Södertälje kommun

Teaching and teacher quality: What it is, why it matters, and how to get more of it.

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Outline

- Why we need to raise achievement
- What's been tried
- Why it hasn't worked
- Using research to improve teaching
- Why formative assessment
- What it is and what it isn't

Raising achievement matters

- For individuals:
  - Increased lifetime salary (Hanushek, 2005)
  - Improved health (OECD, 2010)
  - Longer life (Lleras-Muney, 2005)
  - Increased life satisfaction (Duckworth & Cara, 2012)
  - Higher achieving students (Macmillan & Tominey, 2023)
- For society:
  - Lower criminal justice costs (Levin et al., 2007)
  - Lower healthcare costs (Levin et al., 2007)
  - More tolerance of diversity (Post, 2016)
  - Increased Swedish GDP (Hanushek & Woessman, 2015)
    - 25-point increase on PISA: 339% increase in GDP
    - all students reaching 420 on PISA: 205% increase in GDP

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

Coming to a restaurant near you…

e-LaCarte from Presto

Ziosk

Computers in medical diagnosis

- Study of the use of neural nets to predict biopsy results
- Sample: 1,787 men with a serum prostate-specific antigen (PSA) concentration > 4.0 ng/ml
- Data:
  - Age
  - Maximum/average/change in PSA concentration over all visits
  - Maximum digital rectal examination over all visits
  - Maximum transrectal ultrasonography results over all visits
- Positive predictive value (% of those predicted with positive biopsies)
  - Specialist urologists: 34%
  - Artificial neural nets: 77%

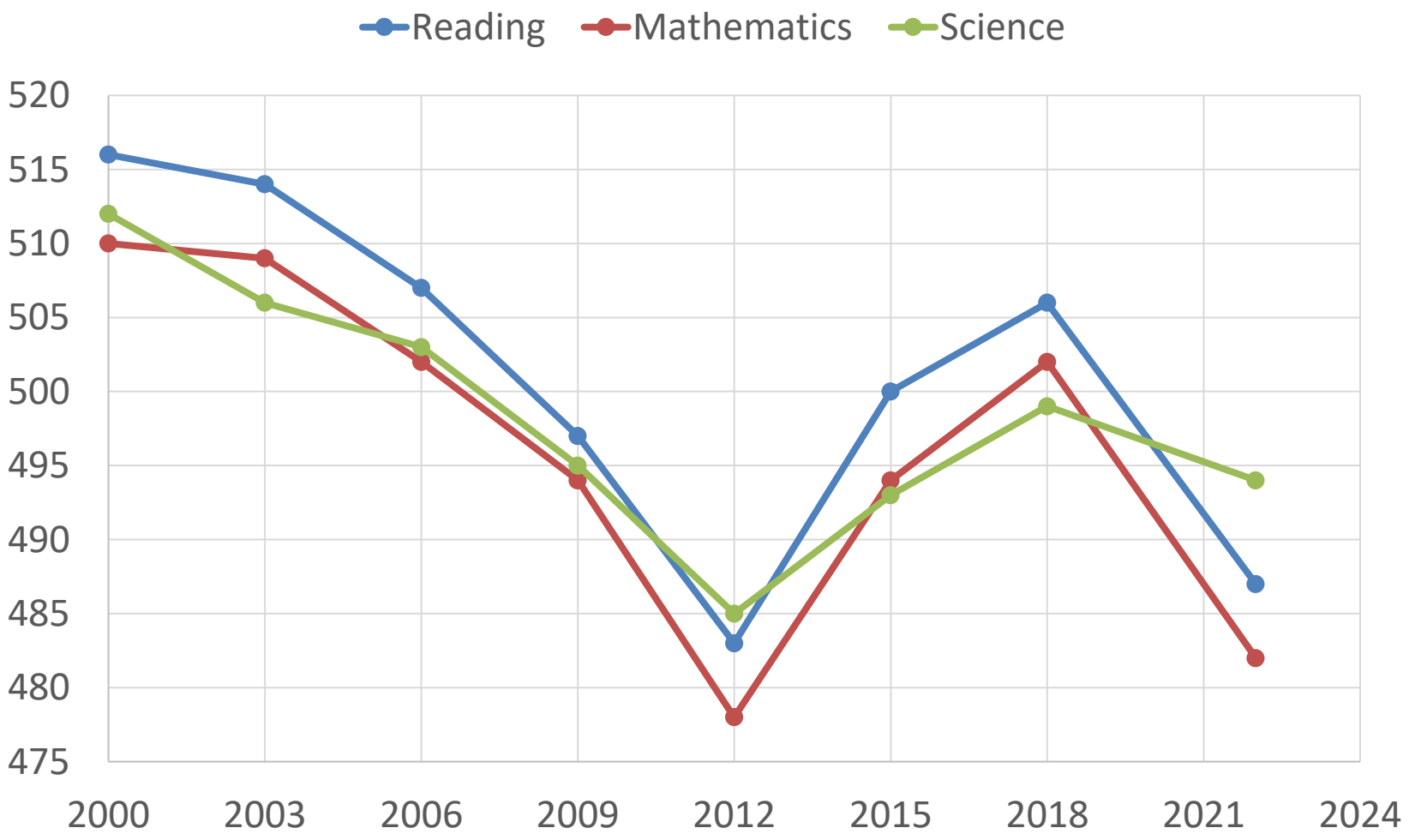
Snow, Smith and Catalona (1994)

Why we need to raise achievement

- In advanced economies, over the next 20 to 30 years
  - 25% to 35% of work could be offshored
  - About half the work being done right now could be done by machines with existing technology
- Proportion of Swedish 15-year-olds without the level of achievement needed to participate effectively in society:
  - Reading: 24%
  - Mathematics: 27%
  - Science: 24%

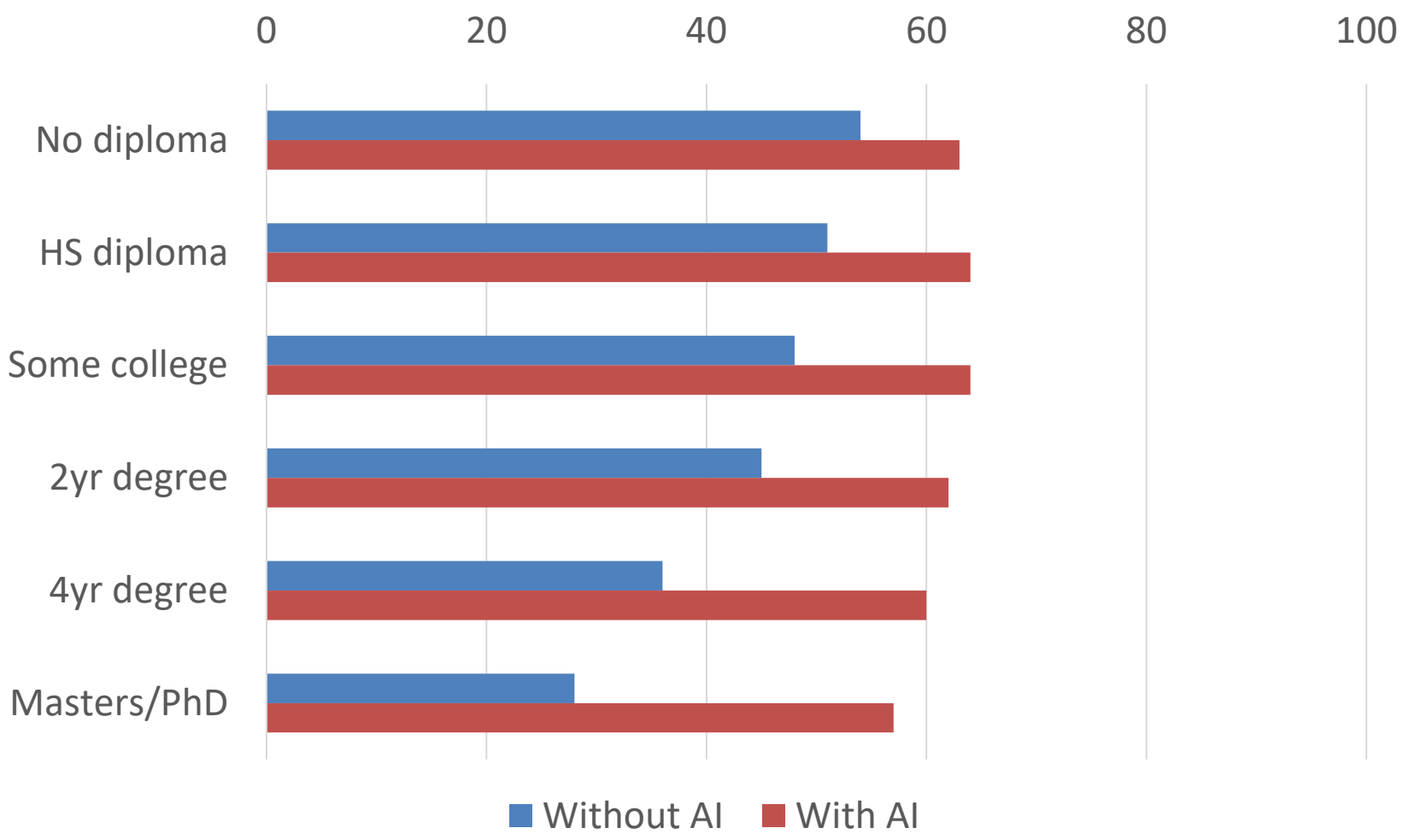
OECD (2023); Blinder (2011); Frey & Osborne, 2013; McKinsey (2015)

Sweden's performance in PISA 2000-2022



Organisation for Economic Cooperation and Development (2001, 2004, 2007, 2010, 2013, 2016, 2019, 2023)

Automation potential with/without generative AI



Chui, Hazan, Roberts, Singla, Smaje, Sukharevsky, Yee, and Zemmel (2023)

There is only one 21st century skill

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)

The challenge

- Higher and higher levels of educational achievement are needed
- We cannot afford to narrow the curriculum to achieve this
- But we also need our students to leave us with a desire to carry on learning

What determines how quickly students learn?

- Student characteristics
- School/college organization
- Instructional quality (i.e., teaching quality)
  - The quality of the curriculum
  - The time teachers have to plan teaching
  - The size of classes
  - The resources available
  - The skills of the teacher
- All of these are important, but the quality of the teacher seems to be especially important

Improving teacher quality

- Hiring better teachers
  - We can't predict who will be good teachers
    - From their qualifications
    - From how they are trained
- Removing less-effective teachers
  - We can't identify good teaching
    - From observation
    - From test scores
    - From student surveys
    - By combining data from all these sources
- Investing in the teachers we already have
  - The "love the one you're with" strategy

What we're doing right now (and why it won't help much)

Things that don’t work

- Brain Gym®
- Learning styles
- Paying good teachers more
- Copying other countries

Things that might work (a bit)

- Removing ineffective teachers
- Class size reduction
- Educational neuroscience
- Differentiated instruction
- Social and emotional aspects of learning
- Growth mindset
- Grit

What we can do instead

- Five questions to ask of research
  1. Does this solve a problem we have?
  2. If we do this, how much faster will our students learn?
  3. What will be the cost:
     - In money?
     - In teacher time?
  4. Can we implement it here?
  5. Do we know what to do?
- Educators need to be *critical consumers* of educational research
- Currently two 'best bets'
  - Curriculum development
  - Formative assessment

Classroom formative assessment

Why 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”

Formative assessment defined inclusively

	Long-cycle	Medium-cycle	Short-cycle
Span	Across terms, teaching units	Within and between teaching units	Within and between lessons
Length	Four weeks to one year	One to four weeks	Minute-by-minute and day-by-day
Impact	Monitoring, curriculum alignment	Student-involved assessment	

Engagement and responsiveness

Formative Assessment: A contested term

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Balancing chemical equations

$$\square\,Hg(OH)_2 + \square\,H_3PO_4 \rightarrow \square\,Hg_3(PO_4)_2 + \square\,H_2O$$

Unpacking Formative Assessment

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

Unpacking Formative Assessment

	Where the learner is going	Where the learner is now	How to get the learner there
Teacher	Before you can begin	Responsive teaching	
Peer	The learner's role		
Student			

Formative assessment and achievement gaps

EEF Teaching and Learning Toolkit

- Focus on ways of closing “the achievement gap”
  - Proficiency for all
  - Excellence for many
  - All student sub-groups well represented in the excellent
- Educational interventions evaluated in terms of:
  - Cost
  - Quality of evidence
  - Impact on student achievement

Education Endowment Foundation (2022)

Educational Endowment Foundation toolkit

Intervention	Cost	Quality of evidence	Extra months of learning
Metacognition and self-regulation	£	🔒🔒🔒🔒	+7
Feedback	£	🔒🔒🔒🔒	+6
Oral language interventions	£	🔒🔒🔒🔒	+6
Reading comprehension strategies	£	🔒🔒🔒🔒	+6
Collaborative learning	£	🔒🔒	+5
Homework	£	🔒	+5
Peer tutoring	£	🔒🔒🔒🔒	+5
Phonics	£	🔒🔒🔒🔒 🔒	+5
Individualised instruction	£	🔒🔒	+4
Parental engagement	£	🔒🔒🔒🔒	+4
Social and emotional learning	£	🔒	+4

Educational Endowment Foundation toolkit

Intervention	Cost	Quality of evidence	Extra months of learning
Arts participation	£	🔒🔒🔒	+3
Mastery learning	£	🔒🔒	+5
Behaviour interventions	££	🔒🔒	+4
Small group tution	££	🔒🔒🔒	+4
Within-class attainment grouping	£	🔒	+2
One to one tuition	£££	🔒🔒🔒	+5
Teaching assistant interventions	£££	🔒🔒🔒	+4
Extending school time	£££	🔒🔒	+3
Physical activity	£	🔒🔒🔒	+1
Summer schools	£££	🔒🔒	+3
Mentoring	£££	🔒🔒🔒	+2

Educational Endowment Foundation toolkit

Intervention	Cost	Quality of evidence	Extra months of learning
Performance pay	££	🔒	+1
Reducing class size	£££££	🔒	+2
Aspiration interventions	S		
Learning styles	£		
Outdoor adventure learning	£££		
School uniform	£		
Setting and streaming	£	🔒	0
Repeating a year	£££££	🔒 🔒	-3

Most cost-effective with strong evidence

Intervention	Cost	Quality of evidence	Extra months of learning
Metacognition and self-regulation	£	🔒🔒🔒🔒	+7
Feedback	£	🔒🔒🔒🔒	+6
Oral language interventions	£	🔒🔒🔒🔒	+6
Reading comprehension strategies	£	🔒🔒🔒🔒	+6
Peer tutoring	£	🔒🔒🔒🔒	+5
Phonics	£	🔒🔒🔒🔒🔒	+5
Parental engagement	£	🔒🔒🔒🔒	+4

Most cost-effective general interventions

Intervention	Cost	Quality of evidence	Extra months of learning
Metacognition and self-regulation	£	🔒🔒🔒🔒	+7
Feedback	£	🔒🔒🔒🔒	+6
Peer tutoring	£	🔒🔒🔒🔒	+5

Unpacking Formative Assessment

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Clarifying, sharing and understanding learning intentions

Teaching as an intentional activity

- Learning intentions are descriptions of the *learning* that is intended as a result of completing tasks specified by the teacher.
- Success criteria are descriptions of the desired *performance* on those tasks ("I'll be happy if…")

	Purpose	Mostly useful to
Learning intentions	Planning teaching	Teachers
Success criteria	Evaluating teaching	Teachers and pupils

Share learning intentions

- Share learning intentions and success criteria when appropriate (not necessarily at the beginning)
- Use planning and writing frames *judiciously*
- Start with examples rather than rubrics
  - Don’t give a single example of the best work
  - Don’t conflate intended and unintended features
- Ask students to assess work of anonymous others
- Over time, reduce use of student-friendly language
- Ask students to design their own test questions.

Success criteria and self-monitoring

Learning intentions	Success criteria
To be able to describe and explain the adaptations of animals to cold climates	• *To be able to state three adaptations that polar bears have to help them to survive in cold climates.* • *To be able to explain how these adaptations help polar bears to survive in cold climates.*
To be able to describe what happens during photosynthesis	• *To be able to state the two reactants and two products of photosynthesis.* • *To be able to describe at least one thing that happens to each of the products of photosynthesis*

Spenceley (2022)

Eliciting evidence of learning

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
- All-student response systems
  - Finger voting, ABCD cards, “show-me” boards, exit passes

Providing feedback that moves learners forward

General principles for feedback

- The purpose of feedback is to improve the student, not the work
- The only thing that matters with feedback is what students do with it
- If your feedback is getting you more of what you want, it’s good feedback
- Feedback should be more work for the recipient than the donor

Practical techniques for feedback

- Key idea: feedback should:
  - Cause thinking
  - Provide guidance on how to improve
- Four-quarters marking
  - Individual feedback
  - Whole-class feedback
  - Peer assessment
  - Self assessment
- Comment-only marking
- Focused marking
- Explicit reference to mark-schemes/rubrics
- Not giving complete solutions

Making feedback into detective work (1)

Feedback as information	Feedback as detective work
You've done a really great job of ordering the first 3 objects in order of smallest to largest. The final two are the wrong way around. Shall we try again with these different objects?'	"You're nearly there, but two of these are the wrong way round. Can you see which ones they are?"
Great use of capital letters. Make sure you are forming your letters correctly and using full stops in all your work	Great use of capital letters. Look back at your work and draw a line under five words that you think could be written better.
When reading maps, remember the order of North, East, South, West. This will be really useful across all of our map work.	Can you think of a way that would help you remember the order for North, East, South West?
You've named lots of carnivores, but not many herbivores. Check back over your work to see if you have included all of the herbivores we've learned about.	You've named lots of carnivores. Check back over your work to see if you have included all the other kinds of animals we've learned about.

Making feedback into detective work (2)

Feedback as information	Feedback as detective work
You need to add more factual details to support your argument in your 3rd paragraph	One of these paragraphs could do with adding more factual details to support your argument. Can you figure out which one, and supply the missing details?
Ensure that you use BIDMAS throughout your calculations.	In three of these calculations, you haven't used BIDMAS correctly. See if you can find them and fix them
When writing in German, remember to use the correct grammatical gender: 'der', 'die' or 'das'.	In the second paragraph, you have used the incorrect grammatical gender for "the" (der/die/das) in three places. Please find them and fix them.
Throughout your answers you need to use specialist terminology, and use it appropriately; ensure that you are monitoring this as you write, and revisit responses where you require more.	There are at least five places in these answers where it would be much better to use specialist terminology. I've highlighted two of them. Please redraft using the appropriate language in the other three.

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

Slavin, Hurley and Chamberlain (2003)

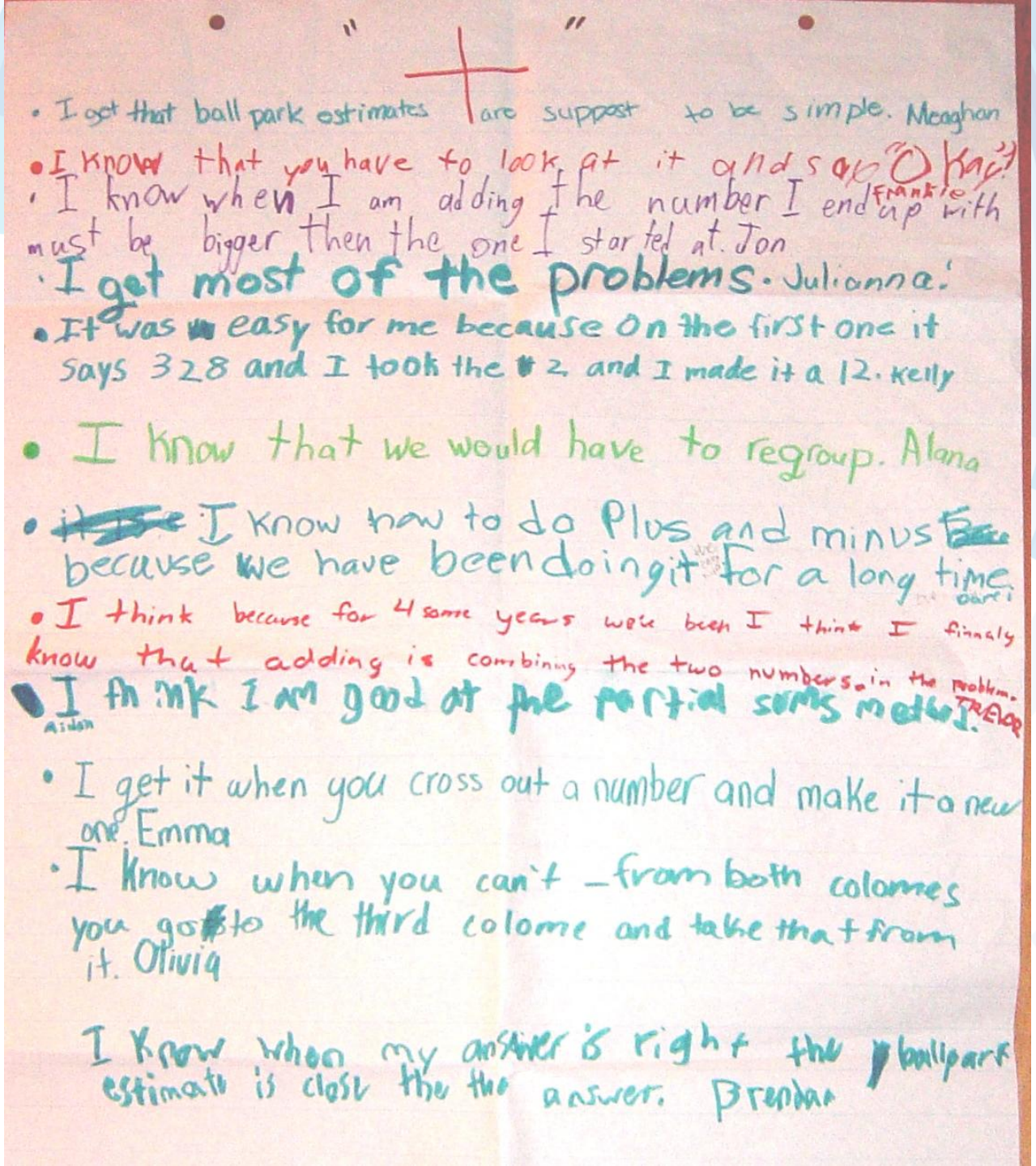
Help students be learning resources

- Students assessing peers' work:
  - "Pre-flight checklist"
  - "Two stars and a wish"
  - Choose-swap-choose
- Ladder of feedback (Perkins, 2003)
  - Clarify->Value->Concerns->Suggest
- Peer assessment as stepping-stone to self-assessment
  - Anonymous peers->actual peers->self-assessment
- Group questions
- Students' end-of-lesson review
- Best composite response

Activating students as owners of their own learning

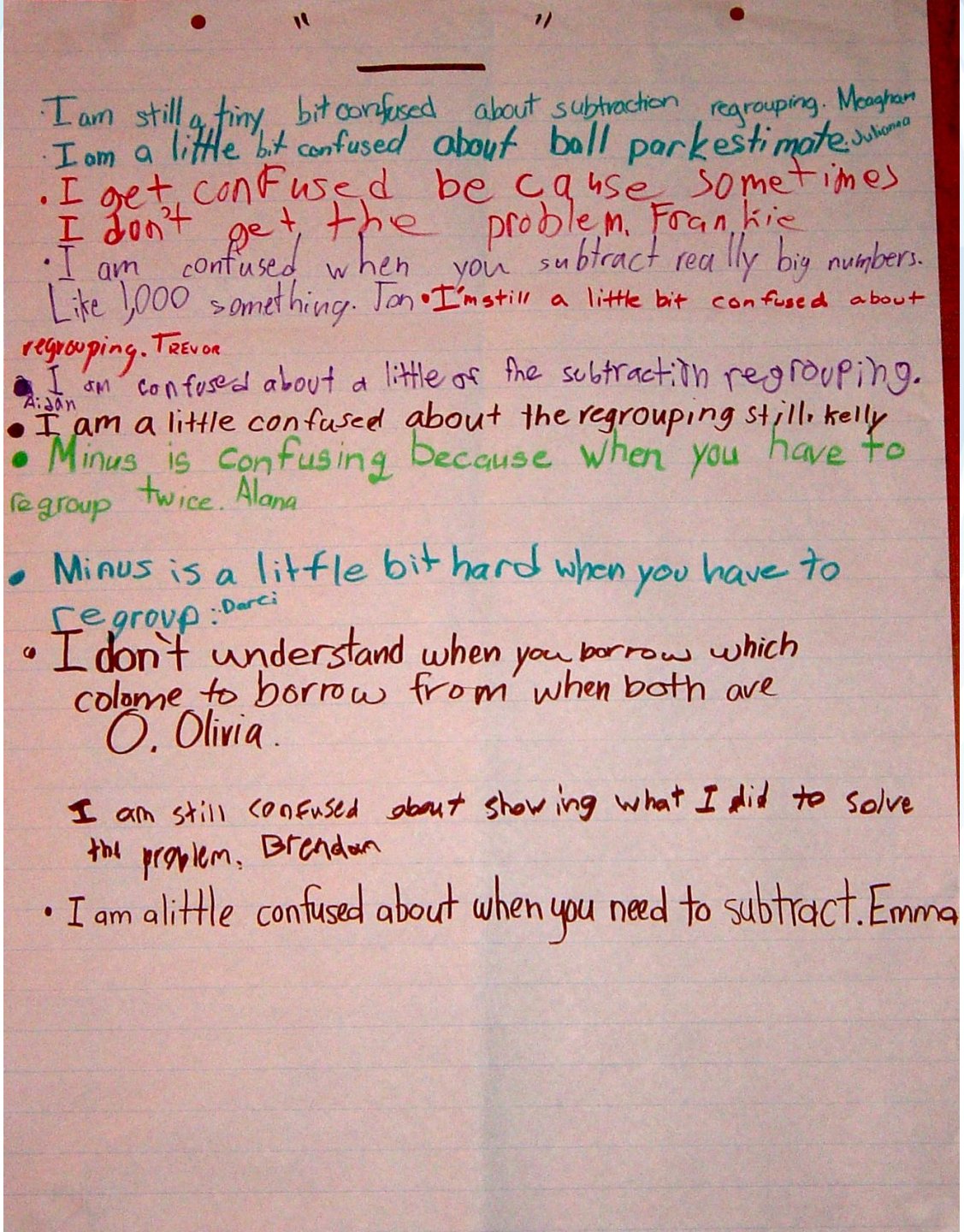
Help students own their own learning

- 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 suppost to be simple. Meaghan
- I know that you have to look at it and say "Okay" Frankie
- I know when I am adding the number I end up with must be bigger then the one I started at. Jon
- I get most of the problems. Julianna
- 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
- ~~it is~~ I know how to do Plus and minus ~~because~~ because we have been doing it for a long time. Dani
- I think because for 4 some years we've been I think I finnaly know that adding is combining the two numbers in the problem. TREVOR
- I think I am good at the partial sums method. Aiden
- I get it when you cross out a number and make it a new one. Emma
- I know when you can't - from both colomes you go to the third colome and take that from it. Olivia

I know when my answer is right the ballpark estimate is close the the answer. Brendan



I am still a tiny bit confused about subtraction regrouping. Meaghan
I am a little bit confused about ball park estimate. Julianna
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 litfle bit hard when you have to regroup: Darci
I don't understand when you borrow which colome to borrow from when both ave O. Olivia.
I am still confused about showing what I did to solve the problem. Brendan
I am alittle confused about when you need to subtract. Emma

interesting

Carrying the number over to the next number Julianna

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

It's intereting how some have to re group twice. Alana

It is interesting sometimes how you have to regroup ~~[illegible]~~ Darci

- It's pretty interesting about how you have to really work hard. Frankie
  - ~~I am~~ 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 ~~pretty good~~ easy but some times confusing. Kelly
  - I really think that regrouping is pretty amazing.
  - It is cool how addition and subtraction regrouping is just moving nombers and you could get it right easily.

+/–/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 a little confused about when you need to subtract
- I am still confused about showing what I did to solve the problem

+/–/interesting: responses for “interesting”

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- It’s interesting how some have to regroup twice
- It’s pretty interesting about how you have to work really hard
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- 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

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
  - Practice testing

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

- We need higher achievement
- We cannot afford to do this by
  - Narrowing the curriculum
  - Alienating our students
- Improving teaching quality requires investing in the teachers we already have
- But this investment needs to be cost-effective
  - Pedagogies of engagement and responsiveness
  - Teacher learning focused on practice