Lecture Slide Design: Evidence Based Practices
By Bev Bramble, Instructional Designer, UNB Centre for Enhanced Teaching and Learning

Students need to interact with the material in order to “encode” and “rehearse” the information. Without this it will be very difficult to recall it later. Making your own notes and drawings does this, so make lecture slides available for note taking, handouts should be in a form set up for note-taking, such as 3 slides to a page. This format has pictures of the slide end states on the left and lines for writing on the right. Students are far more likely to remember information from their own notes and drawings than from an instructor’s. They take ownership and customize representation of the content in ways that are meaningful for them and thus memorable.

Slide shows tend to put students into a passive, “entertain me” mode that results in little information retention. Also, if students can get the slides online, many may mistakenly think they have all the important content, and thus will magically be able to retrieve this information for tests and assignments without having to do anything other than read the slides. You need to explain why this won’t work, which is noted in the paragraph immediately above.

Memory works best when information is delivered in 10-minute chunks followed by immediate application (discussion, Q&A, notes consolidation), to help memory formation through consolidation. Consolidation includes figuring out how new information fits with students’ current mental models of the topic and refining those models or creating new ones if none currently exist. (Klemm, 122)

Show only a few slides at a time, limiting content to pictures and diagrams that would take too long to draw on the board, or illustrations that use animation. It is effective to have some slides with no text at all—pictures are far more memorable.

When the instructor draws and writes, it slows things down enough for students to think about it.

Slides can be interactive quizzes that require completion of a diagram, contain movie clips, have links to Web sites, use slide animation features to illustrate the in-between states, not just before and after.

Students can read much more quickly than the presenters can speak. This is why reading text from the screen does not work—it results in “dual channeling” where two primary modes of information absorption (reading and listening) compete with one another so that neither works (Stone, 360). Better to have illustrations and short text summaries or keywords with the details presented in the narration. Ensure that the written key words are the same as the spoken ones, rather than synonyms, to further reduce dissonance.

“To accommodate templates, authors must often distort real conceptual relationships, or consistently violate the template, which invalidates the notion of template” (Stone, 362). Break free from linear
presentations. Hyperlink sets of slides to a menu, then link and move around according to student interest. Chunking breaks relationships between pieces of information. Use the slide show structure to reinforce information structure e.g., a graphic organizer with hot links and returns.

Consider how the PowerPoint structure affects the way students perceive and process the information. The linear structure, page templates and wizards “encourage a vacuous recital of reductive bullet points, while the projected display format minimizes the amount of textual or numeric information that can be communicated” (Cyphert, 185). “Authors trying to express logical relationships that are not similar to the default logic of PowerPoint must invest significant effort into working around the problem, if a work-around can be devised” (Stone 366). Some ideas for overcoming this are presented below.

For disciplines in which mathematical or quantitative application of central ideas is emphasized, instructors often need to repeatedly demonstrate step-by-step examples of how to apply models or churn through certain formulas. Having students see problems being worked out in real time—as they work along with the instructor—is often easily accomplished using other media such as a chalkboard, whiteboard, document camera, or overhead (Burke, 249).

Speak to the students, not the screen. Consider that it is likely students will make an assumption of a positive correlation between the number of slides on a topic and its importance.

Dim lights near the screen to avoid wash-out. Use the light switch system to raise and lower light levels between slide show and application activities.

A good diagram or graph can explain much better than text. However, “…teachers need to ask whether each picture, sound, or video clip furthers student learning or is extraneous fluff” (Rosenthal, 85).

Use visual consistency as an instructional aid (e.g., colours and styles for similar types of content). Avoid using canned templates and clip art. Three colors should be sufficient, however: one for the slide background, one for the text color, and perhaps one accent color.

*Example visual slide that shows content organizational relationships:*
Be careful with publisher-provided slides—some simply replicate textbook examples or just take the chapter headings and subheadings.

Don’t have too many slides in any one class. Don’t let PPT slides become the lecture—they should supplement the lecture. Engage students with the slides by:

- Having slide blanks to fill in.
- Presenting slide content as questions or challenges rather than statements.
- Including open-ended, thought-provoking and brainstorming slides.
- Assigning students to co-lead class lectures.
- Having topic slide summaries and questions to which students indicate their answer selections by hands or coloured cards or clickers.

More practical tips:

**Why high-contrast?**
- Your PC screen is hi-res
  - everything looks great
  - don't trust it!
- big displays “wash out” colors
- always TEST on final equipment
- alter template’s defaults as needed

**Don’t waste bullets**
- use
- no
- more
- than
- 6
- in a list

**Be font savvy**
- Sans serif *good*
  - Arial
  - Arial Black
  - Futura
  - Tahoma
- Serif *bad*
  - Times New Roman
  - Cambria
  - Courier

**Observe the limit**
- words per slide
- max

**Assertion-Visual Evidence approach vs. Title-Bullet Points**
Consider a slide approach of Assertion-Visual Evidence instead of Title-Bullet Points. Two recent studies showed significant improvement in test scores using this method in Computer Science (Wolfe) and Geoscience (Diesel). The assertion-visual evidence approach more readily orients students to the purpose of the slides. Makes it easier to know where topics begin and end (Wolfe). Allows the instructor
to clearly emphasize the most important point of the slide be giving that assertion more emphasis than it would receive in a bulleted list (if it were even there). Visual evidence follows findings from research that students learn better from relevant images coupled with words than from words alone. Also, from images placed close to, and represented simultaneously with, corresponding text. (Diesel, T2G-12)

**Title-Bullet Points Approach ex. 1:**

What Happens When You Learn (as bullet points)

- Short-Term working memory, analogous to Random Access Memory (RAM). Interacts with the learning environment.
- Long-term storage memory, analogous to Read-Only Memory (ROM), that stores items from working memory until needed.
- Short-Term/Long-Term memory interaction can be viewed as “processing,” the work that the computer chip does.
- Human working memory can hold only a few things at a time – seven, on average, plus or minus two. This places narrow constraints on performance and learning capacity.
- Working (Short-Term) memory interacts with the immediate environment. It also processes information and sends it for storage in long-term memory, or retrieves information from there to be used in its interactions with the environment.

**Assertion-Visual Evidence Approach using animations ex. 1: start**

Learning = Creating and modifying schemas (mental models) and storing them in LTM
Assertion - Visual Evidence Approach using animations ex. 1: end

Learning = Creating and modifying schemas (mental models) and storing them in LTM

Working (Short Term) Memory: 7 new items +/- 2; 15-30 sec.

(Very limited capacity)

Going over new information in your mind, trying to connect it meaningfully to your current mental models of topic (retrieved from LTM), refining them, labelling...

Goal of Instruction: to increase/refine schemas in LTM (info retrieved from LTM into WM does not have the capacity and duration limitations of new WM items).

Title - Bullet Points Approach ex. 2:
PowerPoint Hotspot Linking to Create Scenarios
This form of slide deck has an “ill structured” scenario (one in which relevant and irrelevant information is given without indicating which is which) and the response options represent typical reactions, the correct one of which is unclear. The three slides below show only the logic branch for picking response A each time. To create a scenario, first create a logic structure, then design slides for each part and link
them back and forth with hotspots. The slide presentation then involves application, discussion, and deeper learning.

**Scenario setup**

### Half Ton Scenario

It’s the morning of your first day as supervisor of a tree planting crew at Mountain Valley Forestry Co. Since you are the “newbie,” you are given the oldest and most decrepit vehicle to travel to your crew’s worksite, an ancient half ton with over 400,000 Km on it.

You leave the yard and head toward the work site and at the first stop sign, you stand on the brakes and stop half way out into the roadway. The vehicle is obviously unsafe. What do you do?

A. Keep going—I don’t want to start my first day on the job by complaining.
B. Take the half ton back to my boss and tell him it’s unsafe and I refuse to use it.
C. Take the half ton back to my boss, tell him it’s unsafe, and ask him what to do.

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**Further scenario development after selecting response A:**

### Don’t be a wuss.

You have a close call. Now what?

A. Keep going—I don’t want to risk being seen as a wuss or troublemaker.
B. Take the half ton back to my boss and tell him it’s unsafe and I refuse to use it.
C. Take the half ton back to my boss, tell him it’s unsafe, and ask him what to do.
You’re not a wuss, but...

You have an incident in which one of the workers you supervise is injured. He sues you personally as well as the company.

Things to consider:
- You have a responsibility for safety, not your employer only.
- Exercise due diligence—go back and document that there’s a problem.
- According to your rights under the legislation (Safety Act and Occupational Health & Safety Act) you have a right to refuse to work in unsafe conditions.
- Think ahead.
- There’s no one right path.
- Be diplomatic.

End and back takes students back to the first slide so they can try again. This allows students to explore all options and reinforce the best one.

Have several scenarios in one slide deck with a linkable menu:

ECE Harassment

TA SCENARIOS

- Mixed group
- E-mail
- Marks inquiries
References:


