What formative assessment is (and isn't) and practical techniques for implementing formative assessment

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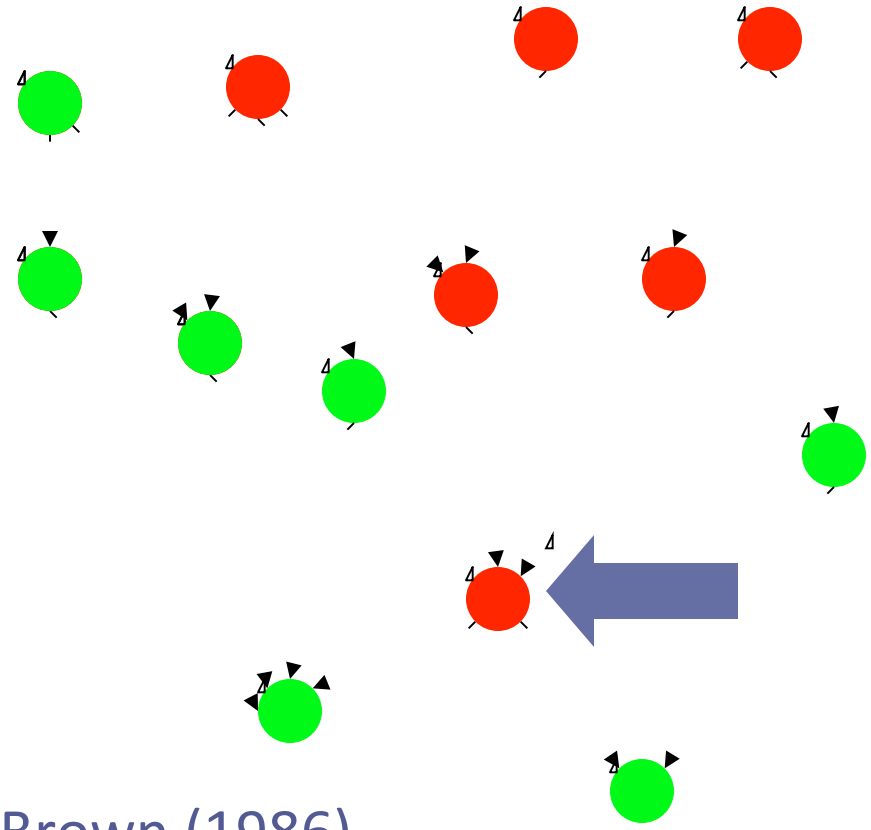
Children do not learn what we teach…



Denvir & Brown (1986)

Which of these are formative?

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 state test in March
D. "Three-fourths 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

- 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

	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

	Where the learner is going	Where the learner is	How to get there
Teacher			
Peer			
Learner			

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

- 3 teachers each teaching 4 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

White & Frederiksen (1998) Cognition & Instruction, **16**(1)

Sharing learning intentions

	Comprehensive Test of Basic Skills		
Group	Low	Middle	High
Likes and dislikes	4.6	5.9	6.6
Reflective assessment			

Who benefits most from reflective assessment?

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

Share learning intentions

- 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

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

- ‘No hands up’ (except to ask a question)
- All-student response systems

Providing feedback that moves learners forward

Getting feedback right is hard

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

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% (50 out of 131) of effect sizes were negative

Provide feedback that moves learning on

- Comment-only grading
- Not giving complete solutions

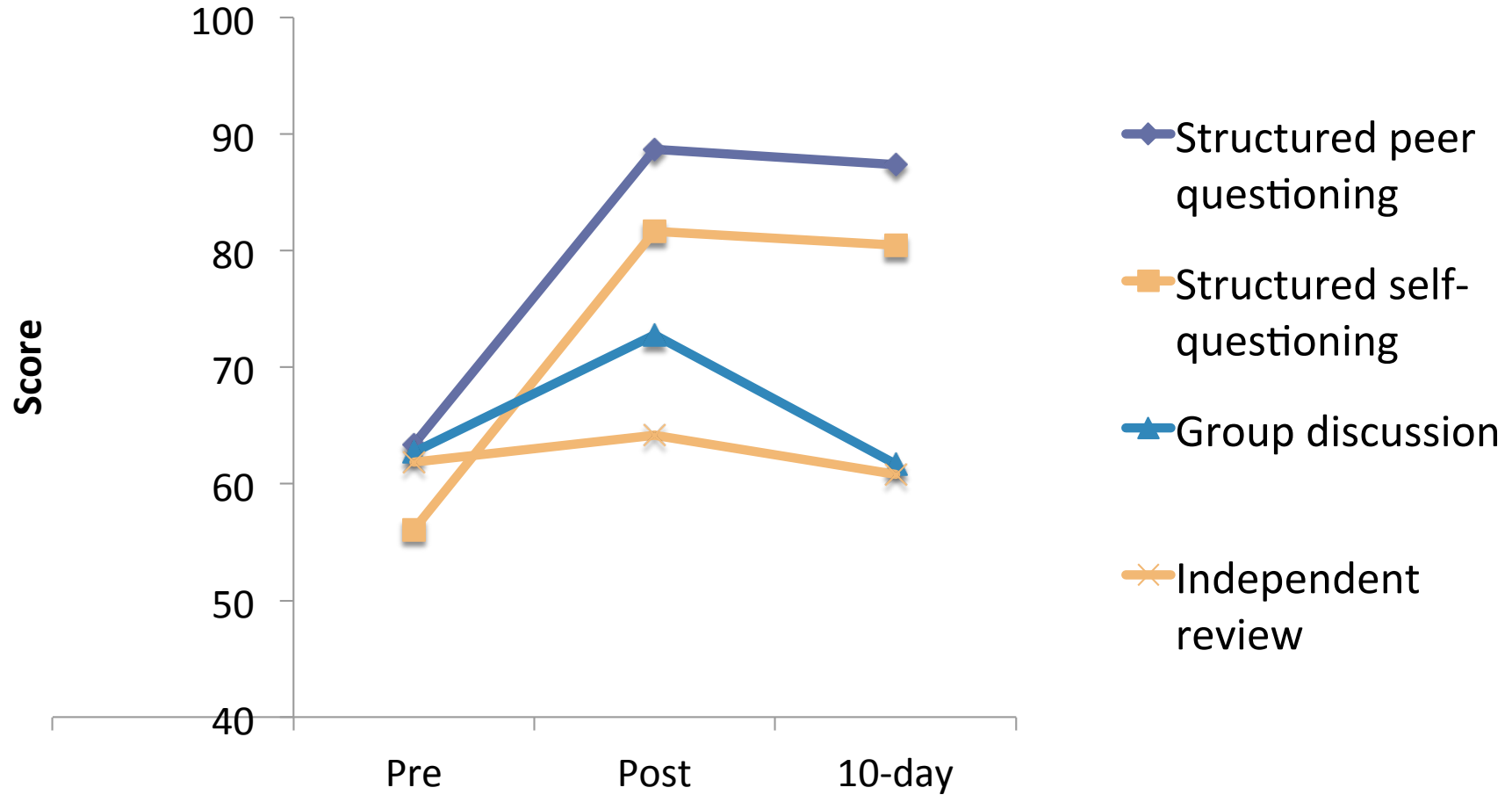
Activating students as learning resources for one another

Benefits of structured interaction

- 15-yr-olds studying World History were tested on their understanding of material delivered in lectures
- Half the students were trained to pose questions as they listened to the lectures
- At the end of the lectures, students were given time to review their understanding of the material

	Individual	Group
Unstructured	Independent review	Group discussion
Structured	Structured self-questioning	Structured peer-questioning

Impact on achievement



King, A. (1991). *Applied Cognitive Psychology,* **5**(4), 331-346.

Help students be learning resources

- “Pre-flight checklist”
- Training students to pose questions/identifying group weaknesses

Activating students as owners of their own learning

Self-assessment: Portugal

45 teachers studying for a Masters degree in Education, matched in age, qualifications and experience using the same curriculum scheme for the same amount of time	
Control group (N=20) follow regular MA program	Experimental group (N=25) develop self-assessment with their students
117 students aged 8 years	125 students aged 8 years
119 students aged 9 years	121 students aged 9 years
77 students aged 10 - 14 years	108 students aged 10 - 14 years

Fontana & Fernandes, *Br. J. Educ. Psychol.* **64**: 407-417

Details of the intervention

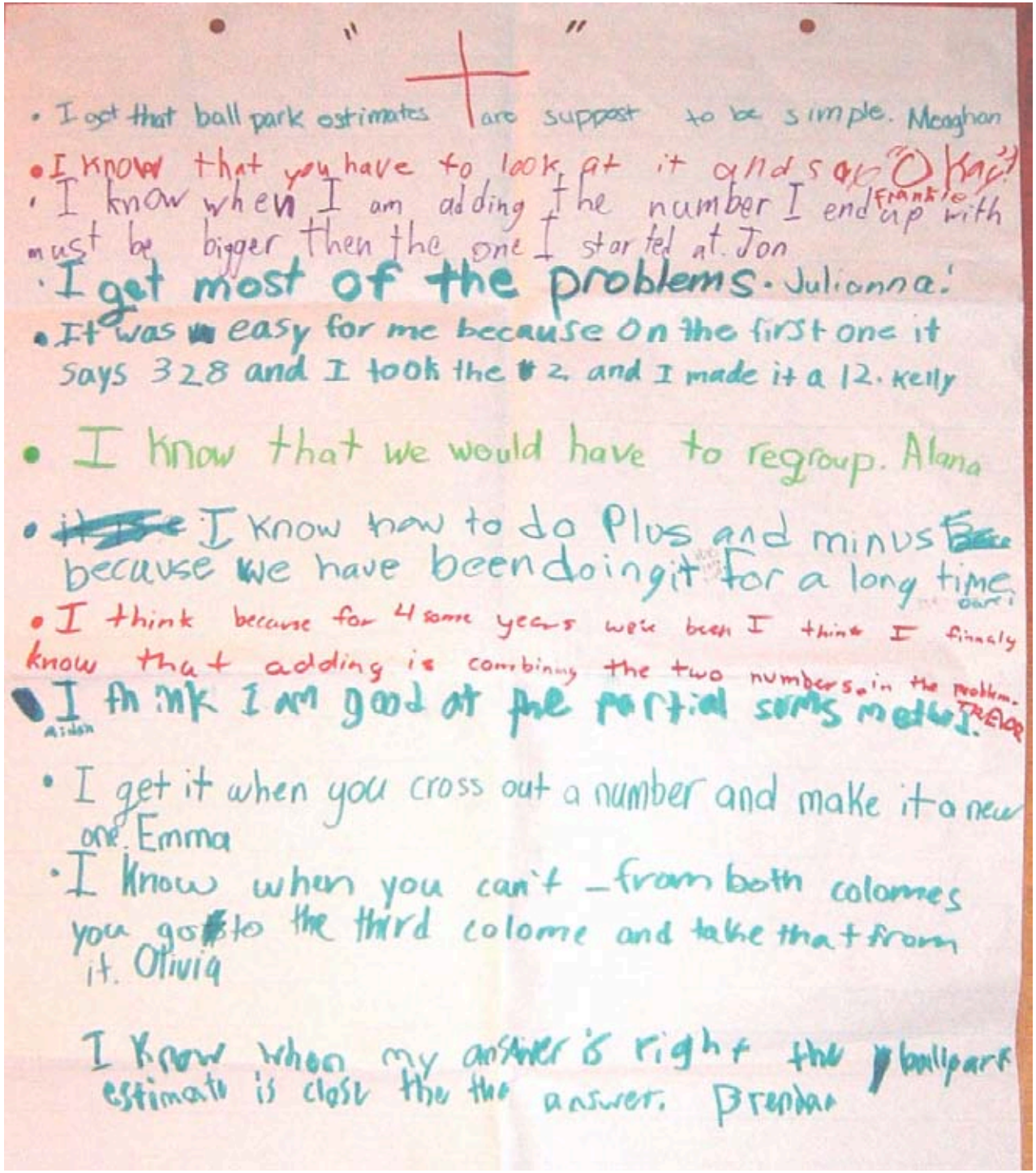
Weeks	Intervention
1 to 2	Individual choice from a range of work provided by the teacher. Student self-assessment using materials provided
3 to 6	Children construct own problems like those in weeks 1 and 2 and select structured math apparatus to aid solutions
7 to 10	Children presented with a new learning objectives, and make up their own problems, without exemplars by the teacher
11 to 14	Children set their own learning objectives, construct appropriate problems, and use appropriate self-assessment
15 to 20	As weeks 1 to 14, but with less monitoring from the teacher and increased freedom of choice and personal responsibility

Impact on student achievement

	Pre-test	Post-test	Gain	Effect size
Control	65.1	72.9	7.8	0.34
Experimental	58.7	73.7	15.0	0.66

Help students own their own learning

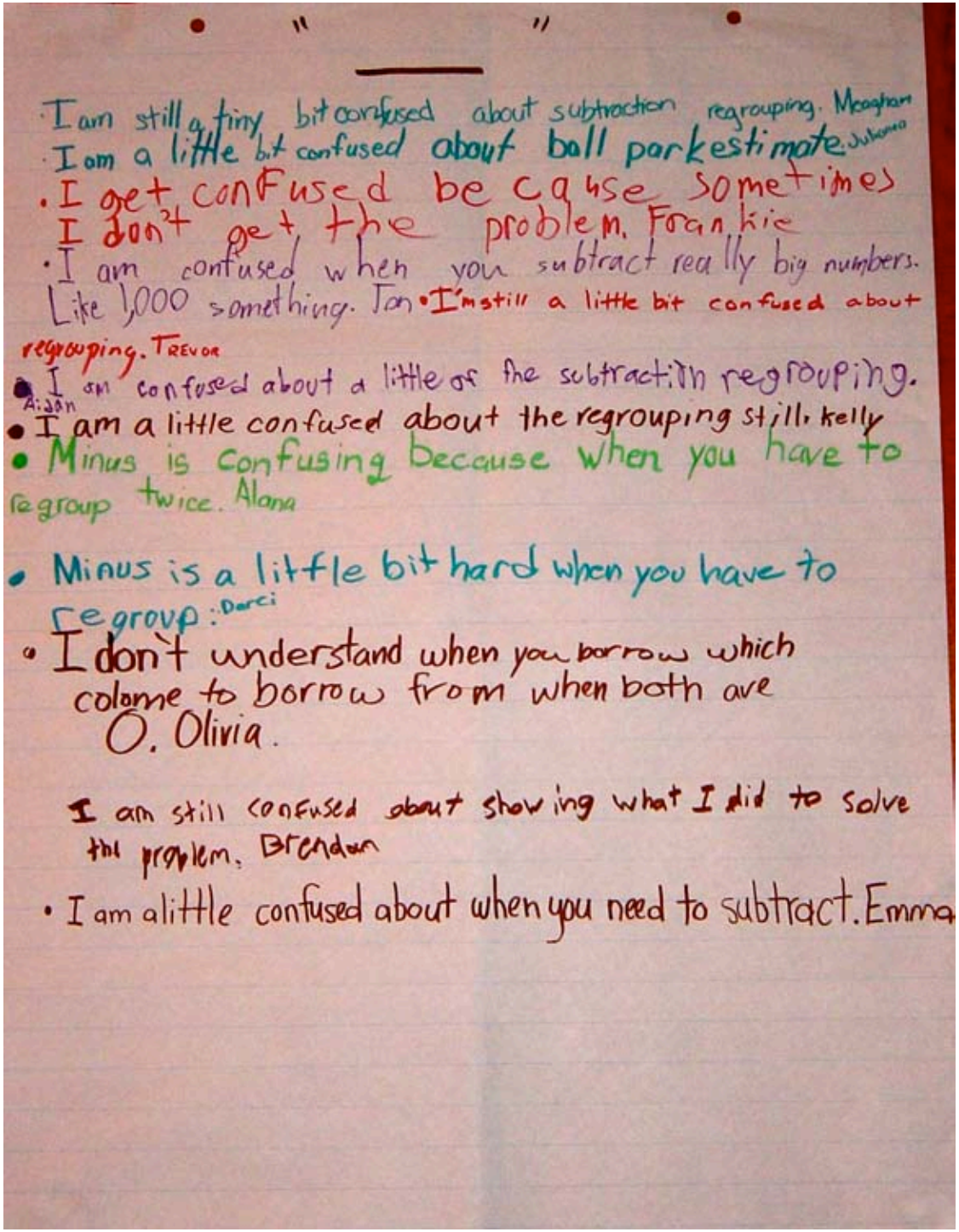
- Plus/minus/interesting
- Learning portfolio



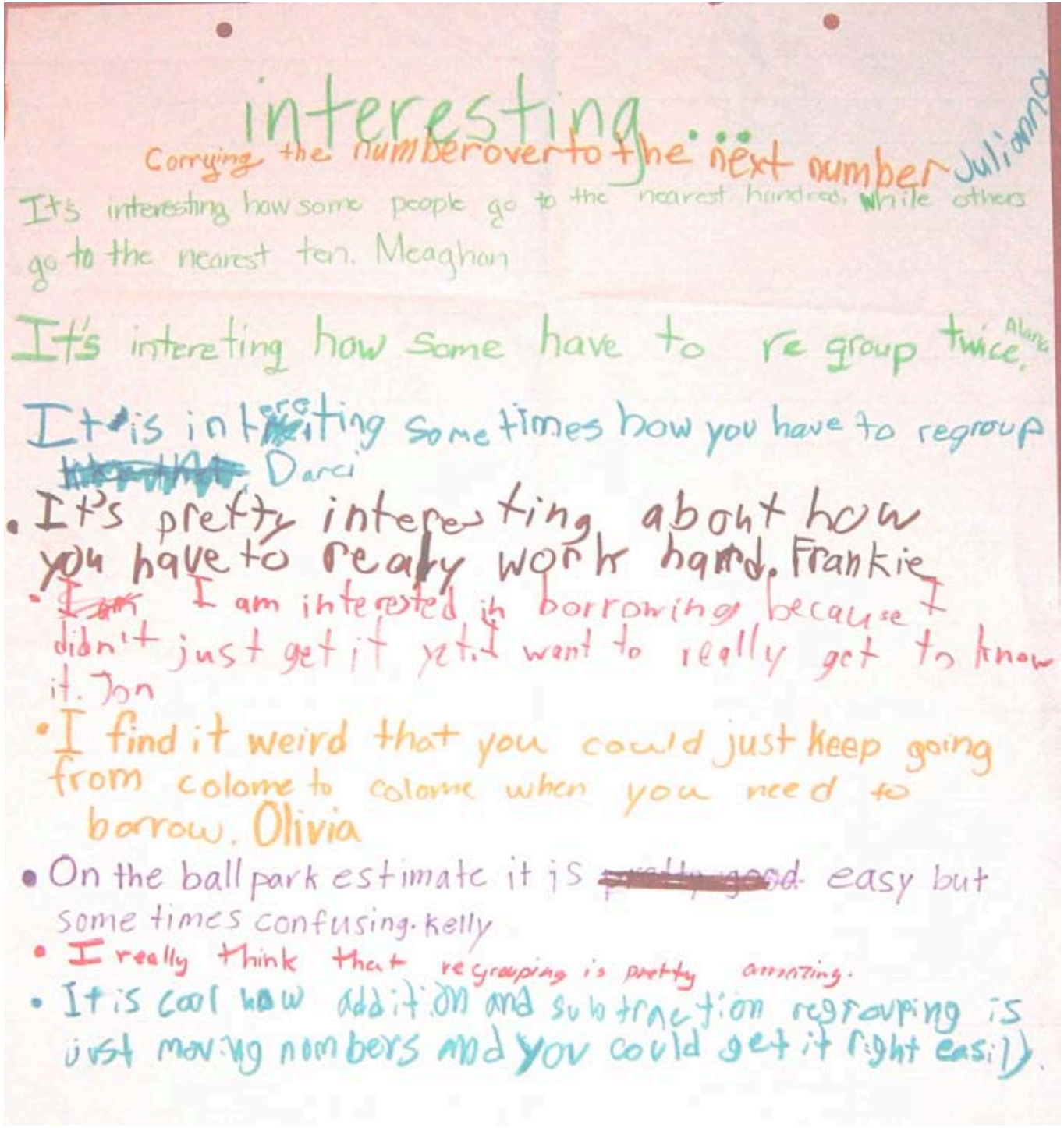
+

- I get that ball park estimates are suppost to be simple. Meaghan
- I know that you have to look at it and say "OK" 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
- I know how to do Plus and minus because we have been doing it for a long time. Aiden
- 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. 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. Brenda



- 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 colomne 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 interesting how some have to re group twice. Alana

It is interesting sometimes how you have to regroup ~~Whoohaa~~ 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 ~~really 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 numbers 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
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- I am still confused about showing what I did to solve the problem
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+/–/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
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So much for the easy bit