack of learning
Lack of learning
Lack of retention
not transfer but assimilation of information is key
education

PI
1. transfer of information
1. transfer of information

2. assimilation of that information
1. transfer of information (in class)

2. assimilation of that information
1. transfer of information (in class)

2. assimilation of that information (out of class)
1. transfer of information (in class)

2. assimilation of that information (out of class)

Should focus on THIS!
1. transfer of information (in class)

2. assimilation of that information (out of class)
1. transfer of information (out of class)

2. assimilation of that information (in class)
1. transfer of information (out of class)

2. assimilation of that information (in class)
question
question
→
think
→
poll
→
discuss
question
think
poll
discuss
repoll
explain
education

PI
Let's try it!
thermal expansion
1 education
2 PI
education

PI
all of them
Consider a rectangular metal plate with a circular hole in it.
Consider a rectangular metal plate with a circular hole in it.

When the plate is uniformly heated, the diameter of the hole

1. increases.
2. stays the same.
3. decreases.
Consider a rectangular metal plate with a circular hole in it.

When the plate is uniformly heated, the diameter of the hole:

1. increases
2. stays the same
3. decreases
Consider a rectangular metal plate with a circular hole in it.

When the plate is uniformly heated, the diameter of the hole

1. increases.
2. stays the same.
3. decreases.
Before I tell you the answer...
Before I tell you the answer, let’s analyze what happened.
Before I tell you the answer, let’s analyze what happened.

You...
Before I tell you the answer, let’s analyze what happened.

You...

1. made a commitment
Before I tell you the answer, let’s analyze what happened.

You…

1. made a commitment
2. externalized your answer
Before I tell you the answer, let’s analyze what happened.

You...

1. made a commitment
2. externalized your answer
3. moved from the answer/fact to reasoning
Before I tell you the answer, let’s analyze what happened.

You...

1. made a commitment
2. externalized your answer
3. moved from the answer/fact to reasoning
4. became emotionally invested in the learning process
Consider a rectangular metal plate with a circular hole in it.

When the plate is uniformly heated, the diameter of the hole

1. increases.
2. stays the same.
3. decreases.
Consider a rectangular metal plate with a circular hole in it.

When the plate is uniformly heated, the diameter of the hole

1. increases. ✓
2. stays the same.
3. decreases.
consider atoms at rim of hole
consider atoms at rim of hole
consider atoms at rim of hole
consider atoms at rim of hole

you won't forget this
Greater learning gains
Peer INSTRUCTION

Greater learning gains

Better retention

1 education  2 PI  3 test
in a lecture, students...
in a lecture, students...

1. don’t pay utmost attention
1. don’t pay utmost attention

doi: 10.1109/TBME.2009.2038487
1. don’t pay utmost attention
in a lecture, students…

1. don’t pay utmost attention
in a lecture, students...

1. don’t pay utmost attention

doi: 10.1109/TBME.2009.2038487
in a lecture, students...

1. don’t pay utmost attention
2. think they know it
in a lecture, students...

1. don’t pay utmost attention

2. think they know it

3. are not confronted with misconceptions
in a lecture, students...

1. don’t pay utmost attention
2. think they know it
3. are not confronted with misconceptions
education

PI

test
an illusion...
Education is not just about:

• transferring information

• getting students to do what we do
Education is not just about:

• transferring information
• getting students to do what we do

active participation a must!
三人行，必有我师焉。
——孔子
择其善者而从之，
其不善者而改之。
PeerInstruction.net

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