

ENGR 150:
**INTRODUCTION TO HIGHER
EDUCATION FOR ENGINEERS**
WEDNESDAY, OCTOBER 28

Professor Ethan Lipton
FALL QUARTER 2009

TODAY'S AGENDA – REVISED

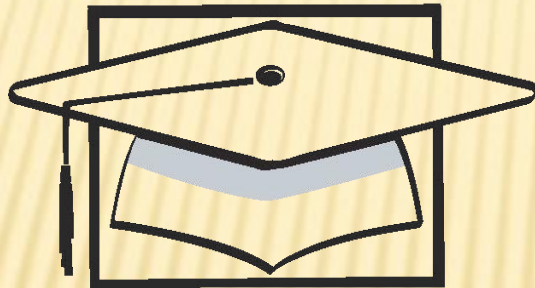
Reading Assignment: Sections 3.5, 3.6 and 3.7

Problem Assignment: Chap. 3: Problems 5, 6, 8, 9 and 10

Class Discussion:

- Debrief Quiz 1 Retake
- Learning & Learning Styles
- Improving Your Learning Process
- Learning as a Reinforcement Process
- Teaching Styles
- Mistakes Students Make
- Academic Skills Survey

Understanding the Teaching/Learning Process



KEY ISSUES

- ✘ What is learning?
- ✘ How do we learn?
- ✘ Metacognition – Improving your learning process
- ✘ Learning is a reinforcement process
- ✘ Understanding the teaching part of the teaching/learning process
- ✘ Mistakes students make
- ✘ Don't be hung up on the idea of seeking help

WHAT IS LEARNING?

Learning is the process of acquiring

- ✘ New knowledge and intellectual skills
(Cognitive learning)
- ✘ New manual or physical skills
(Psychomotor learning)
- ✘ New emotional responses, attitudes, and values
(Affective learning)

LEVELS OF INTELLECTUAL SKILLS – BLOOM'S TAXONOMY

- × Remembering
- × Understanding
- × Applying
- × Analyzing
- × Evaluating
- × Creating

HOW DO WE LEARN?

- ✘ Receiving new knowledge
- ✘ Processing new knowledge

RECEIVING NEW KNOWLEDGE

- ✘ What type of information do you prefer?
 - Sensing learner
 - Intuitive learner
- ✘ What sensory channel do you perceive external information most effectively?
 - Visual learner
 - Verbal learner

PROCESSING NEW KNOWLEDGE

- ✘ The way you prefer to process new information
 - Active learners
 - Reflective learners
- ✘ The way you progress toward understanding
 - Sequential learners
 - Global learners

INDEX OF LEARNING STYLES QUESTIONNAIRE

- ✘ Recommend taking Index of Learning Styles Questionnaire www.engr.ncsu.edu/learningstyles/ilswb.html
- ✘ You'll choose one of two preferences for 44 items that cover the ways you prefer to receive and process new knowledge
- ✘ You'll immediately receive the scored results telling you your preferred learning styles

METACOGNITION – IMPROVE YOUR LEARNING

- ✘ Observe your learning
- ✘ Feedback what you observe
- ✘ Make changes to improve your learning process

CHARACTERISTICS OF “EXPERT” LEARNERS

- ✘ Control the learning process rather than become a victim of it
- ✘ Are active, not passive, in their approach to learning
- ✘ Are motivated (e.g., enjoy learning, have short-term and long-term goals, etc)
- ✘ Are disciplined (e.g. have learned good habits and use them consistently)
- ✘ Are more aware of themselves as learners (e.g. know their own strengths and weaknesses)
- ✘ Initiate opportunities to learn
- ✘ Set specific learning goals for themselves

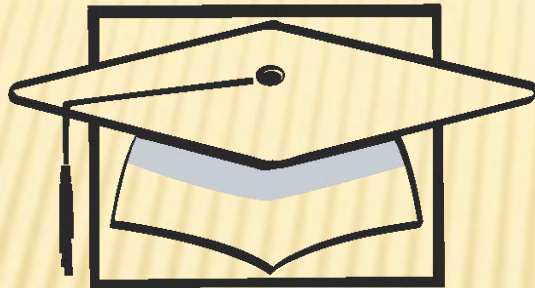
MORE CHARACTERISTICS OF “EXPERT” LEARNERS

- ✘ Have a larger repertoire of learning strategies from which to choose
- ✘ Know not only *what* to learn, but *how* to learn
- ✘ Plan their approach to learning
- ✘ Monitor their learning while it's happening
- ✘ Are more adaptive because they do self-monitor while learning
- ✘ Reflect more upon their own learning
- ✘ Evaluate the effectiveness of learning approaches and strategies
- ✘ Use learning strategies selectively
- ✘ Tend to attribute failures to correctable causes
- ✘ Tend to attribute successes to personal competence

LEARNING IS A REINFORCEMENT PROCESS

WHEN	WHAT
Before class	Prepare for the lecture by reviewing notes, reading text, attempting a few problems, formulating some questions
During class	Attend lecture, concentrate intently, take detailed notes, ask questions
After class but before next class	Review and annotate notes, reread text; work assigned problems, work extra problems, meet with a study partner or study group to go over material and problems
In preparation for test/exam	Review notes; review text, rework problems, meet with a study partner or study group to go over material and problems
In preparation for final exam	Review notes, reread text, rework problems, meet with a study partner or study group to go over material and problems

The Teaching Process



OVERVIEW OF THE TEACHING PROCESS

Teaching modes

- × Large lectures
- × Small lectures
- × Recitations
- × One-on-one tutoring

CHARACTERISTICS OF TEACHING MODES

- ✘ Each involves a person who is knowledgeable about a subject (an “expert,” if you will) communicating what he or she knows to a less knowledgeable person (the student)
- ✘ Generally, most of the communication is one-way—i.e., from the teacher to the student
- ✘ Relatively little learning takes place

FIVE ASPECTS OF TEACHING STYLES

Note: Teaching styles most prevalent in math/science/engineering courses are highlighted in red bold type

1. What type of information is emphasized?

Concrete – Facts, data, observable phenomena

Abstract – Principles, concepts, theories, mathematical models

2. What mode of presentation is stressed?

Visual – Pictures, diagrams, films, demonstrations

Verbal – Spoken words, written words

3. How is the presentation organized?

Deductive – Start with fundamentals; proceed to applications

Inductive – Start with applications; proceed to fundamentals

4. What mode of student participation is facilitated?

Active – Student involved (talking, moving, reflecting, solving problems)

Passive – Student as a spectator (watch, listen)

5. What type of perspective is provided on the information presented?

Sequential – Step by step progression

Global – Content and relevance are provided

IMPORTANT QUESTIONS RELATED TO THE WAY YOUR PROFESSORS TEACH

- ✘ What value is it to me to understand how my professors teach?
- ✘ What if the way I prefer to learn differs from the way I am taught?
- ✘ Why don't my professors use a variety of teaching styles?

MISTAKES STUDENTS MAKE

Mistakes Students Make

Strategies for Overcoming Them

*Assume engineering study
will be like high school*

Work to understand and adjust to the differences between high school and engineering study

Program themselves for failure

Create a life situation that enables you to devote adequate time and energy to your studies

Spend little time on campus

Immerse yourself in the academic environment of the institution

Neglect studying

Schedule study time. Devote significant time and energy to studying.

*Delay studying
until test is announced*

Master the material presented in each class prior to next class

Study 100% alone

Study collaboratively with other students

MISTAKES STUDENTS MAKE

Mistakes Students Make

Strategies for Overcoming Them

Come to each lecture unprepared

Review notes, read text, attempt problems prior to each lecture

Avoid professors

Interact regularly with professors outside the classroom

*Cut classes;
don't get the most out of lectures*

Attend classes and practice good listening skills. Ask questions in class; participate in class discussions.

Fail to take notes or fail to use them properly in the learning process

Take effective notes and use a systematic learning methodology to study from notes

Skim over material in assigned reading in a rush to get to homework problems

Use reading for comprehension methodology to understand concepts before attempting problems

Fail to solve problems. Don't approach problems using a systematic method

Solve not only assigned problems but extra problems; use systematic problem-solving methods.

DON'T BE HUNG UP ON THE IDEA OF SEEKING HELP

If I have seen a little further, it is by standing on the shoulders of Giants

- Isaac Newton

Primary sources of “help” with your academic work

- ✗ Your *peers*
- ✗ Your professors

KEY FINDING

Students who get the most out of college, who grow the most academically, and who are the happiest, organize their time to include interpersonal activities with faculty members, or with fellow students, built around substantive academic work.

GROUP DISCUSSION - DIFFERENCES BETWEEN ENGINEERING STUDY AND HIGH SCHOOL

In your group, brainstorm a list of the major differences between the teaching/learning process you experienced in high school and the teaching/learning process you will encounter in university-level math/science/engineering study. Once you have a list of differences, discuss strategies for adjusting to each item on the list.

Appoint a leader to keep the discussion on topic and a recorder to write down and report what was learned

SEE YOU NEXT CLASS . . .

Reading Assignment: Sections 4.1, 4.2 and 4.3

Problem Assignment: Chap. 4: Problems 3, 5, 6 and 8

Class Discussion: Early Course Preparation
Preparing for Lectures
During Your Lectures