Lesson Design: Preparing for a Class Period
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With material from Heather Macdonald, Rachel Beene, Josh Gabler, and David McConnell

• Elements of lesson design
• Lesson planning activity
• Framework for review

What did your favorite teachers include in their lessons that helped you learn?

One Approach to Lesson Design

Frame the lesson
• Importance
• Prior knowledge
• Goals

Student Activity
• Promotes learning
• Peer interaction
• Time needed?

Organize Lesson
• Outline & review lesson
• Prepare slides & materials
• Practice

Assessment
• Learning goals met?

Student Reflection
• Opportunity to think about their learning

Example verbs for writing lesson goals
(Students will be able to...)

<table>
<thead>
<tr>
<th>Cognitive Dimension (version of Bloom's Taxonomy)</th>
<th>Remember</th>
<th>Understand</th>
<th>Apply</th>
<th>Analyze</th>
<th>Evaluate</th>
<th>Create</th>
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</thead>
<tbody>
<tr>
<td>Facts</td>
<td>list</td>
<td>paraphrase</td>
<td>classify</td>
<td>outline</td>
<td>rank</td>
<td>categorize</td>
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<td>recall</td>
<td>explain</td>
<td>demonstrate</td>
<td>contrast</td>
<td>critique</td>
<td>modify</td>
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<td>estimate</td>
<td>produce</td>
<td>diagram</td>
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<td>give an example</td>
<td>relate</td>
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<td>solve</td>
<td>differentiate</td>
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<td>interpret</td>
<td>discover</td>
<td>infer</td>
<td>predict</td>
<td>actualize</td>
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1. Start your planning

• Importance: Why should students care?
• Prior knowledge: What knowledge do students bring to this lesson (from this course and from other experiences)?
• Goals: What should students know/be able to do by the end of the lesson?

2. Continue your planning

• What activities will be in your lesson?
• How will you assess student learning?
Examples of Interactive Activities

• Project
• Gallery Walk
• Think-pair-share
• Lecture Tutorial
• Debate
• Jigsaw
• Concept Map
• Discussion
• Concept Test (group)
• ...  

http://serc.carleton.edu/NAGTWorkshops/earlycareer/teaching/toolkit.html

3. Outline your lesson

• Beginning – “Hook”
• Middle – interactive activity
• End – students discuss/synthesize/reflect

4. Review your lesson plan

Will students/learners...

— see a clear framework?
— use & be assessed on prior knowledge?
— investigate/explore science through an activity?
— interact with each other?
— reflect on their learning?
— be listened to and responded to?

Review your lesson plan

• Is the framework clear to students?
  (Question of day, outline, learning outcomes, concept map…)
• Does the lesson use/assess prior knowledge?
  (brainstorm, everyday experiences, Concept Test, previous exams…)
• Is there an activity that allows students to explore or investigate?
  (predict, hypothesize, assess, represent/interpret data…)
• Will students interact with each other about course content?
  (Think-pair-share, gallery walk, jigsaw…)
• Are students asked to reflect on their learning?
  (minute paper, concept map, how do you know?…)
• Will you have an opportunity to listen & respond?
  (question-response, listening to discussions, Concept Tests…)

Class Prep as the Blob

• Class prep will expand to fill whatever time you allow it: one more image, one more example...
  — Limit prep to a set time.
• Try not to over-prepare: have confidence!
  — Allows for creative class discussions and unexpected directions
  — Including interactive exercises easier than lecturing
• Powerpoint is not always your friend

Sample lecture notes on surface runoff

• Runoff: infiltration over time curve, when does soil water saturate?
• Infiltration: water content
• Runoff
• Infiltration
• Throughflow
• Baseflow
• Factors affecting permeability
  • Vegetation, subsoil, bedrock,鲷polithic condition, (time, days)
• Soil moisture/overlandflow
• Infiltration
• Channelized flow
• Solution movement of water
• Bed shear stress depends on depth and slope
• τ = gρf
• Positive feedback cycle of channel development
• Discharge: volume per time
• Different ways to measure discharge
  • Area (A) = c
  • Velocity profile (V * H)
  • Smaller and smaller basins
• Hydrograph: depth vs discharge over time
  • Area, duration, peak rate
• Lag time, peak
• Water balance
• Storm, flashy
• flashy flow
• Sheet wash/overland flow
• Rills
• Channelized flow
• Effect of land use change
• Baseflow, and flood flow

4/29/19
5’ Paper: Reflecting on Lesson Design

• What is the most important concept that you learned?

• What aspect of this session was most helpful for your learning?

• How will you approach planning for your next class?