

Thermo Virtual Community of Practice (VCP)

Session 2: Pedagogical Change and Constructive Alignment

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Tentative Agenda

- Introductions, Objectives ~ 10 min
- An anecdote about lecturing ~ 5 min
- Breakout Activity #1 ~ 12 min (group)
- Re-gather/report back ~ 3 min
- Constructive Alignment ~ 10 min
- Breakout Activity #2 ~ 10 min (group)
- Re-gather/report back ~ 10 min
- Wrap-up and next week ~ 5 min

Team Flow



Ganesh
Balasubramanian
Iowa State



Jeff LaMack
Milwaukee School
of Engineering



Melissa Pasquinelli
North Carolina State



Georg Pinggen
Union



Nastaran Hashemi
Iowa State

Team Energy



Nihad Dukhan
Detroit Mercy



Calvin Li
Villanova



Krishna Pakala
Boise State

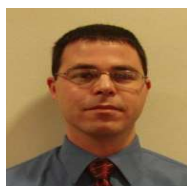


Hessam Taherian
Alabama at Birmingham



Robert F Richards
Washington State

Killer Watts



Jamie Canino
Trine



Heather Dillon
Portland



Edwin Wiggins
Webb Institute



Joseph Tipton
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Team Green Engineering



Margot Vigeant
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John O'Connell
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Zihua Xu
Minnesota Duluth



Sapna Sarupina
Clemson



Bernie van Wie
Washington State

Tds



Sooby Bhattacharjee
San Diego State



Ashland Brown
Pacific



Betta Fisher
Cornell



H. S. Udaykumar
Iowa

Team Cycle



John Chen
California Polytechnic



Milo Koretsky
Oregon State



Sadi Carnot
École Polytechnique

Objectives

- Have Thermo VCP community participants discuss the effectiveness of lecture and the “learning by transmission” model of instruction
- Identify the three components of constructive alignment and consider it as a strategy for course development

An anecdote about lecturing ...

After explaining the physics of sound in our usual incredibly engaging and lucid fashion, we brought a violin into class. We explained how, in accordance with the physics we had just explained, the strings do not move enough air to create the sound from the violin. Rather, the strings cause the back of the violin to move via the soundpost, and thus it is the back of the violin that actually produces the sound that is heard. Fifteen minutes later, we asked the students the multiple choice question shown in figure 3

Wieman and Perkins *Physics Today* 2005

15 min later they asked the question...

The sound you hear in your violin is produced...:

- a. mostly by strings
- b. mostly by wood in back**
- c. both equally
- d. none of the above

What percent of the students do you think chose the correct answer (b)? - poll

Breakout Room Discussions

Instructions: In your group, use the Notes feature to brainstorm and record:

- Why faculty are resistant to abandoning lecture and the “transmission” model of learning?
- Discuss whether more data and evidence would convince them and summarize.
- Why do faculty who try other pedagogies often go back to “100% lecture”?

Constructive Alignment (CA)



“Constructive” refers to the idea that students *construct meaning* through relevant learning activities; “alignment” refers to the situation when teaching and learning activities, and assessment tasks, are aligned to the Intended Learning Outcomes.

John Biggs and Catherine Tang

Constructive Alignment (CA)



1. All assessments should address one or more pre-formulated learning objectives;
2. Summative assessment of a skill should be done only after adequate practice and feedback in the skill has been provided in class activities and assignments;
3. If a learning objective is important, be it analytical, critical or creative thinking, writing or speaking, or anything else, it should be assessed. The assessment drives the learning.

Richard Felder (*Technical Teaching*)

Declarative and Functioning Knowledge

- Declarative knowledge is what the teacher “declares” in class and is accessible in libraries and search engines.
- Functioning Knowledge is how well students can put their knowledge to work, in solving problems, or generally operating more effectively in their particular context
- In your breakout rooms develop 2 corresponding examples from thermodynamics of each type of knowledge

SOLO Taxonomy (from Biggs and Tang)

Some typical declarative and functioning knowledge verbs by SOLO level

| | <i>declarative knowledge</i> | <i>functioning knowledge</i> |
|--------------------------|--|---|
| <i>unistructural</i> | memorize, identify, recite. | count, match, order. |
| <i>multistructural</i> | describe, classify. | compute, illustrate. |
| <i>relational</i> | compare and contrast explain, argue, analyze. | apply, construct, translate, solve near problem. predict within same domain. |
| <i>extended abstract</i> | theorize, hypothesize, generalize. | reflect and improve, invent, create, solve unseen problems. predict to unknown domain. |

Holistic Assessment

- “CA requires a change from a quantitative and analytic mindset, that does atomise knowledge into marks, to one that uses and grades assessment tasks *qualitatively* and *holistically* wherever possible. High level outcomes, academic or professional, refer to whole acts, not to the independent components of those acts.”
- Question and feedback: What are your reactions?

For Session 3: April 17, 2013

- Learning Objectives and Bloom's Taxonomy
 - Read and be prepared to discuss Appendix D of HLW: What are learning objectives and how can we use them?
 - Review the two websites about (1) changes to Bloom's Taxonomy and (2) the revised Bloom's Taxonomy
 - www4.uwsp.edu/education/lwilson/curric/newtaxonomy.htm
 - www.celt.iastate.edu/pdfs-docs/teaching/RevisedBloomsHandout.pdf
- With your VCP Team, create two Learning Objectives based on different places in Bloom's Taxonomy (or the SOLO taxonomy); post them to the portal by noon on April 22, and be prepared to discuss