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Learning**
Conference

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PROFESSOR DYLAN WILIAM

FRIDAY 18 MAY
One-Day Institute

Embedding Formative Assessment Institute

MELBOURNE

PROFESSOR DYLAN WILIAM

Professor Dylan Wiliam is emeritus professor of educational assessment at University College London. In a varied career, he has taught in urban public schools, directed a large-scale testing program, served a number of roles in university administration, authored numerous books, and pursued a research program focused on supporting teachers to develop their use of assessment in support of learning.



As one of the United Kingdom's leading experts on assessment, Dylan has an extensive history of research and consultation in this area. His recent work has focused on the use of assessment to support learning, which is sometimes called formative assessment. He was the coauthor, with Paul Black, of a major review of the research evidence on formative assessment, and he has worked with many groups of teachers across the globe on developing formative assessment practices.

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Embedding formative assessment with teacher learning communities


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Overview: Science and Design

- 2
- We need to improve student achievement
- This requires improving teacher quality
- Improving the quality of entrants takes too long
- So we have to make the teachers we have better **Science**
- We can change teachers in a range of ways
- Some will benefit students, and some will not
- Those that do involve changes in teacher practice
- Changing practice requires new kinds of teacher learning **Design**
- And new models of professional development

Raising achievement matters

- 3
 - For individuals:
 - ▣ Increased lifetime salary
 - ▣ Improved health
 - ▣ Longer life
 - For society:
 - ▣ Lower criminal justice costs
 - ▣ Lower healthcare costs
 - ▣ Increased economic growth
 - Net present value to Australia of a 25-point increase on PISA: AU\$5.6 trillion (Hanushek & Woessman, 2015)
 - Net present value Australia of getting all students to 420 on PISA: AU\$2 trillion
- 

The coming war for jobs (Clifton, 2011)

- Right now
 - ▣ 7 billion people on earth
 - ▣ 5 billion adults
 - ▣ 3 billion people who want to work
 - ▣ 90% of these want to work full time
- As a consequence
 - ▣ 2.7 billion full-time formal jobs are wanted
 - ▣ with only 1.2 billion full-time formal jobs available
- A shortfall of 1.5 billion jobs
- Or, to put it another way, for every Australian worker, there are 125 people on the planet who would like their job...



The world of work is changing

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Which kinds of skills are disappearing fastest from the workplace?

	Skill category
A	Complex communication
B	Expert thinking/problem solving
C	Non-routine manual
D	Routine cognitive
E	Routine manual

Autor, Levy and Murnane (2003)



Employment change by job type: 2002-2014

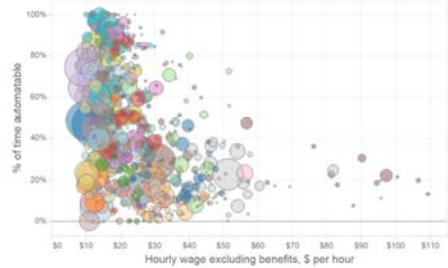
Organisation for Economic Cooperation and Development (2016)



Automation potential and wages for US jobs

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US employment by hourly wage and potential for automation based on current technology, bubble size = number of workers



McKinsey & Co (2015)



Why we need to raise achievement

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- In advanced economies, over the next 20 to 30 years
 - ▣ Between a quarter and a third of jobs could be offshored (Blinder, 2011)
 - ▣ About half could be done by machines (Frey & Osborne, 2013; McKinsey & Co., 2015)



There is only one 21st century skill

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So the model that says learn while you're at school, while you're young, the skills that you will apply during your lifetime is no longer tenable. The skills that you can learn when you're at school will not be applicable. They will be obsolete by the time you get into the workplace and need them, except for one skill. The one really competitive skill is the skill of being able to learn. It is the skill of being able not to give the right answer to questions about what you were taught in school, but to make the right response to situations that are outside the scope of what you were taught in school. We need to produce people who know how to act when they're faced with situations for which they were not specifically prepared. (Papert, 1998)



Successful education?

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The test of successful education is not the amount of knowledge that a pupil takes away from school, but his appetite to know and his capacity to learn. If the school sends out children with the desire for knowledge and some idea how to acquire and use it, it will have done its work. Too many leave school with the appetite killed and the mind loaded with undigested lumps of information. The good schoolmaster is known by the number of valuable subjects that he declines to teach.

The Future in Education (Livingstone, 1941 p. 28)



Pause for reflection

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- What's the most interesting, surprising, or challenging thing you have heard so far?
- See if you can get consensus on your table



Formative assessment: what it is and what it isn't; when it works and when it doesn't

Dylan Wiliam

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Why Strategic Formative Assessment?

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- A principle and an uncomfortable fact about the world
 - ▣ The principle:
 - "If I had to reduce all of educational psychology to just one principle, I would say this: The most important single factor influencing learning is what the learner already knows. Ascertain this and teach him [or her] accordingly" (Ausubel, 1968 p. vi)
 - ▣ The uncomfortable fact:
 - Students do not learn what we teach.
 - ▣ What is learning?
 - Learning is 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



Building Plan "B" into Plan "A"

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Relevant studies

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- | | |
|---------------------------------|--------------------------------|
| □ Fuchs and Fuchs (1986) | □ Elshout-Mohr (1994) |
| □ Natriello (1987) | □ Brookhart (2004) |
| □ Crooks (1988) | □ Allal and Lopez (2005) |
| □ Bangert-Drowns, et al. (1991) | □ Köller (2005) |
| □ Kluger and DeNisi (1996) | □ Brookhart (2007) |
| □ Black and Wiliam (1998) | □ Wiliam (2007) |
| □ Nyquist (2003) | □ Hattie and Timperley (2007) |
| □ Dempster (1991) | □ Shute (2008) |
| □ Dempster (1992) | □ Kingston & Nash (2011, 2015) |



Which of these are formative?

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- A. A district science supervisor uses test results to plan professional development workshops for teachers
- B. Teachers doing item-by-item analysis of 5th grade math tests to review their 5th grade curriculum
- C. A school tests students every 10 weeks to predict which students are “on course” to pass the end-of-year exam
- D. “Three-quarters of the way through a unit” test
- E. Students who fail a test on Friday have to come back on Saturday
- F. Exit pass question: “What is the difference between mass and weight?”
- G. “Sketch the graph of y equals one over one plus x squared on your mini-white boards.”



The formative assessment hijack

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- Long-cycle:
 - Span: across units, terms
 - Length: four weeks to one year
 - Impact: student monitoring; curriculum alignment
- Medium-cycle:
 - Span: within and between teaching units
 - Length: one to four weeks
 - Impact: improved, student-involved assessment; teacher cognition about learning
- Short-cycle:
 - Span: within and between lessons
 - Length:
 - day-by-day: 24 to 48 hours
 - minute-by-minute: five seconds to two hours
 - Impact: classroom practice; student engagement



Unpacking formative assessment

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	Where the learner is going	Where the learner is	How to get there
Teacher	Clarifying, sharing and understanding learning intentions	Engineering effective discussions, tasks, and activities that elicit evidence of learning	Providing feedback that moves learners forward
Peer		Activating students as learning resources for one another	
Learner		Activating students as owners of their own learning	

And one big idea


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	Where the learner is going	Where the learner is	How to get there
Teacher	Using evidence of achievement to adapt what happens in classrooms to meet learner needs		
Peer			
Learner			

An educational positioning system

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- A good teacher:
 - ▣ Establishes where the students are in their learning
 - ▣ Identifies the learning destination
 - ▣ Carefully plans a route
 - ▣ Begins the learning journey
 - ▣ Makes regular checks on progress on the way
 - ▣ Makes adjustments to the course as conditions dictate



Strategies and practical techniques for classroom formative assessment

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Clarifying, sharing and understanding learning intentions


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Sharing learning intentions

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- 3 teachers each teaching 4 Year 8 science classes in two US schools
- 14 week experiment
- 7 two-week projects, each scored 2-10
- All teaching the same, except:
 - For a part of each week
 - Two of each teacher's classes discuss their likes and dislikes about the teaching (control group)
 - The other two classes discuss how their work will be assessed (experimental group)

White and Frederiksen (1998)




Sharing learning intentions

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Group	Comprehensive Test of Basic Skills		
	Low	Middle	High
Likes and dislikes (control group)	4.6	5.9	6.6
Reflective assessment (experimental group)			

Who benefits most from reflective assessment?

1. Low achievers
2. Average students
3. High achievers
4. All students benefit equally



Share learning intentions

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- Explain learning intentions at start of lesson/unit:
 - ▣ Learning intentions
 - ▣ Success criteria
- Consider providing learning intentions and success criteria in students' language
- Use posters of key words to talk about learning:
 - ▣ E.g., describe, explain, evaluate
- Use planning and writing frames judiciously
- Use annotated examples of different standards to "flesh out" assessment rubrics (e.g., lab reports).
- Provide opportunities for students to design their own tests.



Engineering effective discussions, activities, and classroom tasks that elicit evidence of learning

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Kinds of questions: Israel

Which fraction is the smallest? a) $\frac{1}{6}$, b) $\frac{2}{3}$, c) $\frac{1}{3}$, d) $\frac{1}{2}$.

Success rate 88%

Which fraction is the largest? a) $\frac{4}{5}$, b) $\frac{3}{4}$, c) $\frac{5}{8}$, d) $\frac{7}{10}$.

Success rate 46%; 39% chose (b)

Vinner (1997)



Eliciting evidence

- Key idea: questioning should
 - ▣ cause thinking
 - ▣ provide data that informs teaching
- Improving teacher questioning
 - ▣ generating questions with colleagues
 - ▣ low-order vs. high-order not closed vs. open
 - ▣ appropriate wait-time
- Getting away from I-R-E
 - ▣ basketball rather than serial table-tennis
 - ▣ ‘No hands up’ (except to ask a question)
 - ▣ ‘Hot Seat’ questioning
- All-student response systems
 - ▣ ABCD cards, “show-me” boards, exit passes



Eliciting evidence: Kinds of questions

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Questioning in science: Discussion

Ice-cubes are added to a glass of water. What happens to the level of the water as the ice-cubes melt?

- A. The level of the water drops
- B. The level of the water stays the same
- C. The level of the water increases
- D. You need more information to be sure



Questioning in science: Diagnosis (2)

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Version 1

Which of these are living?

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

Version 2

Which of these are living?

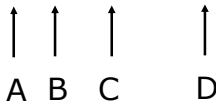
- A. Grass
- B. Bus
- C. Computer
- D. Tree



Questioning in English: Diagnosis (1)

Where is the verb in this sentence?

The dog ran across the road



Questioning in English: Diagnosis (2)

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.



Questioning in English: Diagnosis (3)

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)



Hinge questions

- A hinge question is based on the important concept in a lesson that is critical for students to understand before you move on in the lesson.
- The question should fall about midway during the lesson.
- Every student must respond to the question within two minutes.
- You must be able to collect and interpret the responses from all students in 30 seconds



What psychology tells us about learning

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- Review of the research on techniques that help students learn better
- Focus on techniques that are relatively easy to use
- Evaluation in terms of generalizability of findings across
 - ▣ different material to be learned
 - ▣ different learning conditions
 - ▣ different kinds of student
 - ▣ different measures of learning

Dunlosky, Rawson, Marsh, Nathan, and Willingham (2013)




1. Elaborative interrogation	Generating an explanation for why an explicitly stated fact or concept is true
2. Self-explanation	Explaining how new information is related to known information, or explaining steps taken during problem solving
3. Summarization	Writing summaries (of various lengths) of to-be-learned texts
4. Highlighting/underlining	Marking potentially important portions of to-be-learned materials while reading
	Using keywords and mental imagery to associate verbal materials
	Attempting to form mental images of text materials while reading or listening
7. Rereading	Restudying text material again after an initial reading
	Self-testing or taking practice tests over to-be-learned material
9. Distributed practice	Implementing a schedule of practice that spreads out study activities over time
10. Interleaved practice	Practice that mixes different kinds of problems, or study that mixes different kinds of material, within a single study session

“The new theory of disuse”

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- An item in memory is characterized by
 - ▣ Storage strength
 - how well learned an item is
 - can only increase
 - ▣ Retrieval strength
 - how easy an item is to retrieve at a particular time
 - goes up and down

Bjork (1992) 

Storage strength and retrieval strength

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		Storage strength	
		Low	High
Retrieval strength	Low	Credit card number	First license plate number
	High	Current parking space number	Date of birth



How memory really works

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- Storage strength and retrieval strength are increased by
 - ▣ Re-studying an item
 - ▣ Retrieving it from memory
 - ▣ Retrieval has a greater impact than re-study
- Retrieval and re-study increase:
 - ▣ storage strength more when retrieval strength is low
 - ▣ retrieval strength more when
 - retrieval strength is low
 - storage strength is high
- Learners need “desirable difficulties” in learning

Bjork (1992) 

Which of these consistently improves learning?


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1. Elaborative interrogation
2. Self-explanation
3. Summarization
4. Highlighting/underlining
5. Keyword mnemonic
6. Imagery for text
7. Rereading
8. Practice testing
9. Distributed practice
10. Interleaved practice



Real-time test: Figurative language

<ul style="list-style-type: none">A. AlliterationB. HyperboleC. OnomatopoeiaD. PersonificationE. Simile	<ol style="list-style-type: none">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.
---	--



Providing feedback that moves learners forward

Kinds of feedback: Israel

- 264 low and high ability grade 6 students in 12 classes in 4 schools; analysis of 132 students at top and bottom of each class
- Same teaching, same aims, same teachers, same classwork
- Three kinds of feedback: grades, comments, grades+comments

	Achievement	Attitude
Grades	no gain	High scorers: positive Low scorers: negative
Comments	30% gain	High scorers: positive Low scorers: positive

Butler (1988)

Responses

	Achievement	Attitude
Grades	no gain	High scorers: positive Low scorers: negative
Comments	30% gain	High scorers: positive Low scorers: positive

What happened for students given both grades and comments?

- A. Gain: 30%; Attitude: all positive
- B. Gain: 30%; Attitude: high scorers positive, low scorers negative
- C. Gain: 0%; Attitude: all positive
- D. Gain: 0%; Attitude: high scorers positive, low scorers negative
- E. Something else

Kinds of feedback: Israel (2)

- 200 grade 5 and 6 Israeli students
- Divergent thinking tasks
- 4 matched groups
 - ▣ experimental group 1 (EG1); comments
 - ▣ experimental group 2 (EG2); grades
 - ▣ experimental group 3 (EG3); praise
 - ▣ control group (CG); no feedback
- Achievement
 - ▣ $EG1 > (EG2 \approx EG3 \approx CG)$
- Ego-involvement
 - ▣ $(EG2 \approx EG3) > (EG1 \approx CG)$

Butler (1987)



Effects of feedback

- Kluger & DeNisi (1996) review of 3000 research reports
- Excluding those:
 - ▣ without adequate controls
 - ▣ with poor design
 - ▣ with fewer than 10 participants
 - ▣ where performance was not measured
 - ▣ without details of effect sizes
- left 131 reports, 607 effect sizes, involving 12652 individuals
- On average, feedback increases achievement
 - ▣ Effect sizes highly variable
 - ▣ 38% (231 out of 607) of effect sizes were negative



Getting feedback right is hard

Response type	Feedback indicates performance...	
	falls short of goal	exceeds goal
Change behavior	Increase effort	Exert less effort
Change goal	Reduce aspiration	Increase aspiration
Abandon goal	Decide goal is too hard	Decide goal is too easy
Reject feedback	Feedback is ignored	Feedback is ignored



Discussion question

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Discussion

- What are the obstacles to introducing more effective forms of feedback?



Engagement and learning

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- Attribution (Dweck, 2000)
 - ▣ Personalization (internal vs. external)
 - ▣ Permanence (stable vs. unstable)
 - ▣ Good learners attribute failure and success to internal, unstable causes. (It's down to you, and you can do something about it.)



"Ability": Fixed or malleable?

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- 'Mindset' (Dweck, 2000)
 - ▣ Implicit theory of intelligence
 - "Some believe that intelligence is more of an unchangeable, fixed "entity" (an entity theory). Others think of intelligence as a malleable quality that can be developed (an incremental theory)." (Blackwell, Dweck, & Trzesniewski, 2007 p. 247)
 - ▣ Issues
 - Impact on student achievement not significant ($0.05 < p < 0.10$)
 - Results have never been replicated (despite at least 3 attempts)
 - No examples of schools changing their own students' mindsets
 - ▣ But,
 - None of this matters if we ignore Dweck and just focus on getting students to believe that "Smart is not something you just are, smart is something you can get" (Howard, 1991 p. 7)



Dual-pathway theory (Boekaerts, 2006)

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- Long-term learning goals are translated into short-term learning intentions
- Dynamic comparisons of task and situational demands with personal resources, taking into account:
 - ▣ Current perceptions of the task
 - ▣ Beliefs about the subject or task
 - ▣ Beliefs about “ability” and the role of effort in the subject
 - ▣ Interest in the subject (personal vs. situational)
 - ▣ Previous experiences on similar tasks
 - ▣ Costs and benefits



Dual-pathway theory

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- Resulting activation of energy along one of two pathways:
 - ▣ Well-being
 - ▣ Growth



Discussion question

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Discussion

- How can feedback be designed so that feedback leads to a focus on growth, rather than well-being?



Provide feedback that moves learning on

- Key idea: feedback should:
 - Cause thinking
 - Provide guidance on how to improve
- Comment-only marking
- Focused marking
- Explicit reference to mark-schemes/rubrics
- Suggestions on how to improve:
 - Not giving complete solutions
- Re-timing assessment:
 - E.g., three-quarters-of-the-way-through-a-unit test



Activating students as learning resources for one another

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Cooperative learning: a research success story

- Two essential components
 - Group goals:
 - so students are working *as* a group, not just *in* a group
 - Individual accountability:
 - the best learning efforts of every member of the group must be necessary for the group to succeed, and
 - the performance of each group member must be clearly visible and quantifiable to the other group members

Slavin, Hurley and Chamberlain (2003)



How does cooperative learning work?

- Four mechanisms
 - ▣ Motivation: students help their peers to learn because, in well-structured cooperative learning settings, it is in their own interests to do so, and so effort is increased;
 - ▣ Social cohesion: students help their peers because they care about the group, again leading to increased effort;
 - ▣ Personalization: students learn more because more able peers can engage with the particular difficulties a student is having;
 - ▣ Cognitive elaboration: those who provide help in group settings are forced to think through the ideas more clearly.

Slavin, Hurley and Chamberlain (2003)



Help students be learning resources

- Students assessing their peers' work:
 - ▣ "Pre-flight checklist"
 - ▣ "Two stars and a wish"
 - ▣ Choose-swap-choose
 - ▣ Daily sign-in
- Training students to pose questions/identifying group weaknesses
- End-of-lesson students' review



Activating students as owners of their own learning

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Help students own their own learning

- Students assessing their own work:
 - ▣ With rubrics
 - ▣ With exemplars
- Self-assessment of understanding:
 - ▣ Learning portfolio
 - ▣ Traffic lights
 - ▣ Red/green discs
 - ▣ Coloured cups
 - ▣ Plus/minus/interesting



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I know that we would have to regroup. Alina

I know how to do Plus and minus because we have been doing it for a long time.

I think because for 4 years ago I did I think I really know that adding is combining the two numbers in the column.

I think I am good at the partial sums method.

I get it when you cross out a number and make it a new one. Emma

I know when you can't - from both columns you go to the third column and take that from it. Olivia

I know when my answer is right the highest estimate is close to the answer. Prithvi



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Tina still has a bit of trouble about subtraction regrouping. Maybe I am a little confused about ball park estimates.

I get confused because sometimes I don't get the problem. Frankie

I am confused when you subtract really big numbers like 1000 something. Tim. I am a little bit confused about regrouping. Tom

I am confused about a little bit about subtraction regrouping.

I am a little confused about the regrouping stuff. Emily

Minus is confusing because when you have to regroup twice. Alina

Minus is a little bit hard when you have to regroup. Sam


I don't understand when you borrow which column to borrow from when both are 0. Olivia

I am still confused about showing what I did to solve the problem. Brendan

I am a little confused about when you need to subtract. Emma




interesting...
 Carry the number over to the next number. *Juliana*
 It's interesting how some people go to the nearest number while others go to the roundest. *Meaghan*
 It's interesting how some have to re-group twice.
 It is interesting sometimes how you have to regroup. *Diana*
 It's pretty interesting about how you have to really work hard. *Frankie*
 I am interested in borrowing because I didn't just get it yet I want to really get to know it. *Jon*
 I find it weird that you could just keep going from colome to colome when you need to borrow. *Olivia*
 On the ball park estimate it is ~~easy~~ easy but some times confusing. *hally*
 I really think that regrouping is really amusing.
 It is cool how addition and subtraction regrouping is just moving numbers and you could get it right easly.




+/-/interesting: responses for “+”

- I got that ball-park estimates are supposed to be simple
- I know that you have to look at it and say “OK”
- I know that when I am adding the number I end up with must be bigger than the one I started at
- I get most of the problems
- It was easy for me because on the first one it says 328 so I took the 2 and made it a 12
- I know that we would have to regroup
- I know how to do plus and minus because we have been doing it for a long time
- I get it when you cross out a number and make it a new one
- I know that when you can't – from both colomes you go to the third colome and take that from it
- I know that when my answer is right the ball park estimate is close to it



+/-/interesting: responses for “-”

- I am still a tiny bit confused about subtraction regrouping
- I am a little bit confused about ball park estimates
- I get confused because sometimes I don't get the problem
- I am confused when you subtract really big numbers like 1,000 something
- I'm still a little bit confused about regrouping
- Minus is confusing when you have to regroup twice
- Minus is a little bit hard when you have to regroup
- I don't understand when you borrow which colome you borrow from when both are 0
- I am still confused about showing what I did to solve the problem
- I am a little confused about when you need to subtract



+/-/interesting: responses for "interesting"

- Carrying the number over to the next number
- It's interesting how some people go to the nearest hundred while some go to the nearest ten
- It's interesting how some have to regroup twice
- It's pretty interesting about how you have to work really hard
- I am interested in borrowing because I didn't just get it yet. I want to really get to know it
- I find it weird that you could just keep going from colome to colome when you need to borrow
- On the ball park estimate it is easy but sometimes hard
- I really think that regrouping is pretty amazing
- It is cool how addition and subtraction regrouping is just moving numbers and you could get it right easily



Self-assessment in the early years

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All ready for action in year four...

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Tell me about you...



IKEA mats...



Technique review


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So much for the easy bit

A model for teacher learning

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- Content, then process
- Content (what we want teachers to change):
 - ▣ Evidence
 - ▣ Ideas (strategies and techniques)
- Process (how to go about change):
 - ▣ Choice
 - ▣ Flexibility
 - ▣ Small steps
 - ▣ Accountability
 - ▣ Support




Teacher learning communities

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- We need to create time and space for teachers to reflect on their practice in a structured way, and to learn from mistakes.
(Bransford, Brown & Cocking, 1999)
- “Always make new mistakes.”
—Esther Dyson
- “Ever tried. Ever failed. No matter. Try again. Fail again. Fail better.”
(Beckett, 1984)



Teacher learning communities

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- Plan that the TLC will run for two years.
- Identify 10 to 12 interested colleagues:
 - Composition:
 - Similar assignments (e.g., early years, math/science)
 - Mixed subject/mixed phase
 - Hybrid
 - Secure institutional support for:
 - Monthly meetings (75–120 minutes each, inside or outside school time)
 - Time between meetings (two hours per month in school time):
 - Collaborative planning
 - Peer observation
 - Any necessary waivers from school policies



A “signature pedagogy” for teacher learning

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- Every monthly TLC meeting should follow the same structure and sequence of activities:
 - ▣ Activity 1: Introduction (5 minutes)
 - ▣ Activity 2: Starter activity (5 minutes)
 - ▣ Activity 3: Feedback (25–50 minutes)
 - ▣ Activity 4: New learning about formative assessment (20–40 minutes)
 - ▣ Activity 5: Personal action planning (15 minutes)
 - ▣ Activity 6: Review of learning (5 minutes)



Every TLC needs a leader

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- The job of the TLC leader(s):
 - ▣ To ensure that all necessary resources (including refreshments!) are available at meetings
 - ▣ To ensure that the agenda is followed
 - ▣ To maintain a collegial and supportive environment
- But most important of all:
 - ▣ It is not to be the formative assessment “expert.”



Peer observation

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- Run to the agenda of the observed, not the observer:
 - ▣ Observed teacher specifies focus of observation:
 - E.g., teacher wants to increase wait time.
 - ▣ Observed teacher specifies what counts as evidence:
 - Provides observer with a stopwatch to log wait times.
 - ▣ Observed teacher owns any notes made during the observation.



Summary

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- Raising achievement is important.
- Raising achievement requires improving teacher quality.
- Improving teacher quality requires teacher professional development.
- To be effective, teacher professional development must address:
 - ▣ What teachers do in the classroom
 - ▣ How teachers change what they do in the classroom
- Formative assessment + teacher learning communities:
 - ▣ A point of (uniquely?) high leverage
 - ▣ A “Trojan horse” into wider issues of pedagogy, psychology, and curriculum



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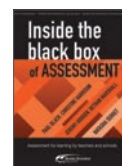
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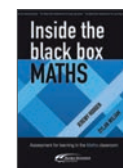
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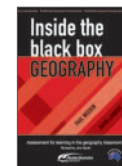
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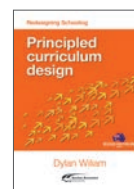
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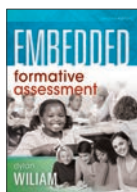
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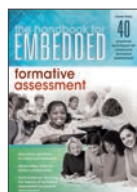
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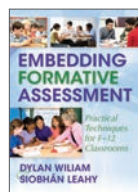
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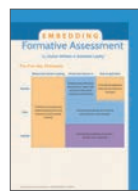
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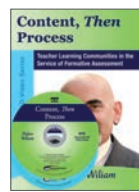
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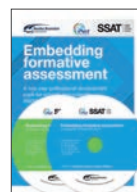
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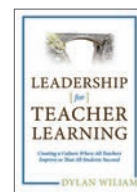
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