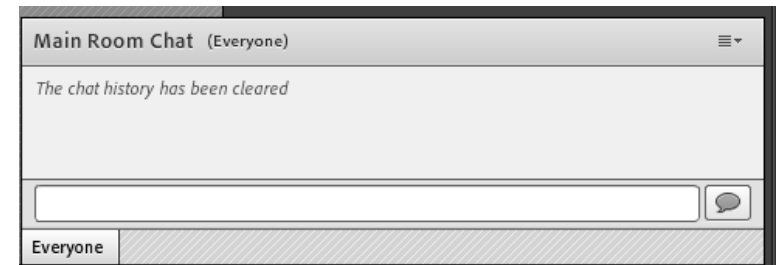
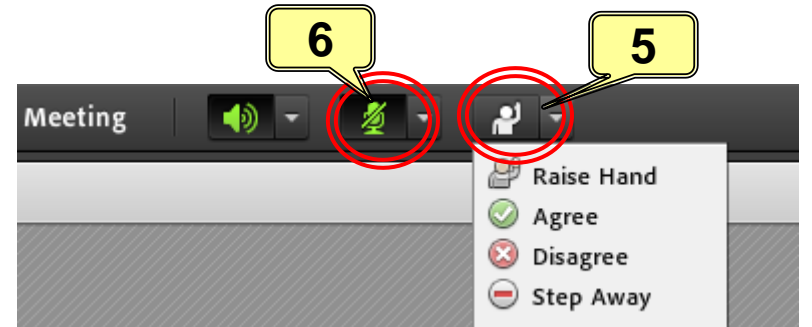
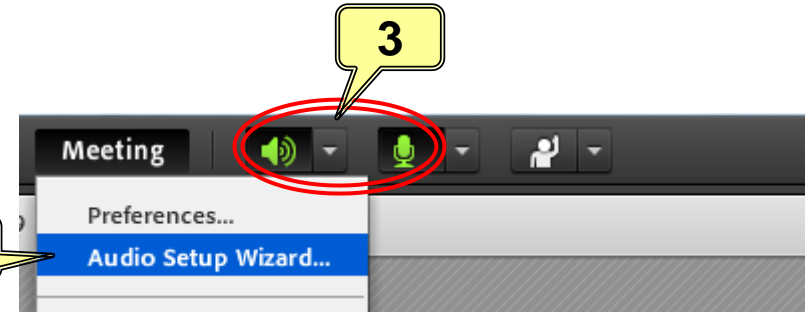


# Welcome! As you enter...

1. Plug in your headset (if available).
2. Enable your speakers and mic
3. The top bar icons should be green).
4. Run the audio setup wizard (use “Meeting” menu on top left).
5. “Raise your hand” by clicking the icon to let the hosts know you are ready to test your mic.
6. After testing your mic, mute yourself by clicking the mic icon
7. Feel free to use the chat at any time!



**Start Recording**

# Faculty Virtual Community of Practice

## Computer Science & Computer Engineering

### Session 2: Learning Objectives & Bloom's Taxonomy

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# Today's Agenda

- Introductions & organization of FVCP portal (10 min)
- Member Survey (10 min)
- Learning Objectives(10 mins)
- Group Breakouts (20 mins)
- Bloom's Taxonomy
- Report out (15 mins)

# Rules of Engagement

Create your own bubble of solitude:

- Close your office door
- Use a “do not disturb” sign
- Turn off e-mail
- Silence or forward phone
- Avoid any other potential distractions
- Occasionally check to see whether or not you are muted; review the Chat box to see if there is anything relevant

# ASEE – CSE FVCP Portal

- <https://aseevcp.asee.org/?q=computer>
- Facility to allow information sharing
  - Files
  - Past FVCP session recordings
  - Blog
  - Assessment info
- IdeaScale – idea sharing software

# Taxonomy of Types of Learning

- Bloom's taxonomy of educational objectives: Cognitive domain (Bloom & Krathwohl, 1956)
- *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives (Anderson & Krathwohl, 2001)*
- Facets of understanding (Wiggins & McTighe, 1998)
- Taxonomy of significant learning (Fink, 2003)
- Evaluating the quality of learning: The SOLO taxonomy (Biggs & Collis, 1982)

# Poll Question

- Did you read the assigned articles?
  - I meant to but...
  - Skimmed the material
  - Read them closely



# Poll Question

- To what extent do you currently provide learning objectives on your syllabus?
  - I do not provide any
  - I now realize by objectives are not well designed
  - I provide a few well-designed objectives
  - I provide more than five objectives

# Poll Question

- Do you provide learning objectives with individual assignments?
  - No
  - For some of the assignments
  - Almost always

# Poll Question

- Do learning objectives influence your grading criteria?
  - Not that I am aware
  - Sort of
  - Yes, there is often a direct correlation

# Poll Question

- Were you familiar with Bloom's Taxonomy before reading about it in the Homework 1 assignment?
  - Completely familiar
  - Somewhat familiar
  - Somewhat unfamiliar
  - Completely unfamiliar

# Poll Question

- Have you used Bloom's taxonomy to guide the setting of learning objectives in actual assignments you have given in the past?
  - Always
  - Most of the time
  - Some times
  - Never

# Report Out on Homework 1

- Group 1, 3 and 6 describe their learning objectives and the project they are used in.

# What Are Learning Objectives

- A learning objective is an explicit statement that clearly expresses what the student will be able to do after taking a course.
- An Observable and measureable student outcome.
- Identifies a behavior that a student must demonstrate in order for the teacher to know that a specific learning has taken place.
- Learning objectives must be concise and concrete so they are open to only limited interpretation
- Learning objectives help students clarifying their personal goals for a course and give them a framework against which to measure their own success.

# Writing Learning Objectives

Three parts:

- Behavior: Describes what participants will be able to do as a consequence of performing an activity or taking a course.
- Condition: Describes conditions under which the student will perform the behavior.
- Criteria: Describes the criteria teacher will use to evaluate student performance.



# Writing Learning Objectives

Example in four steps:

- Step 1: Describe what new information, skills, or behaviors participants will be able to do at the conclusion of the activity. Behavior must be observable and/or measurable.
- Example: Students will be able to design a low power integrated circuit

# Writing Learning Objectives

Example in four steps:

- Step 2: Explain HOW the behavior will be performed. Think of circumstances, commands, materials, and directions that the student will be given to perform the behavior.
- Example: ... using CMOS design principles with minimal circuit area

# Writing Learning Objectives

Example in four steps:

- Step 3: How will you evaluate the behavior? How often, how well, how many, how much, etc.
- Example: ... evaluate if the integrated circuit is optimized primarily by power and secondarily by speed and area; mid project design review and final presentation and report

# Writing Learning Objectives

Example in four steps:

- Step 4: Put it all together
- Example: Students will be able to design a minimal area, low power integrated circuit using CMOS principles. The design will be described in a mid project review and a final project report describing the optimization for power, and speed

# Writing Learning Objectives

Example in four steps:

- Step 4: Put it all together
- Example: **Students will be able to design a minimal area, low power integrated circuit using CMOS principles.** The design will be described in a mid project review and a final project report describing the optimization for power, and speed
- **Behavior – Condition -- Criteria**

# Breakout Activity 1

- Critique the following learning outcomes with respect to published best practices. Student centered? Action oriented? Measurable? Rewrite them if needed.
  - Students will be able to compare and contrast key topics
  - Students will be able to write short methods using selection statements in response to a problem definition
  - Students will understand nested loops
  - Students will gain knowledge of programming

# Breakout Activity 2

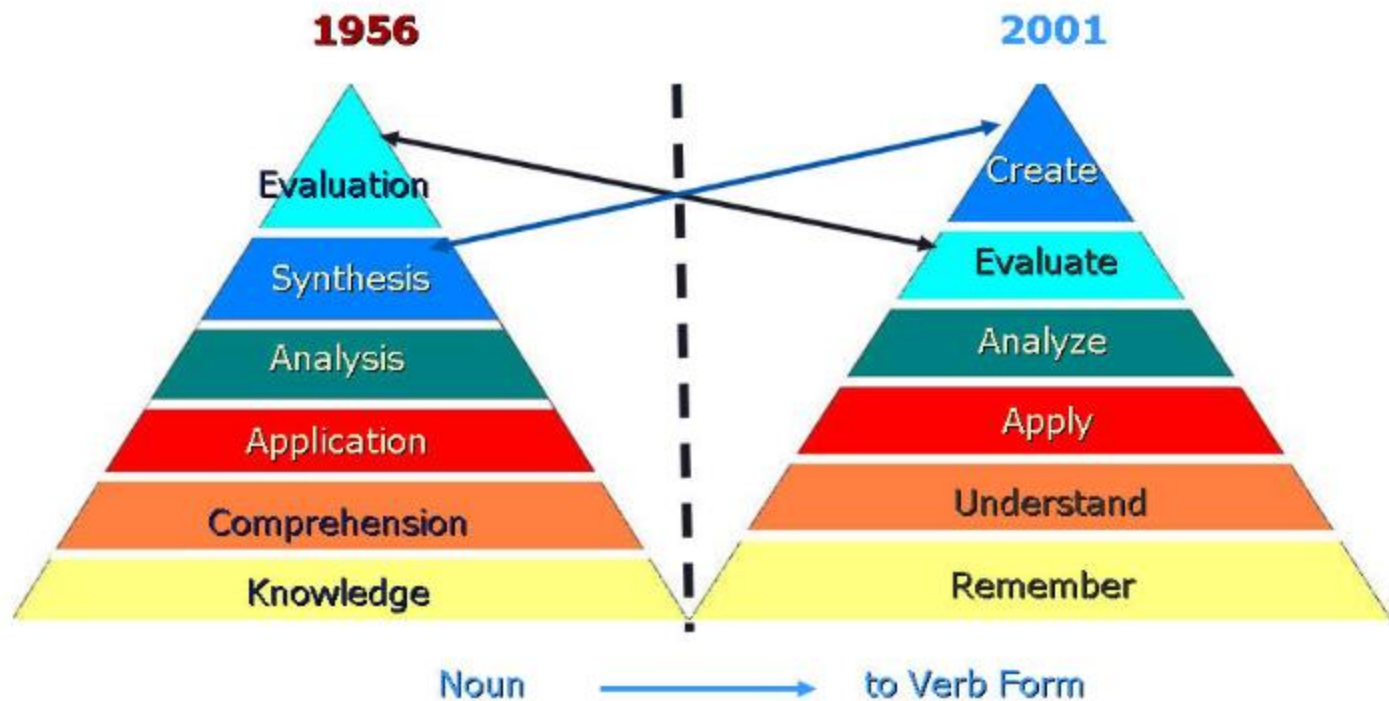
- List two advantages to students and two advantages to instructors of providing learning outcomes.

# Bloom's Taxonomy

- The taxonomy of educational objectives is a framework for classifying statements of what we expect or intend students to learn as a result of instruction\*
- Bloom saw the original taxonomy as:
  - A common language about learning goals to facilitate communication across persons, subject matter and grade levels
  - A panorama of the range of educational possibilities



# Changes to Bloom's



# Cognitive Process Dimension

a continuum of increasing cognitive complexity

**Table 1. The cognitive processes dimension — categories, cognitive processes (and alternative names)**

lower order thinking skills  higher order thinking skills

remember	understand	apply	analyze	evaluate	create
recognizing (identifying) recalling (retrieving)	interpreting (clarifying, paraphrasing, representing, translating) exemplifying (illustrating, instantiating) classifying (categorizing, subsuming) summarizing (abstracting, generalizing) inferring (concluding, extrapolating, interpolating, predicting) comparing (contrasting, mapping, matching) explaining (constructing models)	executing (carrying out) implementing (using)	differentiating (discriminating, distinguishing, focusing, selecting) organizing (finding coherence, integrating, outlining, parsing, structuring) attributing (deconstructing)	checking (coordinating, detecting, monitoring, testing) critiquing (judging)	generating (hypothesizing) planning (designing) producing (construct)

(Table 1 adapted from Anderson and Krathwohl, 2001, pp. 67–68.)

# Mapping Learning Objectives to the Taxonomy

- Attempt to measure the increase in knowledge that students obtain (or are expected to obtain)
- How do we measure success of attaining objectives?

# Breakout Activity 3

- Discuss the revised outcomes from the earlier breakout activity today. Which level of Bloom's Taxonomy do they relate to?

# Breakout Activity 4

- Give examples of how you can assess whether or not student have attained learning objectives you stated in an assignment. How can you make objectives measurable?

# Summary

- Some insight into FVCP portal
- Discussed Learning Objectives
  - Writing
  - Importance to students and faculty
  - Measuring
- Bloom's Taxonomy
  - Organizational value
  - Relationship to learning objectives

# Next Week

- Student's Prior Knowledge:
  - Read Chapter 1 of *How Learning Works*
  - Consider the knowledge you expect students to have coming into your course next semester.
  - Write at least three questions / problems for students to complete on the first day.
  - Post a Word or PDF document with your name in the Session 3 folder at the Web Portal.
  - Post by Sunday 11:59 pm