“I’m fine with having to think as long as I still get an ‘A’”

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Purpose of Study

What students think about learning

What do students report about their thinking and learning?

More details than MPEX
Evaluation of class
Contrast with other classes
Change over semester
Base level of student

Sources

Traditional algebra based intro physics
- 10 interviews
- After first exam in first semester

Meta-learning class
- 13 interviews at end of year
- Pre and post surveys
- Videotapes of lab and tutorial

Thoughts on thinking by meta-learning students

Thinking is good (9 / 13)
- “It’s good to think about the things too…not have them just presented to you.” Henry (commenting on lecture)

Thinking is not normal (3 / 13)
- “You have to be ready to think, be ready to apply, everything. Whereas in other classes it’s kind of like okay that’s the answer. But [in this class] you have to think and apply.” Sharon (commenting on exams)

Thinking is not positively correlated to grades (2 / 13)
- “First semester] I got an A on that class but I didn’t feel I was learning anything…And that’s what I wanted to get, that way of thinking about things without just using straight equations and memorizing them… I’m learning more this semester than I did last semester but I don’t think grade wise I’m doing better.” Joshua (explaining why he switched)

When are students willing to think?

In meta-learning class…
Physics is useful ≥ willing to think (10 interviews)
Physics is useless ≤ unwilling to think (2 interviews)

“Because it’s required for our major but it’s one of those classes we’re only going to use a very little bit of it, so I might have gone with a professor who required less, just because I can’t lie.”
- Brian (whether he would take this course again)

“I put a lot of effort into this class, more than I’ve ever put into any other college class. But I learned a lot more, I took more from it than I have any other college class too, so it was worth it.”
- Sharon (initial comments)
### Will you use any of this in two years?

**According to traditional students...**

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<tr>
<th>Opinion</th>
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<tbody>
<tr>
<td>No (6 / 10)</td>
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<td>It’s possible (1 / 10)</td>
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<td>They tell me I will (1 / 10)</td>
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*“physics has nothing to do with my major, I know I’m just going to take the class, and that’s about it…. I know it’s not going to help me in my later career, but biochem, at least it has some applications”*  
Beach

*“like biomechanics, with the torque around your wrists and the pressure that you put on a bone that causes it to break…. I could see how this could be relevant if I know it, but since I don’t, I’m just praying that it’s not going to be relevant.”*  
Liz

*“So I believe that people that planned the physics, they know that one day these people are going to use physics, that’s why it’s there. So I think it will be very helpful, because they’ve planned it like that.”*  
Uta

**According to our new and improved students...**

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<th>Opinion</th>
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<td>Content Useful (7 / 13)</td>
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<td>Communication Skills (2 / 13)</td>
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<td>Problem Solving (7 / 13)</td>
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<td>MCAT (2 / 13)</td>
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*“a lot of things I learned here that are biology related obviously have immediate benefits....the homework problem we just returned this week with the radioactive nuclei of the gold, the cancer, I can see how that relates and I can understand from the physics there and the biology that I’ve learned...”*  
Thomas

*“unlike a lot of chemistry and stuff like that, you’re always working with other people, so I felt like this class really helped me to be able to communicate about science with other people... sometimes talking about science can be kind of complicated and everybody has their own ways of looking at things sometimes, and being able to express the way that I justify a situation both helps me to understand it and sometimes helps other people to understand more.”*  
Jacob

### Group Learning

**Taught by others (7 / 13)**

- Sometimes other students can explain it to you because they understand how you think more than the professor.”  
  
  *Brian*

**Helps to teach others (8 / 13)**

- “at that point I was teaching them that particular situation and that made me understand it better and that made them understand it better too, and I think that’s just a better way of learning.”  
  
  *David*

**Illuminates thought process (3 / 13)**

- “In my group I had to defend every answer I gave because no one agreed with me on anything....And it helped to see, even if I was wrong, what my thought process was to get me to that wrong answer so I don’t make that mistake again.”  
  
  *Joshua*

### Conclusion

**Students in the traditional class**

- rarely see the relevance of physics to their work

**Students in the modified class**

- have a better appreciation for the role of physics in their profession
- may be more likely to approach physics as a thinking and understanding activity rather than just as a memorization task
- often value group learning