Computer Science (CSCI) 698
Practicum in Teaching Computer Science

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How to prepare a lecture

- Some content from https://uwaterloo.ca/centre-for-teaching-excellence/teaching-resources/teaching-tips/lecturing-and-presenting/delivery/lecturing-effectively-university

- Also see USC's Center for Excellence in Teaching (CET)
  - Link in previous lectures

Prepare in advance

- **Visit your classroom in advance.**
- Familiarize yourself with the layout of the desks and the front of the classroom. Decide where you will stand and how you will move from one place to another. Find out whether the classroom has audio-visual equipment or whether you will have to request it from audio visual services. Make sure that you know how to use the audio-visual equipment.

Prepare in advance

- **Have a back-up plan.**
- If you are using technology, have a back-up plan ready in case you run into technical difficulties. Technology problems can negatively affect your credibility, even if they are beyond your control.

Prepare in advance

- **Plan your lecture and visual aids beforehand.**
- Outline how you will introduce, explain, and summarize the main ideas. Select examples and prepare how you will show students the relationships between the main ideas.

Prepare in advance

- **Prepare speaking notes.**
- Prepare notes that work for you (e.g., a detailed outline, a list of major points, key definitions, proofs, solved problems, examples, etc.). To better engage students, avoid reading from a script, a computer screen, or overhead projector.

- **Include delivery reminders in your notes.**
- Include cues to remind yourself to smile, look at the whole class, pause after posing a question, etc.

Prepare in advance

- **Practice your lecture.**
- Practice to ensure that you have an appropriate amount of material and activities for the time available. Resist the common error of including too much material in a lecture. Students' questions and learning activities can take up to 50% more time than you may first think.

Prepare in advance

- **Bring a bottle of water.**
- The water will soothe a sore or dry throat. Taking a sip is also a good way to buy thinking time before responding to a student question.

Structure the lecture clearly

- **Be transparent. Show your students "the big picture."**
- Don't assume that your students know the pedagogical purpose of your lecture. Instead, explain how the lecture relates to previously-learned material and the course themes and goals in general. Begin the class with a short review of the key points from the previous class and end with a preview of the topics for next class (along with a reminder about any readings or assignments to be completed).

Structure the lecture clearly

- **Make explicit transitions between topics with mini-summaries.**
- Link current material to previously-learned content and future lectures. Be explicit about how one topic connects to the next, or ask your students to explain the connections. By linking new material to previously learned content, you help students understand and organize new information in their minds.

Structure the lecture clearly

- **Cover only a few main points in each lecture.**
- Plan to cover only three or four points in a fifty-minute lecture and four or five points in a seventy-five-minute class. Select key points that introduce, complement, and/or clarify the course readings, assignments, and goals. Focus on presenting central points or general themes that tie together as many topics as possible.

Structure the lecture clearly

- **Be flexible when following your notes.**
- Watch students' level of interest and confusion and be ready to adapt your lecture accordingly. Your notes are there if needed, but the lecture should arise out of your interaction with the students, not the notes themselves.

Use effective presentation strategies

- **Maintain regular eye contact with the entire class.** By doing so, you create connections with them, are able to gauge their note-taking, and discourage distracting class noise.
- **Avoid turning away from students when you speak.** It helps many students to be able to see your face and mouth while you speak
- **Use a microphone in large classes.** Amplifying your voice will help all students — not just students with hearing impairments — and will also put less stress on your vocal cords.
- **Speak clearly, but use a conversational tone.** Think of the lecture as an opportunity to speak with the students, not at them.

Use effective presentation strategies

- **Convey your enthusiasm for the material and the students.** Vary your vocal speed and pitch, as well as your facial expressions. Smile often. Consider using humor when appropriate.
- **If possible, move around the room, and use natural gestures.** This movement is especially important for engaging large classes. Changes help to refocus students' attention, but remember to move with purpose so you avoid distracting your students.
- **Interact with your students to create positive rapport with them.** Arrive at class early so that you can welcome students. Address them by name as much as possible, and plan to stay after class to chat with students and answer their questions.

Use effective visual aids

- **Avoid writing everything that you say on your slides.** Consider providing partial or skeleton slides that leave space for students to write down examples and other notes.
- **Reveal visual information gradually rather than all at once.** This keeps students focusing on your oral development of each point, instead of rushing to copy down the material.
- **Write down key words and names.** Many students try to write down everything they see. If information does not need to be copied down, mention that to the students, or consider whether it is important enough to include in the first place. Consider providing handouts that give an outline of the lecture material for students to annotate.

Make each visual stand on its own

- limit each slide to only one topic, and give it a relevant title
- state sources where appropriate – for statistics, figures, pictures, etc.
- number headings to clearly illustrate where you are in your presentation
- know your audience: avoid abbreviations and jargon unfamiliar to them
- use meaningful graphics when they reinforce your written message
- highlight key information on charts, tables, and graphs to help focus your audience's attention (i.e., use color, circle the information, or use a pointer)

Achieve balanced and consistent layouts

- keep type sizes and fonts consistent on all visuals in a presentation
- format headings consistently (e.g., bold text and increased font size)
- use no more than two fonts per slide (one for headings and one for main text)
- spread the information out so that it fills the screen
- use color consistently but avoid overuse – two to four colors per slide
- be aware of connotations behind colors (e.g., red on a financial statement connotes a cash deficit)
- use parallel grammar for points (e.g., begin each point with the same part of speech)

Make visuals easy to read

- use 24 - 28 point font for main text, 32 - 40 point font for headings
- avoid distracting, unnecessary graphics and excessively complex backgrounds
- use clear, standard fonts such as Times New Roman, Arial, Helvetica
- consider using boldface lettering to make text thicker
- avoid putting much text in italics or all upper-case letters – this slows down reading
- ensure diagrams are not too intricate to be visible from the back of the room
- limit each point to one line whenever possible to limit reading time

Include only your main points

- write only main points on your visuals, not the details that support them – avoid giving the audience your presentation to read
- put the key words you repeat throughout your presentation on your visuals (repetition is acceptable in presentations, since it helps audience retention)
- assume your audience will copy down everything you present on a visual – keep information clear, simple, and minimal

Lecturing guidelines

- See CET Teaching nuggets

- And also content here from

https://teachingcommons.stanford.edu/

Lecturing guidelines

Preparation

Thorough preparation of a lecture will increase your confidence, improve your delivery style, and enhance the effectiveness of your presentation. When preparation time is limited, focus on the following:

- Craft an introduction that will set a clear and engaging agenda.
- Create an outline of your main points, examples, or demonstration.
- Prepare and practice a short conclusion that will tie the strands of the lecture together and place the lecture in the wider context of the course.
- If you plan to use technology aids, prepare backups in case of technological difficulties.

Lecturing guidelines

Keep Your Focus

- Limit the main points in a lecture to five or fewer.
- Create effective visuals, analogies, demonstrations, and examples to reinforce the main points.
- Share your outline with students.
- Emphasize your objectives and key points in the beginning, as you get to them, and as a summary at the end.

Lecturing guidelines

Basic Presentation Skills

You don’t need to be a charismatic showman to deliver a strong lecture; begin by refining your basic presentation skills.

- Avoid reading your lectures verbatim; if you must refer to your notes frequently, combine this with lots of eye contact.
- When making eye contact, actually look at specific individuals while you make a point; don’t just continually scan the room. Individuals seem most comfortable with about five seconds of sustained eye contact.
- When you lecture, speak clearly and not too rapidly. If students are busy taking notes, go even slower.
- Face the students as much as possible, rather than facing the blackboard, projection screen, or laptop.
- Try taping your lecture on a tape recorder and listen to yourself.

Lecturing guidelines

Engage Your Audience

- Focus attention early on using a quote, a dramatic visual, an anecdote, or other material relevant to the topic.
- Integrate visuals, multimedia, discussion, active learning strategies, small-group techniques, and peer instruction.
- Link new material to students' prior knowledge, such as common experiences or previous coursework. Can what you're teaching explain a phenomenon that students may have wondered about? Does what you're teaching contradict ideas that students may have about how the world works?
- Show enthusiasm for the topic and information. Remember, you are modeling your discipline.
- Give students time to think and genuine opportunities to respond.
- Plan for diverse learners. Use verbal, visual, and kinesthetic approaches such as hands-on exercises and simulations.

Lecturing guidelines

Get Feedback

- Observe students' non-verbal communication: note taking, response to questions, eye contact, seating patterns, and response to humor. Are they "with" you?
- Use the "minute paper" or other assessment techniques. Ask students to respond in one or two sentences to the following questions: What stood out as most important in today's lecture? What are you confused about? Do this every few lectures—it will take you about 15 minutes to review the responses and you'll learn an enormous amount about your students.
- Give quizzes periodically on lecture objectives, not obscure material. Are they getting it?
- Conduct midterm teaching evaluations or simply ask the students for suggestions and comments at the midpoint of the quarter.

Lecturing guidelines

Handling Questions

You should go out of your way to encourage questions, although instructors have different preferences for how they take them. Let your students know if they can interrupt with questions or should save them for the end of the period. In either case, avoid going overtime, so there is a reasonable chance for students to formulate and ask questions. Here are some tips for encouraging, and responding to, questions:

- When asking if there are any questions, don't simply ask "Any questions?" with your back turned to the audience. Phrase it as a genuine invitation, such as "What parts of this are still a little unclear or confusing for you?" or "What do I need to explain again?" or "What are you wondering about that I haven't yet addressed?"
- Make sure you understand the student's question before launching into a long explanation. Restate the question and let the student clarify, if necessary.
- In a large class, repeat a student's question so that all the students know what question you're answering.
- Consider reserving two- to three-minute blocks for questions at transition points in your lecture. Let students have the full time to think, even if nobody asks a question. This reinforces your commitment to answering questions and will encourage students to review the material recently covered.
- If you don't know the answer to a question, don't bluff. You can let the student know that the question goes well beyond what you can address in lecture, volunteer to find the answer and report back, or ask the student to investigate and report back to the class. Or, consider trying to work out an answer with the students, if the question seems solvable.

Lecturing guidelines

Handouts

· If you give out copies of your lecture slides or notes, go out of your way to make sure students are actively engaging with the material. Use the note-taking time you have saved to build in student participation and other active learning exercises.

- Handouts can be particularly effective for presenting complex data, detailed material, examples, and diagrams. Focus on material you think there is a good chance students will need to review, especially if they need to apply it in an assignment.

Student Engagement

- In education, student engagement refers to the degree of attention, curiosity, interest, optimism, and passion that students show when they are learning or being taught, which extends to the level of motivation they have to learn and progress in their education. Generally speaking, the concept of "student engagement" is predicated on the belief that learning improves when students are inquisitive, interested, or inspired, and that learning tends to suffer when students are bored, dispassionate, disaffected, or otherwise "disengaged." Stronger student engagement or improved student engagement are common instructional objectives expressed by educators.
- https://www.edglossary.org/student-engagement/

Student Engagement Factors

- "…intellectual, emotional, behavioral, physical and social factors…"
- Non-cognitive skills
  - Motivation, interest, curiosity, responsibility, determination, perseverance, attitude, work habits, self-regulation, social skills
- Influence cognitive learning results
  - Academic performance, exams scores, recall, etc.

Student Engagement Axes

- Intellectual engagement
  - Assignments, projects
- Emotional engagement
  - Welcoming learning environments, mental health services, peer mentoring
- Behavioral engagement
  - Applies mostly to younger students
  - Seating requests, attendance/participation points
- Physical Engagement
  - Small group discussions, outside lecture/discussion
  - Presentations
  - Hard in university lecture environment, easier in labs
- Social Engagement
  - Group projects, discussion boards, (friendly) contests
  - Field trips
- Cultural Engagement
  - University and School level affinity groups

Student Engagement in CS

- In lecture
  - Good lecture practices: pacing, questions, breaks
  - Demos (easy in coding classes)
  - Activities (easier in labs)
  - Narratives (tell stories, especially if you have practical experiences)
  - Computer history asides
  - Industry connections
  - Humor (it's hard!)

Student Engagement outside of lecture

- Relevant and skill-level appropriate assignments/projects
- “Fun” labs
- Quick responses to student enquires
  - Discussion board
  - Lots of help from TAs
- Quick turn-around on grading assignments/labs
- Optional readings
- Extra/co curricular activities (clubs)

How to measure student engagement?

- Attendance?
- Academic performance?
  - Assignment completion ratios?
- End of semester course reviews?
- Direct surveys?
- Not easy to quantify/measure
  - In large classes engagement will vary from 0 – 110%