

Active Learning

Some strategies for getting what **EVERYONE**
wants from the classroom.

Larry Unsworth

Feb 5, 2013

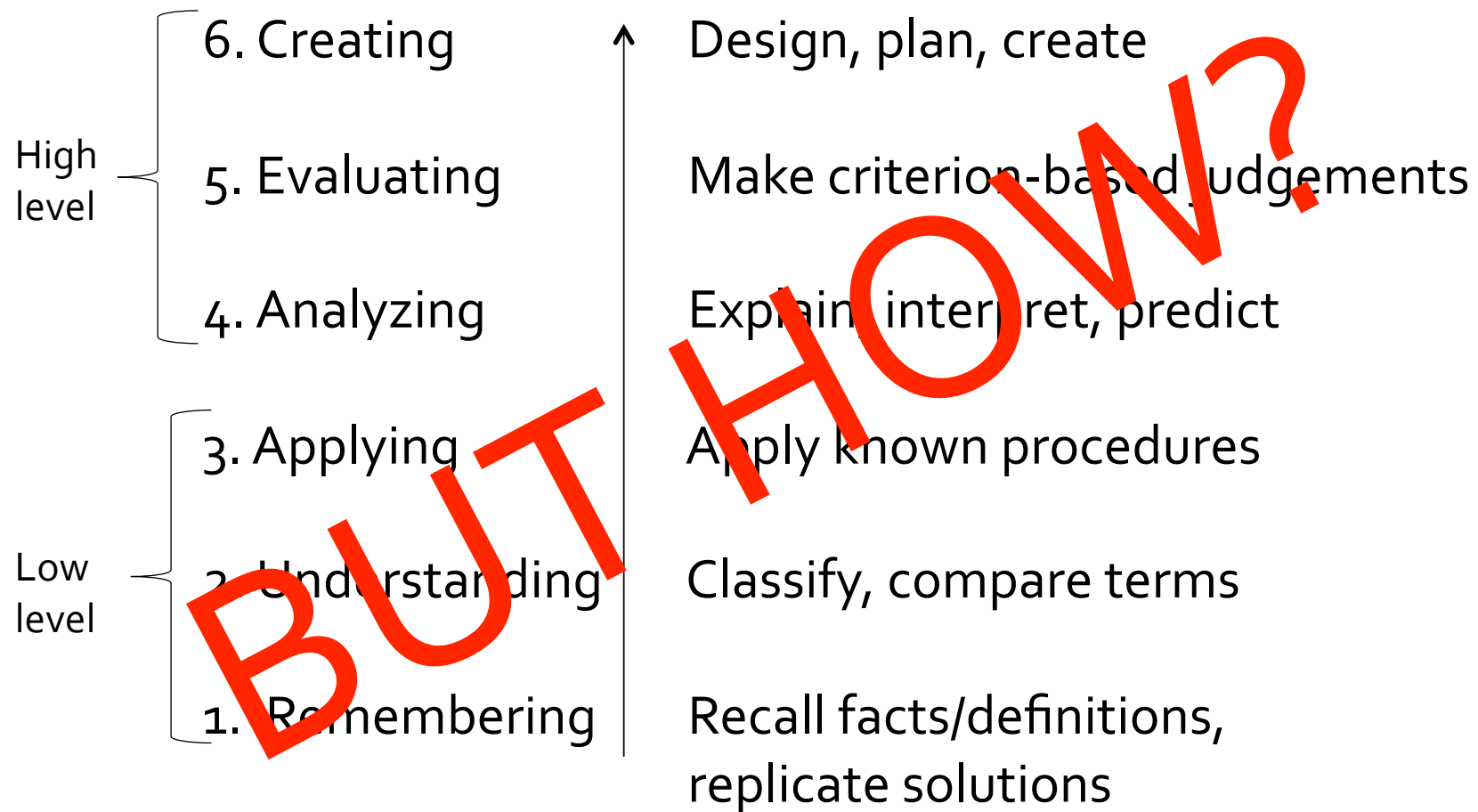
'New' Faculty Forums

Summary of Advanced National Effective Teaching Institute Workshop (NETI-2)

The challenge

<http://youtu.be/8ve23i5K334>

The objective



Outline

Some strategies

Inductive vs. Deductive

Some tools

Concept Tests

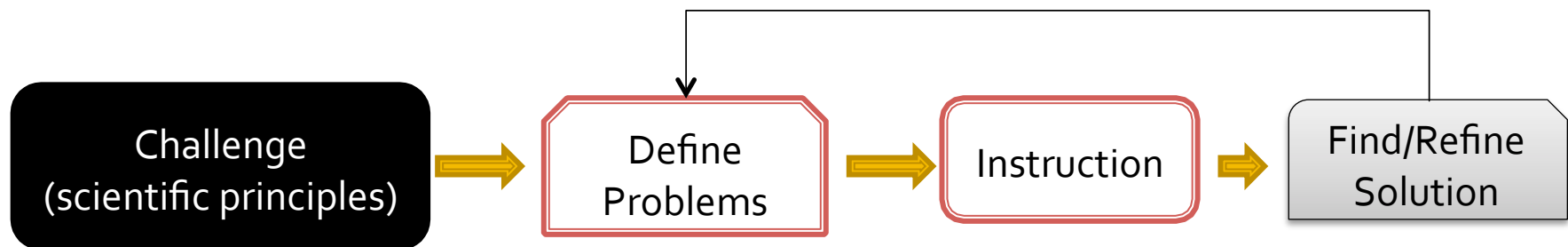
Cooperative Learning

Inductive, deductive...?

Deductive (Traditional) Method



Inductive (Inquiry, problem-based) Method



Inductive, deductive...? (con't)

Deductive Teaching: may better promote short-term retention of factual information (inconclusive evidence)

Inductive Teaching: IF WELL IMPLEMENTED, better promotes student interest/motivation, active engagement, long-term retention, knowledge transfer, critical thinking, understanding, satisfaction and a sense of how science and engineering happens.

Inductive: pick the right approach

Several methods for starting an inductive teaching strategy, from the very basic to the very complex.

The Spectrum:

1. Inquiry-based instruction: Simply begin topics with a challenge, namely, a question or problem that requires the knowledge presented (in that class or course) to solve it.
2. Discovery learning: extreme form where students are challenged with a problem with NO (or at least very little) instructor guidance.

Active learning killers

1. Trivial questions

2. Too long

3. Call for volunteers

Random student selector apps

i. Random student picker (android)

ii. The Hat (iPod)

Tool 1: concept tests (handout)

Concept Tests:

Multiple choice questions that assesses understanding of a course-related concept, ideally with one distracter that reflects common misconception.

Use: Pose question, students vote, discuss responses in pairs, vote again. If incorrect answers persist, more instruction called for.

Sources:

cihub.org – NSF sponsored inventory

learncheme.com – University of Colorado, core Chem Eng courses

jimi.cbee.oregonstate.edu/concept_warehouse/ - Chem Eng related

Tool 2: cooperative learning

Active Learning:

IN CLASS, course related activities other than taking notes.

Collaborative Learning:

students work together to learn and apply course material, but doesn't require individual accountability; instructor plays a small role

Cooperative Learning:

students work in teams where 5 criteria are met

Tool 2: cooperative learning

Criteria:

1. Positive interdependence:
MUST rely on each other to meet goal
2. Individual accountability:
each member accountable for their work, and mastering ALL material
3. Face-to-Face interaction:
4. Appropriate use of interpersonal skills:
team members practice and receive instruction on leadership, communication, conflict management
5. REGULAR self-assessment of group functioning:
team members reflect on things they do well, poorly, and how to change in future

Tool 2: cooperative learning

Not only applicable to project courses!

Jigsaw Approach:

1. Form home teams (1,2,3...), members are experts in subtask.
2. Form expert teams (all 1's, 2's...) that are trained and receive handouts in their subtopics
3. Assignment ensures each member of home team teaches group about task

Team building: the root issue

The building of the teams are key, ESPECIALLY in project courses

Items to consider for forming 3-4 member teams:

1. Instructor MUST form the team: ensure criteria are met
 - research indicates instructor formed teams perform better than self-selected; it is what happens on the job, and the students need to learn how to cope.
2. Mixed ability levels on one team: use GPA (voluntary first-day survey)
3. Common time blocks for meeting
4. DO NOT let at risk populations be outnumbered on a team
5. Homework teams: allow an option to dissolve and reform once a semester

The work...it never ends!

The upfront work for the professor is no longer the barrier

Team-Maker (part of CATME, www.catme.org)

- provides an online tool for team building
- once set up, can be used over and over
- can be tailored to collect info you want to form teams

See handout for further details

Inductive: final thoughts

Pros:

1. Solid research support
2. More engaging and enjoyable for students and PROFESSORS

Cons:

1. More prep time (to start), the amount of which depends on the strategy employed.
2. Depending on the strategy, little to significant student resistance may have to be handled because more of the learning responsibility falls on the student. This should not be a barrier, just needs upfront thought.

Inductive: final thoughts

Recommendations:

1. Start small
2. Mix it up
3. Monitor student attitudes: minute papers
4. Provide necessary support:
 - good questions with clear expectations
5. Balance:
 - learning objectives, students and yourself