



Learning Sciences

Dylan **Wiliam** Center

**The right questions,  
the right way**

Dylan Wiliam



# What is learning?

2

- A change in long-term memory (Kirschner et al., 2006)
- The fact that someone can do something now does not mean they will be able to do it in six weeks, **but**
- If they cannot do something now, it is highly unlikely they will be able to do it in six weeks
- We need to find out what our students have learned



# Unpacking Formative Assessment

3

	Where the learner is going	Where the learner is now	How to get the learner there
Teacher	<b>Clarifying, sharing, and understanding learning intentions</b>	<b>Eliciting evidence of learning</b>	<b>Providing feedback that moves learners forward</b>
Peer		<b>Activating students as learning resources for one another</b>	
Student		<b>Activating students as owners of their own learning</b>	



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4

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# Ways of eliciting evidence of achievement

- Unplanned
  - Noticing
- Planned
  - Assessment
    - An assessment is a procedure for making inferences (Cronbach, 1971)
    - “Summative” and “formative” are descriptions of the kinds of inferences being made
      - Summative: Inferences about current status, or future potential
      - Formative: Inferences about how to improve future learning



# Alternatives to questions (Dillon, 1988)

6

- Declarative statement
  - S: “Republicans believe in privatization.”
  - T: “But most Democrats also believes in privatization.”
- Reflective re-statement
  - S: “Republicans and Democrats believe in privatisation.”
  - T: “So you’re saying that both major political parties believe in privatization.”
- Statement of mind
  - T: “The last two things you said seem contradictory. I don’t see how you can believe in both.”
- Statement of interest
  - T: “I’m interested in hearing a little more about that.”
- Student referral
  - T: “Your views contradict the views of the last speaker.”
- Teacher opinion
  - T: “That certainly has(n’t) been my experience.”



# Alternatives to questions

7

- Student questions
  - speaker question
    - “Can you express your confusion in the form of a question?”
  - class question
    - “Does any one else have a question about what X has been saying?”
  - discussion question
    - “What kinds of questions should we be thinking about now?”
- Signals
  - phatics & fillers
  - pass (to another speaker)
- Silences
  - deliberate
  - non-deliberate



# Principles for good “set-piece” questions

- An interpretable response from every student
- A quick check on understanding, not an extended discussion
- Decision-driven data collection
- Minimize false-positives
  - Distractor-driven multiple-choice questions
  - Multiple correct responses



# An interpretable response from every student

9

Where is the verb in this sentence?

The dog ran across the road



A

B

C

D



# A quick check on understanding

10

## Version 1

Which of these are living?

- A. Rock
- B. Cat
- C. Table
- D. Bird

## Version 2

Which of these are living?

- A. Grass
- B. Bus
- C. Computer
- D. Tree



# Decision-driven data collection

11

Exit pass question: “Explain the difference between mass and weight.”



# Understanding student thinking

12

## Version 1

There are two flights per day from Newtown to Oldtown. The first flight leaves Newtown each day at 9:20am and arrives in Oldtown at 10:55am. The second flight from Newtown leaves at 2:15pm. At what time does the second flight arrive in Oldtown? Show your work.

## Version 2

There are two flights per day from Newtown to Oldtown. The first flight leaves Newtown each day at 9:05am and arrives in Oldtown at 10:55am. The second flight from Newtown leaves at 2:15pm. At what time does the second flight arrive in Oldtown? Show your work.



# Distractor-driven multiple-choice questions

13

Janet was asked to do an experiment to find how long it takes for some sugar to dissolve in water. What advice would you give Janet to tell her how many repeated measurements to take?

- A. Two or three measurements are always enough
- B. She should take 5 measurements
- C. If she is accurate she only needs to measure once
- D. She should go on taking measurements until she knows how much they vary
- E. She should go on taking measurements until she gets two or more the same



# Distractor-driven multiple-choice questions

14

What can we do to preserve the ozone layer?

- A. Reduce the amount of carbon dioxide produced by cars and factories
- B. Reduce the greenhouse effect
- C. Stop cutting down the rainforests
- D. Limit the numbers of cars that can be used when the level of ozone is high
- E. Properly dispose of air-conditioners and fridges



# Distractor-driven multiple-choice questions

15

Which of these is correct?

- A. Its on its way.
- B. It's on its way.
- C. Its on it's way.
- D. It's on it's way.



# Distractor-driven multiple-choice questions

16

Identify the adverbs in these sentences:

1. The boy ran across the street quickly.

(A) (B) (C) (D) (E)

2. Jayne usually crossed the street in a leisurely fashion.

(A) (B) (C) (D) (E)

3. Fred ran the race well but unsuccessfully.

(A) (B) (C) (D) (E)



# Distractor-driven multiple-choice questions

17

- Why are historians concerned with bias when analyzing sources?
- A. People can never be trusted to tell the truth
  - B. People deliberately leave out important details
  - C. People are only able to provide meaningful information if they experienced an event firsthand
  - D. People interpret the same event in different ways, according to their experience
  - E. People are unaware of the motivations for their actions
  - F. People get confused about sequences of events



# Distractor-driven multiple-choice questions

18

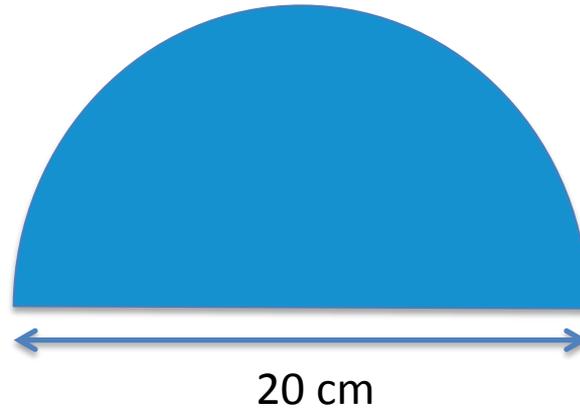
Which of the following is the correct translation for “I give the book to him”?

- A. Yo lo doy el libro.
- B. Yo doy le el libro.
- C. Yo le doy el libro.
- D. Yo doy lo el libro.
- E. Yo doy el libro le.
- F. Yo doy el libro lo.



# Multiple correct responses

19



What is the area of the semi-circle?

- A.  $\frac{\rho \cdot 20}{2}$     B.  $\frac{\rho \cdot 20 \cdot 20}{2}$     C.  $50\rho$     D.  $\frac{\rho \cdot 10 \cdot 10}{2}$     E.  $\frac{\rho}{2} \left( \frac{20}{2} \right)^2$



# Multiple correct responses: Real-time test

20

A. Alliteration

B. Hyperbole

C. Onomatopoeia

D. Personification

E. Simile

1. He was like a bull in a china shop.
2. This backpack weighs a ton.
3. The sweetly smiling sunshine...
4. He honked his horn at the cyclist.
5. He was as tall as a house.



# Design principles, in order of priority

21

1. In no case do students with the right thinking and those with the wrong thinking give you the same response
2. Students with different misconceptions give different responses
3. Students with different correct conceptions give different responses

# Constructing hinge-point questions



# Developing good questions

23

1. Start by identifying a “hinge-point” in a lesson plan—a point where you need to collect evidence from students in order to decide what to do next
2. Identify any relevant misconceptions
  - a. by discussion with colleagues
  - b. by asking the question as an “exit-pass”
3. Develop the question
4. Ask colleagues to look for possible false-positives
5. Trial the question with students, asking them to explain their choices



# EMBEDDING FORMATIVE ASSESSMENT



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# CenterEd

Embedding Formative Assessment



Issue 3: February 2015

**The closer the formative assessment is to your instruction, the bigger the impact on student achievement.**

**Why I wrote my new book**

My [latest book](#), written with Siobhán Leahy, is designed specifically to help individual teachers who want to develop their practice of formative assessment on their own or with small groups of colleagues. In this blog, I provide some suggestions for practical techniques you can try in your classroom right now. Next month, I'll focus on tips and strategies for how you can work with others to gain support for the difficult work of changing practice.

**Technique 1: Start with samples of work, rather than rubrics, to communicate quality**

As an adult in the professional world, if someone were to ask you to write a business plan or create a product brochure and the task was somewhat unfamiliar to you, what's the first thing you might do to get help? Perhaps you would search the Internet for examples of business plans or product brochures that other professionals have created.

As you examine these examples, you might be able to pick out the high-quality vs. low-quality ones, and even identify why you think this is so. Viewing samples of work in this way can help you as you create your own piece of work and, hopefully, result in a higher-quality product than if you had just started from scratch.

While rubrics have a role to play in your classroom, we believe they are best regarded as the culmination of a developmental process that begins with examination of samples of students' work. So, before your students do a laboratory report, before they write a ghost story, spend some time getting them to look at other students' attempts at similar tasks.

Some teachers believe that it is wasteful to take time that students could be generating their own work to look at the work of others, but there are two immediate benefits of getting students to look at samples of student work. First, we are all better at spotting mistakes in the work of others than we are in our own work. Second, when we notice mistakes in the work of others, we are less likely to make the same mistakes in our own work.

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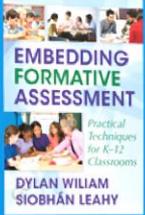
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**Embedding Formative Assessment: Practical Techniques for K-12 Classrooms**



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**Questions?**



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**Thank you**