Embedded Assessment

An Essential Tool for Teaching Science for Understanding
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Building Ss' Base of Information
- Learning facts & concepts
- Familiar teacher-centered methods
  - Listening
  - Reading
  - Taking Notes
  - Memorizing
  - Cookbook Labs
- Testing recall of facts & concepts

Developing Understanding
- Making sense/inter-relating concepts
- New methods for active learning
  - Writing to learn
  - Group discussion
  - Presentations
  - Explaining
  - Investigative Labs
- Assessing understanding

Applying Knowledge
- Applying concepts to real problems
  - Even new methods beyond the classroom
  - Practical applications
  - Aid to understanding
  - Aid next learning
  - Explaining applications
  - Solving real problems
- Assessing problem solving/applications

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Embedded Assessment Cycle

- A recurring sequence of actions:
  1. Teaching
  2. Assessing to determine progress toward goals
    - (“What did the students ‘get’ from the lesson?”)
  3. Interpreting results of assessment
    - (“What sense can I make of this information?”)
  4. Determining the next instructional steps
    - (“What do I do now?”)
How do I assess Ss’ Progress toward goals?

• Any and all written work gives valuable info.
  – essay questions, constructed responses, drawings w/ explanations, quizzes, quick-writes, homework, work done in class
• Listening to Ss as they talk
  – As Ss work in groups, answer questions in class, raise questions, look for evidence of Ss’ logic & concepts
• Watching Ss as they work
  – Walk about & observe Ss as they work individually or in groups
• Making notes of what you hear & see!

How do I assess Ss progress toward goals?

• Asking the right questions & giving the right tasks to Ss are essentials
  – Prompt explanation
  – Require Ss to show relationships & connections
  – Ask Ss to make sense or construct meaning
  – e.g., “Use Newton’s second law to show why small cars with small engines are more fuel efficient (attain more km/liter) than larger cars with more powerful engines?”

How do I make sense of data from my students?

• Sometimes you do this immediately in class
  – The logical error or naïve concept is obvious
• Often you need to reflect on it
  – Notes made during class help
    • Recalling what a S or group said or did
  • Knowing common naïve conceptions helps
    – “Oh yes, I recall that many Ss do not make the connection between Mass and the Force needed for Acceleration.”
How do I figure out what the next steps should be when Ss are not there?

- Often reviewing selected anonymous responses from class members is very effective
- Group discussion to determine how to improve each of the answers can be a useful next step

S1: Cars with smaller engines burn less fuel
S2: Smaller cars are easier to accelerate
S3: Small cars require less force that larger ones to achieve an equivalent acceleration

How would you improve each of these answers?

“Use Newton’s second law to show why small cars with small engines are more fuel efficient (attain more km/liter) than larger cars with more powerful engines?”

S1: Cars with smaller engines burn less fuel
S2: Smaller cars are easier to accelerate
S3: Small cars require less force that larger ones to achieve an equivalent acceleration

Another strategy for next actions when Ss don’t reach the goal

- Asking questions but allowing group think-time about possible answers
  - “I am going to ask you a question, but I don’t want an answer right now, I only want you to tell me if you think you can answer it. Here is the question, Why is it that automobiles, not trains, are required to stop at railway crossings?”
  - “Raise your hand if you think you can answer it?”
  - Then group Ss around those who think they can answer the question, let them talk for 4-5 minutes, and then re-ask how many can answer. If several Ss are unsure, repeat small group activity before whole class discussion
Your task

- Using a lesson plan you already have, containing learning goals, assessments, & activities, develop 2 - 3 embedded assessment tasks that will check Ss’ progress toward one goal. (Small Group)
- Be prepared to share your learning goal and tasks with the rest of the group in about 45 minutes. (Whole Group)