Embedding formative assessment with teacher learning communities

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Overview: Science and Design

- 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
- 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
- And new models of professional development
Raising achievement matters

- For individuals:
  - Increased lifetime salary (Hanushek, 2005)
  - Improved health (OECD, 2010)
  - Longer life (Lleras-Muney, 2005)

- For society:
  - Lower criminal justice costs (Levin et al., 2007)
  - Lower healthcare costs (Levin et al., 2007)
  - Increased economic growth (Hanushek & Woessman, 2015)
    - Net present value to the U.S. of a 25-point increase on PISA: $62 trillion (3 times the National Debt)
    - Net present value to the U.S. of getting all students to 420 on PISA: $29 trillion
What is the purpose of education?

• Four main philosophies of education/development
  – Personal empowerment
  – Cultural transmission
  – Preparation for citizenship
  – Preparation for work

• All are important

• Any education system is a (sometimes uneasy) compromise between these four forces
The world of work is changing

Which kinds of skill are disappearing fastest from the workplace?

<table>
<thead>
<tr>
<th>Skill category</th>
</tr>
</thead>
<tbody>
<tr>
<td>A  Complex communication</td>
</tr>
<tr>
<td>B  Expert thinking/problem solving</td>
</tr>
<tr>
<td>C  Non-routine manual</td>
</tr>
<tr>
<td>D  Routine cognitive</td>
</tr>
<tr>
<td>E  Routine manual</td>
</tr>
</tbody>
</table>

Autor, Levy and Murnane (2003)
Automation potential and wages for US jobs

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

Why we need to raise achievement

• 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 of all jobs could be done by machines (Frey & Osborne, 2013)
• This does not mean there won’t be enough jobs
  – There will be jobs for everyone who wants them
  – The question is what kinds of jobs...
Pause for reflection

• What’s the most interesting, surprising, or challenging thing you have heard so far?
• See if you can get consensus with your neighbors
Why formative assessment needs to be a priority
Why Strategic Formative Assessment?

• 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”
Relevant studies

• Fuchs & Fuchs (1986)
• Natriello (1987)
• Crooks (1988)
• Bangert-Drouns et al. (1991)
• Dempster (1991, 1992)
• Elshout-Mohr (1994)
• Kluger & DeNisi (1996)
• Black & Wiliam (1998)
• Nyquist (2003)
• Allal & Lopez (2005)
• Köller (2005)
• Brookhart (2007)
• Wiliam (2007)
• Hattie & Timperley (2007)
• Shute (2008)
• Kingston & Nash (2011, 2015)
Formative Assessment: A contested term

<table>
<thead>
<tr>
<th>Span</th>
<th>Long-cycle</th>
<th>Medium-cycle</th>
<th>Short-cycle</th>
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<tbody>
<tr>
<td>Across</td>
<td>Within and between teaching units</td>
<td>Within and between teaching units</td>
<td>Within and between lessons</td>
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<tr>
<td>terms</td>
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<td>teaching</td>
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<tr>
<td>units</td>
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<tr>
<td>Four</td>
<td>One to four weeks</td>
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<tr>
<td>weeks</td>
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<td>Minute-by-minute and day-by-day</td>
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<td>to</td>
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<td>one year</td>
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<td>Monitoring</td>
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<tr>
<td>Engagement</td>
<td></td>
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<tr>
<td>responsiveness</td>
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Across terms, teaching units

One to four weeks

Minute-by-minute and day-by-day
## Unpacking Formative Assessment

<table>
<thead>
<tr>
<th></th>
<th>Where the learner is going</th>
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<th>How to get the learner there</th>
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<tr>
<td><strong>Teacher</strong></td>
<td>Clarifying, sharing, and understanding learning intentions</td>
<td>Eliciting evidence of learning</td>
<td>Providing feedback that moves learners forward</td>
</tr>
<tr>
<td><strong>Peer</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Student</strong></td>
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<td>Activating students as learning resources for one another</td>
<td>Activating students as owners of their own learning</td>
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**Unpacking Formative Assessment**

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Using evidence of achievement to adapt what happens in classrooms to meet learner needs.
An educational positioning system

• 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
Clarifying, sharing and understanding learning intentions
Sharing learning intentions

• Three teachers each teaching four 7th grade 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 discusses their likes and dislikes about the teaching (control)
  – The other two classes discusses how their work will be assessed (experimental)

White and Frederiksen (1998)
Sharing learning intentions

<table>
<thead>
<tr>
<th>Group</th>
<th>Comprehensive Test of Basic Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
</tr>
<tr>
<td>Likes and dislikes (control group)</td>
<td>4.6</td>
</tr>
<tr>
<td>Reflective assessment (experimental group)</td>
<td></td>
</tr>
</tbody>
</table>

Who benefits most from reflective assessment?

1. Low achievers
2. Average students
3. High achievers
4. All students benefit equally
Learning intentions and success criteria

• In general, it is a good idea that students know where they are going

• But,
  – It is not always possible
  – It is not always advisable
  – It is hard to do well
Sometimes, you want all students to learn the same thing
   - Goal-directed teaching
     - Key aim: all students reach the same understanding

Sometimes it is OK when students learn different things
   - Horizon-directed teaching
     - Key aim: all students learn something of value in the subject
A standard middle school math problem...

- Two farmers have adjoining fields with a common boundary that is not straight, which is inconvenient for plowing.

- How can they divide the two fields so that the boundary is straight, but the two fields have the same area as they had before?
How many rectangles?

\[
m(m - 1) \quad \frac{n(n - 1)}{2}
\]
Share learning intentions

• 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
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 (initiation-response-evaluation)
  - basketball rather than serial table-tennis
  - ‘No hands up’ (except to ask a question)
  - ‘Hot Seat’ questioning
Hot seat questioning - Chloe
Case study: maths
Eliciting evidence

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• All-student response systems
  – ABCD cards, “show-me” boards, exit passes
Eliciting evidence:
Kinds of questions
Look at the following sequence:
3, 7, 11, 15, 19, ....

Which is the best rule to describe the sequence?

A. $n + 4$
B. $3 + n$
C. $4n - 1$
D. $4n + 3$
Principles of diagnostic questioning

1. A response from every student
   - ABCD cards, mini-white boards, exit passes

2. Quick checks on understanding, not extended discussions

3. Decision-driven data-collection

4. The right response means the right thinking
   - Distractor-driven multiple-choice questions
   - Multiple correct responses
What can you say about the means of the following two data sets?

Set 1: {10, 12, 13, 15}
Set 2: {10, 12, 13, 15, 0}

A. The two sets have the same mean.
B. The two sets have different means.
C. It depends on whether you choose to count the zero.
What is the median of the following numbers?

38  74  22  44  96  22  19  53

A. 22
B. 38 and 44
C. 41
D. 46
E. 77
F. This data set has no median
In which of these right triangles is \( a^2 + b^2 = c^2 \) ?

(A) \[
\begin{array}{c}
\text{a} \\
\text{b} \\
\text{c}
\end{array}
\]

(B) \[
\begin{array}{c}
\text{a} \\
\text{c} \\
\text{b}
\end{array}
\]

(C) \[
\begin{array}{c}
\text{b} \\
\text{a} \\
\text{c}
\end{array}
\]

(D) \[
\begin{array}{c}
\text{b} \\
\text{c} \\
\text{a}
\end{array}
\]

(E) \[
\begin{array}{c}
\text{c} \\
\text{a} \\
\text{b}
\end{array}
\]

(F) \[
\begin{array}{c}
\text{c} \\
\text{b} \\
\text{a}
\end{array}
\]
What is the area of the semi-circle?

A. \( \frac{20}{2} \)  
B. \( \frac{20}{2} \frac{20}{2} \)  
C. 50  
D. \( \frac{10}{2} \frac{10}{2} \)  
E. \( \frac{\left( \frac{20}{2} \right)^2}{2} \)
Developing good questions

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
What makes a good hinge question?

Essential:

1. In no case do incorrect and correct cognitive rules lead to the same response

Desirable (in order of priority):

1. Different incorrect cognitive rules lead to different responses
2. Different correct cognitive rules lead to different responses
Which of these are trapezoids?
One more thing...
What psychology tells us about learning

- Review of the research on techniques that help students learn better
- Focus on techniques that are relatively easy for students 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)
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Elaborative interrogation</td>
<td>Generating an explanation for why an explicitly stated fact or concept is true</td>
</tr>
<tr>
<td>2. Self-explanation</td>
<td>Explaining how new information is related to known information, or explaining steps taken during problem solving</td>
</tr>
<tr>
<td>3. Summarization</td>
<td>Writing summaries (of various lengths) of to-be-learned texts</td>
</tr>
<tr>
<td>4. Highlighting/underlining</td>
<td>Marking potentially important portions of to-be-learned materials while reading</td>
</tr>
<tr>
<td></td>
<td>Using keywords and mental imagery to associate verbal materials</td>
</tr>
<tr>
<td></td>
<td>Attempting to form mental images of text materials while reading or listening</td>
</tr>
<tr>
<td>7. Rereading</td>
<td>Restudying text material again after an initial reading</td>
</tr>
<tr>
<td></td>
<td>Self-testing or taking practice tests over to-be-learned material</td>
</tr>
<tr>
<td>9. Distributed practice</td>
<td>Implementing a schedule of practice that spreads out study activities over time</td>
</tr>
<tr>
<td>10. Interleaved practice</td>
<td>Practice that mixes different kinds of problems, or study that mixes different kinds of material, within a single study session</td>
</tr>
</tbody>
</table>
Which of these consistently improves learning?

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
“The new theory of disuse”

• 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

<table>
<thead>
<tr>
<th>Retrieval strength</th>
<th>Storage strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Credit card number</td>
</tr>
<tr>
<td>High</td>
<td>Current hotel room number</td>
</tr>
</tbody>
</table>
How memory really works

• 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
Real-time test: lines of symmetry

A

B

C

D

E

F
Real-time test: equations

Solve the following equations

1. $3x + 3 = 12$
2. $5x - 1 = 19$
3. $12 - 2x = 3$
4. $4 = 31 - 3x$
5. $4x - 3 = 2x + 5$
6. $3 - 2x = 4 - 4x$
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

<table>
<thead>
<tr>
<th></th>
<th>Achievement</th>
<th>Attitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grades</td>
<td>no gain</td>
<td>High scorers: positive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low scorers: negative</td>
</tr>
<tr>
<td>Comments</td>
<td>30% gain</td>
<td>High scorers: positive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low scorers: positive</td>
</tr>
</tbody>
</table>

Butler (1988)
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≈EG3≈CG)
• Ego-involvement
  – (EG2≈EG3)>(EG1≈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 of 607) of effect sizes were negative
Discussion question

• How can feedback lower student achievement?
Getting feedback right is hard

<table>
<thead>
<tr>
<th>Response type</th>
<th>Feedback indicates performance...</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>falls short of goal</td>
</tr>
<tr>
<td>Change behavior</td>
<td>Increase effort</td>
</tr>
<tr>
<td>Change goal</td>
<td>Reduce aspiration</td>
</tr>
<tr>
<td>Abandon goal</td>
<td>Decide goal is too hard</td>
</tr>
<tr>
<td>Reject feedback</td>
<td>Feedback is ignored</td>
</tr>
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</table>
• What are the obstacles to introducing more effective forms of feedback?
• A dancer describes how it feels when a performance is going well: “Your concentration is very complete. Your mind isn’t wandering, you are not thinking of something else; you are totally involved in what you are doing. [...] Your energy is flowing very smoothly. You feel relaxed, comfortable and energetic.”

• A rock climber describes how it feels when he is scaling a mountain: “You are so involved in what you are doing [that] you aren’t thinking of yourself as separate from the immediate activity. ... You don’t see yourself as separate from what you are doing.”

• A chess player tells of playing in a tournament: “... the concentration is like breathing—you never think of it. The roof could fall in and, if it missed you, you would be unaware of it.”
Motivation: cause or effect?

Csikszentmihalyi (1990)
Engagement and learning

• 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.)

• Views of ‘ability’
  – Fixed (IQ)
  – Incremental (untapped potential)
  – Essential that teachers inculcate in students a view that ‘ability’ is incremental rather than fixed (by working, you’re getting smarter).
• 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

- Resulting activation of energy along one of two pathways:
  - Well-being
  - Growth
• 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-fourths-of-the-way-through-a-unit test
Activating students as learning resources for one another
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

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.

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

• Best composite test paper
Activating students as owners of their own learning
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
• I get that ball park estimates are supposed to be simple. Meaghan

• I know that you have to look at it and say O.K.

• I know when I am adding the number I end up with must be bigger than the one I started at. Jon

• I get most of the problems. Juliana.

• It was easy for me because on the first one it says 328 and I took the #2 and I made it a 12. Kelly

• I know that we would have to regroup. Alana

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

• I think because for 4 some years we've been I think I finally know that adding is combining the two numbers in the problem.

• I think I am good at the partial sums method. Alex

• 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 ballpark estimate is close to the the answer. Brendan
I am still a little bit confused about subtraction regrouping. Meaghan.
I am a little bit confused about ball park estimate.
I get confused because sometimes I don't get the problem. Frankie.
I am confused when you subtract really big numbers. Like 1,000 something. Jon.
I'm still a little bit confused about regrouping. Trevor.
I am confused about a little of the subtraction regrouping. Aidan.
I am a little confused about the regrouping still. Kelly.
Minus is confusing because when you have to regroup twice. Alana.
Minus is a little bit hard when you have to regroup. Darcy.
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...

Carrying the number over to the next number. 

It's interesting how some people go to the nearest hundred, while others go to the nearest ten. Meaghan

It's interesting how some have to regroup twice. Darcie

It is interesting sometimes how you have to regroup. 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 column to column when you need to borrow. Olivia

On the ballpark estimate it is pretty good. Easy but some times confusing. Kelly

I really think that regrouping is pretty amazing. Jonathan

It is cool how addition and subtraction regrouping is just moving numbers and you could get it right easily. Olivia
+/−/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
• 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 column you borrow from when both are 0
• I am a little confused about when you need to subtract
• I am still confused about showing what I did to solve the problem
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
All ready for action in third grade...
Tell me about you...
Technique review
So much for the easy bit
A model for teacher learning

• 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
Choice
• Belbin inventory (Management teams: Why they succeed or fail):
  – Eight team roles (defined as “a tendency to behave, contribute and interrelate with others in a particular way”):
    • Company worker; innovator; shaper; chairperson; resource investigator; monitor/evaluator; completer/finisher; team worker
  – Key ideas:
    • Each role has strengths and allowable weaknesses.
    • People rarely sustain “out-of-role” behavior, especially under stress.
<table>
<thead>
<tr>
<th>Role</th>
<th>Principal strengths</th>
<th>Allowable weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company worker</td>
<td>Disciplined, hard-working</td>
<td>Lack of flexibility</td>
</tr>
<tr>
<td>Chairman</td>
<td>Valuing contributions</td>
<td>Not particularly creative</td>
</tr>
<tr>
<td>Shaper</td>
<td>Drive</td>
<td>Impatience</td>
</tr>
<tr>
<td>Plant</td>
<td>Thinking “outside the box”</td>
<td>Impractical</td>
</tr>
<tr>
<td>Resource investigator</td>
<td>Openness to new ideas</td>
<td>Short attention-span</td>
</tr>
<tr>
<td>Monitor-evaluator</td>
<td>Hard-headed</td>
<td>Poor motivator</td>
</tr>
<tr>
<td>Team worker</td>
<td>Responsive to others</td>
<td>Not good in crises</td>
</tr>
<tr>
<td>Completer finisher</td>
<td>Detail-oriented</td>
<td>Obsessive</td>
</tr>
</tbody>
</table>
• Talent development requires attending to both strengths and weaknesses

• The question is how to distribute attention between the two:
  – For novices, attention to weaknesses is likely to have the greatest payoff
  – For more experienced teachers, attention to strengths is likely to be more advantageous
Flexibility
Strategies and techniques

- Distinguish between strategies and techniques:
  - Strategies define the territory of formative assessment (no-brainers).
  - Teachers are responsible for choice of techniques:
    - Allows for customization; caters for local context
    - Creates ownership; shares responsibility

- Key requirements of techniques:
  - They embody the deep cognitive and affective principles that research shows are important.
  - They are seen as relevant, feasible, and acceptable.
Small steps
Expertise

- According to Berliner (1994), experts:
  - Excel mainly in their own domain
  - Often develop automaticity for the repetitive operations that are needed to accomplish their goals
  - Are more sensitive to the task demands and social situation when solving problems
  - Are more opportunistic and flexible in their teaching than novices
  - Represent problems in qualitatively different ways than novices
  - Have faster and more accurate pattern recognition capabilities
  - Perceive meaningful patterns in the domain in which they are experienced
  - Begin to solve problems slower but bring richer and more personal sources of information to bear
Knowing more than we can say

- Six video extracts of a person delivering cardiopulmonary resuscitation (CPR):
  - Five of the video extracts feature students.
  - One of the video extracts feature an expert.
- Videos shown to three groups
  - students, experts, instructors
- Success rate in identifying the expert:
  - Experts: 90%
  - Students: 50%
  - Instructors: 30%

Klein and Klein (1981)
Looking at the wrong knowledge

• The most powerful teacher knowledge is not explicit:
  – That’s why telling teachers what to do doesn’t work.
  – We know more than we can say.
  – And that’s why most professional development has been ineffective.

• Improving practice involves changing habits, not adding knowledge:
  – That’s why it’s hard:
    • And the hardest bit is not getting new ideas into people’s heads.
    • It’s getting the old ones out.
  – That’s why it takes time.

• But it doesn’t happen naturally:
  – If it did, experienced teachers would always be more productive, and that’s not true (Hanushek & Rivkin, 2006).
## Sensory capacity

<table>
<thead>
<tr>
<th>Sensory system</th>
<th>Total bandwidth (in bits/second)</th>
<th>Conscious bandwidth (in bits/second)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sight</td>
<td>10,000,000</td>
<td>40</td>
</tr>
<tr>
<td>Hearing</td>
<td>100,000</td>
<td>30</td>
</tr>
<tr>
<td>Touch</td>
<td>1,000,000</td>
<td>5</td>
</tr>
<tr>
<td>Taste</td>
<td>1,000</td>
<td>1</td>
</tr>
<tr>
<td>Smell</td>
<td>100,000</td>
<td>1</td>
</tr>
</tbody>
</table>

Nørretranders (1998)
Accountability
Making a commitment

• Action planning:
  – Forces teachers to make their ideas concrete and creates a record
  – Makes the teachers accountable for doing what they promised
  – Requires each teacher to focus on a small number of changes
  – Requires the teachers to identify what they will give up or reduce

• A good action plan:
  – Does not try to change everything at once
  – Spells out specific changes in teaching practice
  – Relates to the five “key strategies” of formative assessment
  – Is achievable within a reasonable period of time
  – Identifies something that the teacher will no longer do or will do less of
“I think specifically what was helpful was the ridiculous NCR [No Carbon Required] forms. I thought that was the dumbest thing, but I’m sitting with my friends and on the NCR form I write down what I am going to do next month.

“Well, it turns out to be a sort of ‘I’m telling my friends I’m going to do this’ and I really actually did it and it was because of that. It was because I wrote it down.

“I was surprised at how strong an incentive that was to do actually do something different...that idea of writing down what you are going to do and then because when they come by the next month you better take out that piece of paper and say ‘Did I do that?’...just the idea of sitting in a group, working out something, and making a commitment...I was impressed about how that actually made me do stuff.”

Tim, Spruce Central High School
Supportive accountability

• What is needed from teachers:
  – A commitment to:
    • The continual improvement of practice
    • Focus on those things that make a difference to students

• What is needed from leaders:
  – A commitment to engineer effective learning environments for teachers by:
    • Creating expectations for continually improving practice
    • Keeping the focus on the things that make a difference to students
    • Providing the time, space, dispensation, and support for innovation
    • Supporting risk-taking
Teacher learning communities
• 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


(Beckett, 1984)
Teacher learning communities

- 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

• 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

• 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

• 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

• 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
To find out more...

www.dylanwiliamcenter.com
www.dylanwiliam.net