

Becoming an Effective Teacher

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Boice's advice for new faculty members: Nihil nimus (nothing in excess)*

- New faculty members who thrived were those who worked moderately on teaching, research, and other faculty responsibilities.
- Description of the practical daily work habits that allow new faculty to work moderately, staying on top of their responsibilities while minimizing stress.

* R. Boice Advice for New Faculty Members: Nihil Nimus
2000 Allyn and Bacon. Needham Heights, MA



excerpts in Rick Reis'

"Tomorrow's Professor" Mailing List

- **how to work "moderately" at teaching**
- **how to prepare new courses while keeping your sanity**
- **class preparation time: how much is enough?**
how to prepare for class in about two hours, in small increments of time spread out over a few days.
- **exemplary science teachers concentrate on teaching the process of doing science, rather than overwhelming their students with science content.** When you give up trying to pack information into every second of class, you have less content to prepare.

how to work "moderately" at teaching

- practice patient ways of slowing, notice alternatives and simplifications in what you can say and do
- begin before feeling ready, do class prep in spare moments
- prepare and present in brief, regular sessions (allows time each day for important things)
- stop before diminishing returns set in
- moderate over-attachment and over-reaction (seek out and learn from criticism while reacting less emotionally to it)
- moderate negative thinking and strong emotions
- let others do some of the work
- moderate classroom incivilities (openness, pacing, patience)

how **not** to approach a new course preparation

- Go it alone.
- Try to cover everything known about the subject in your lectures and always be prepared to answer any question any student might ever ask.
- Don't bother making up learning objectives or a detailed syllabus-just work things out as you go.

new course preparation

- Start preparing as soon as you know you'll be teaching a particular course (ideas, resources)
- Don't reinvent the wheel.
- Write detailed learning objectives (statements of observable tasks that students should be able to accomplish if they have learned what the instructor wanted them to learn), **give** them to the students as study guides
- Get feedback during the course.
- Minimize new preps early in your career, avoid more than one at a time.

Felder & Brent, Chem. Engr. Education, 41(2), 121–122 (2007)

too much class

preparation may not pay off

- **MYTH:** more class prep is always better
- prepare for class in small chunks of time (30-45 min conceptual outline, 20 min fill in details, 10 min insert activity breaks, 30 min produce transparencies or note cards, 10-15 min just before class prepare psychologically)
- 80% of the benefit occurs in the first 20% of prep time
- reducing prep time focuses attention on key points, more time to develop and use active learning exercises involving students
- arrive 5 min early to prepare to start, do not rush through lecture, finish 1 min early

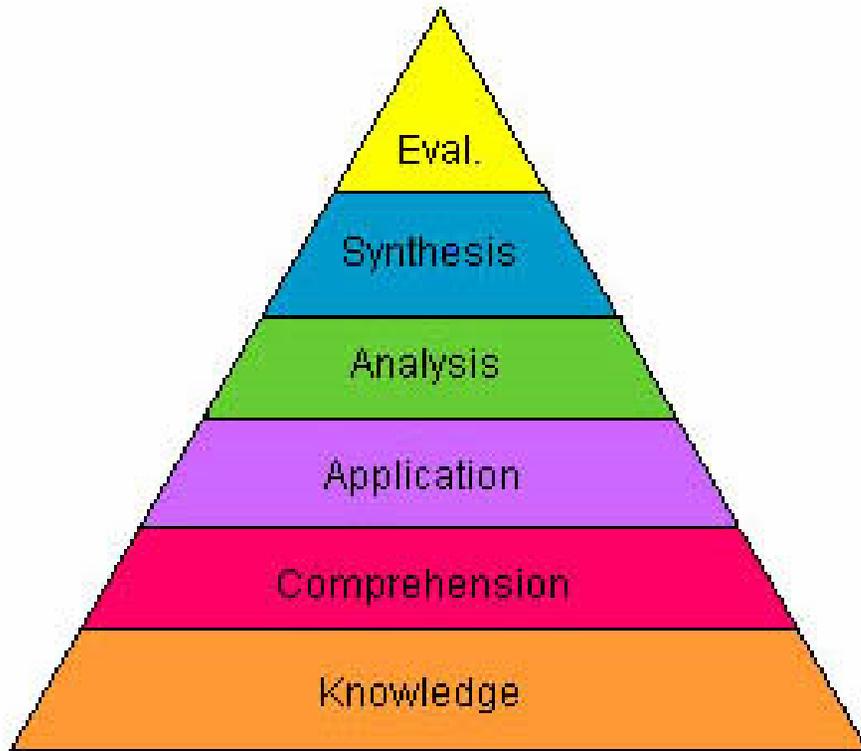
The responsibility of learning is the student's responsibility

- Not the teacher's responsibility
- Teacher provides the learning goals (objectives) to guide the students in the learning process
- Teacher provides the methods of assessment for each learning objective so that students can have feedback on how well they are achieving the learning objective
- Student's grade depends on his own achievement with respect to each learning objective, not how well he has done relative to his classmates.

less is more

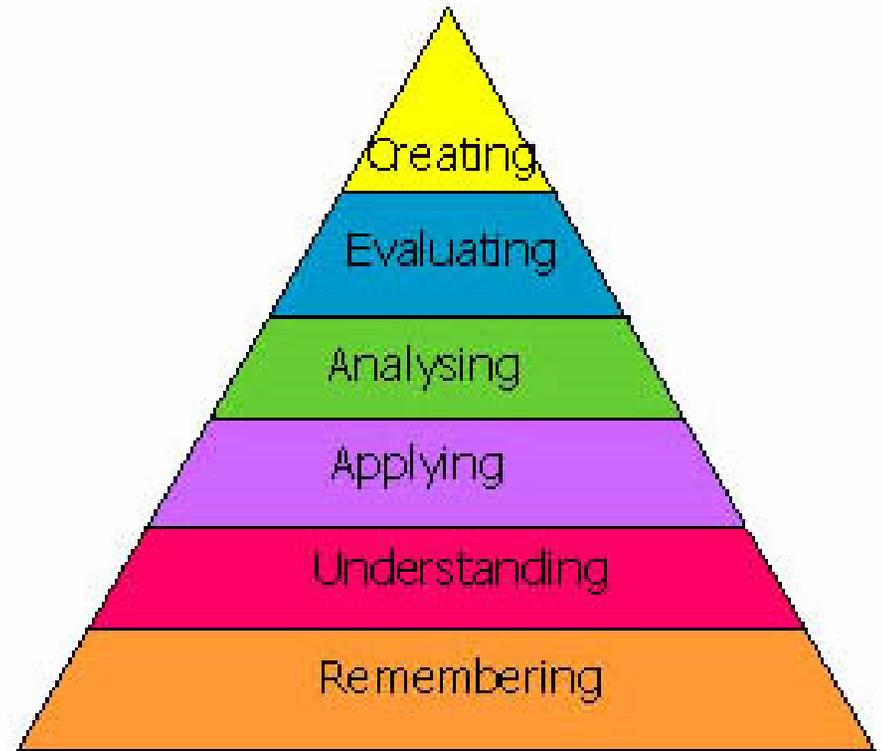
- **DON'T** try to teach much more than can be learned, lose the students so deeply among the details that they fail to grasp the *larger picture*
- **DO** concentrate on *higher order critical thinking*, so must reduce coverage to allow time for thinking.
- **DO** allow time for processing or questions.
- **DO** select particular material, readings, exercises, problems or cases for *deeper processing* every 3rd or 4th lecture

Taxonomy of the Cognitive Domain



Old Version

Bloom 1956



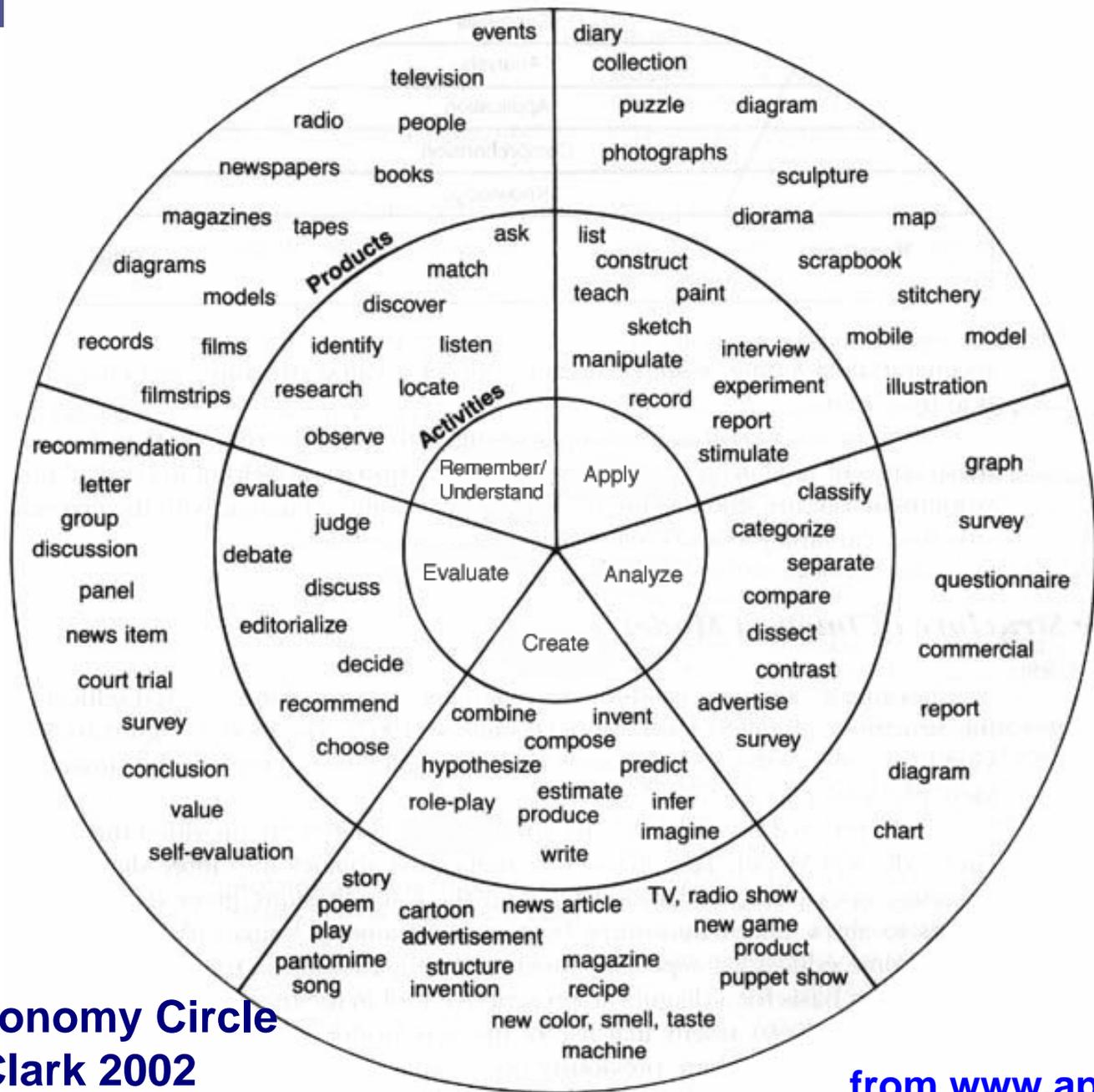
New Version

Anderson & Krathwohl 2001

Taxonomy of Educational Objectives

Bloom's Levels of Understanding

Level	Definition	Activity
Evaluation [Evaluate]	Appraise, assess, or critique on basis of standards or criteria	appraise, argue, assess, attach, choose, defend, estimate, judge, predict, rate, select, evaluate
Synthesis [Create]	Originate, integrate, or combine ideas into a new product or plan	arrange, assemble, compose, construct, create, design, develop, formulate, organize, propose
Analysis [Analyze]	Distinguish, classify, or relate assumption, hypotheses or evidence	analyze, appraise, categorize, compare, distinguish, examine
Application [Apply]	Select, transfer, and use data or principles to complete new task	apply, choose, demonstrate, employ, illustrate, interpret, solve, use
Comprehension [Understand]	Translate, comprehend, or interpret information	classify, describe, discuss, explain, indicate, restate, translate
Knowledge [Remember] NEW	Recall or recognition of information, ideas and principles	arrange, define, label, list, name, relate, recall, repeat, reproduce



Cognitive Taxonomy Circle
Based on B. Clark 2002

How the Taxonomy Promotes Active Learning

Clark (2002)

- **inner ring**: original levels of Bloom's taxonomy.
- **middle ring**: synonyms for various academic processes that comprise that level.
- **outer ring**: links process to product.

For example, if you wish to improve evaluation skills, you might ask students to produce an editorial for the student newspaper in which they discuss the strengths and weaknesses of a particular side of a controversial issue.

Learning Objectives

- Used in corporate & military training programs
- are specific, measurable, and guide students in the learning process

An ***objective*** is a description of a performance you want learners to be able to exhibit before you consider them competent, i.e., it describes what the learner will be **DOING** when demonstrating mastery of the objective

Components of a learning objective

- **Behavior**: specific and **observable**
- **Condition**: for completion, what tools or assistance is to be provided.
- **Standard**: level of performance that is desirable, acceptable range of answers that are allowable as correct
- *Example: Given a stethoscope and normal clinical environment, the medical student will be able to diagnose a heart arrhythmia in 90% of affected patients.*

The condition may be implicit or unnecessary.

BEHAVIOR: At the conclusion of this lesson the student will be able to: (do what?)

specific&observable	not
list	understand
identify	know
state	learn about
describe	
predict	
construct	
solve	
operate ●●●	

EXAMPLE: Course content: How to operate the phone and properly communicate with callers

After completing this course you will be able to:

Poor Example	Good Example
<ul style="list-style-type: none">• operate your phone• know how to greet callers• understand the procedure for transferring a call	<ul style="list-style-type: none">• place a caller on hold• activate the speaker phone• play new messages on the voice mail system• list the three elements of a proper phone greeting• transfer a call to a requested extension

Learning Objective: EXAMPLE

Too general: The learner will be able to prepare appropriate new patient workups.

Better:

The learner will be able to prepare legible, comprehensive, and focused new patient workups that include the following features:

- Present illness organized chronologically, without repetition, omission, or extraneous information.
- A comprehensive physical examination with detail pertinent to the patient's problem.
- A succinct and, where appropriate, unified list of all problems identified in the history & physical exam.
- A differential diagnosis for each problem (appropriate to level of training)
- A diagnosis/treatment plan for each problem (appropriate to level of training)

CONDITION: Examples

- *Given a problem of the following type...*
- *Given a list of...*
- *Given any reference of the student's choice...*
- *Given a matrix of ...*
- *When provided with a standard set of tools...*
- *Given a properly functioning...*
- *Without the aid of references...*
- *With the aid of references...*
- *Without the aid of a calculator...*
- *Without the aid of tools...*
- **Conditions are sometimes implicit or omitted**

STANDARD: Examples

- time limits (when due?)
- accuracy (how many significant figures?)
- quality (lab report in the format and style of a scientific paper?)

Standards are sometimes omitted or implicit.

how to plan a single class period

- Figure out what you want to accomplish in that period
- Goal for that period supports your course goals and dictates how to spend the class time
- ***What do you want students to be able to DO at the end of the 50-min period?***
- ***What do you expect your students to demonstrate to you, in their next exam, lab report, project presentation, or other assessment?***
- What should the student be able to do with the knowledge (apply, analyze, interpret, synthesize, evaluate)?
- ***Give your students the opportunity to practice whatever you will expect them to be able to do***

What are the learning goals for the class? you might want students to be able to: (example, structural geology class)

- look at a field photo or geologic map and identify major folds and faults
- draw a schematic cross-section through major structures on a geologic map
- identify the types and orientations of forces that created the structures in a photo or map
- relate the map region to geologic/tectonic events previously discussed in class
- identify potential oil and gas traps on a geologic map or cross-section, and recommend three locations for drilling
- choose a location for a proposed mansion, dam, nuclear waste storage facility, or other engineered structure

a useful resource

<http://serc.carleton.edu/NAGTWorkshops/earlycareer/teaching/>

Includes:

- [Course Design](#)
- [Teaching Efficiently](#)
- [Building Your Tenure Case](#)
- [Learning Styles](#)
- [Teaching Toolkit](#)
- [Large Classes](#)
- [Assessment](#)
- Workshops

On the Cutting Edge, National Association of Geoscience Teachers