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Transcript from October 23- 27, 2006 and February 13 - 18, 2007

''Action Research''

Students are seen working on *Bits and Pieces II, Using Fraction Operations, Investigation 3,* and *Bits and Pieces III, Computing with Decimals and Percents.*
Each focal student is shown twice, thinking about the same concept.
The teacher is shown reflecting on these students' responses.

The video was shot in real time over the course of several days, spanning the school year, 2006-07. The teacher's final reflection was shot in the fall of 2007. The whole was edited to 25 minutes.

•Bits & Pieces II, Investigation 3•
Class: 6th Grade•
Case 1: Both clips are from 10/26/06
Case 2: Clips are from 10/27/06 and 2/15/07

Chapter 1: Introduction
Approximate time 00 – 00:26 (Times from start of video)

Slide:
*On this video are two cases of a student or students apparently
understanding a concept, only to demonstrate a few minutes or a few
months later that the mathematical concept was not understood in the
same way as the teacher might have deduced from what she could observe.*

Slide:
*Based on her observations the teacher makes decisions about immediate
actions, and about what further investigation is needed.*

Chapter 2: The Commutative Property (Fall'06)
Approximate time 00:27 - 3:33 (Times from start of video)

Slide:
Case 1

Student understanding of the Commutative Property for Multiplication.

Slide:
At the beginning of class on 10/26/06 students are considering a homework question, ACE problem 4, page 40 Bits and Pieces II. Nikki demonstrates that multiplication is commutative.

Slide:
Showing the ACE problem.

Line 1, 00:52 Nicky: First, I just drew a box, and then I split it up into fourths

       T: I - I'm really sorry. Are you doing two thirds of three fourths right now, or the other one?

       Nicky: I'm doing two thirds of three fourths.

       T: Okay.

       Nicky: And I colored in three of them because it's three fourths. And then I cut it into thirds and, and then I had to color in two of them - wait, no -

Line 10, 1:36 T: It's not there, is it? Okay.

       Nicky: And then, um, then I got twelve sixths, uh, six twelfths and -

       T: Could you write that number sentence down for us? What did she just draw, you guys? Tell her what she just drew.

       Class: Two thirds -

       T and Class: Two thirds of three fourths. Okay. And what did you end up with?

       Nicky: Six twelfths or a half.

Line 20, 1:58 T: Okay. Alright.

       Nicky: And then, I just knew you could do it the opposite way because you'd just start out with the thirds instead of starting out with the fourths.

       T: Could you just try it over there?

       Nicky: Yeah.

       T: Prov - seeing is believing, right? [01:02:11;09] So now what is she going to start with, guys?

       Class: Thirds.

       T: Thirds. If we take three fourths of the two thirds.

Nicky: I cut it into thirds first and colored in two thirds -

Line 30, 2:25   T: Feel free to move if you can't see something, okay? Go ahead and move if you're trying to see and you can't. That's fine. There's her two thirds.

Nicky: And then I cut it into fourths, and then I what was it, three fourths then I colored in three of the fourths and then I got the same answer, half. One, two, three, four, five, six, seven, eight.

Hayden: It's just the same as like if you turn that around

Nicky: Yeah, it's just - you just -

Line 40, 3:04   Hayden: Oh, you turn it upside down.

Nicky: Rotate it. You can just rotate the box.

T: Oh, you're kidding. Can you just rotate that?

Class: Yeah.

T: Hmmm. So how does that piece over there that you double-colored compare with this piece over here that we double-colored?

Nicky: Uh -

Hayden: Just that part is down on the bottom -

Nicky: They're the same amount of pieces and the
Line 50, 3:25   same answer.

Hayden: Yeah, you just -

Nicky: You just flip-flop the -

Hayden: The part that she doesn't -

Nicky: These twelfths -

Hayden: Have right there's on the bottom just like that.

Chapter 3: The Commutative Property Continued (Fall'06)
Approximate time 3:34 - 5:00 (Times from start of video)

Slide:
16 minutes later in the same class, 10/26/06, students are considering
how to estimate the answer for 2 ½ x 4/7. Kristen suggests reversing
the order, but Nikki is not sure you can do this.

Line 1, 3:34:	Kristen do you have any ideas about how to estimate that one?
	Kristen: Well, um, I think it might be, um, well, 'cause if it was four and - four sevenths, um, times two and one half it would [01:03:57;12]be like four sevenths of two and a half.
	T: Okay, so you're thinking about it like this?
	Kristen: Yeah. So -
	T: Okay.
Line 10, 4:05	Kirsten: And four sevenths is about half so I think it'd be like two.
	T: So you're thinking of half of two and a half.
	Kristen: Yeah.
	T: So what would a half of two and a half be?
	Kristen: Oh, wait. It would be, um, one and one fourth.
	Nicky: But wouldn't that change the problem if you're switching it around a little bit, 'cause -
	T: Does it? What did we just talk about?
Line 20, 4:25	Nicky: It's with a mixed number, so -
	T: But, is it still multiplication?
	Nicky: Yes.
	T: So can I switch my two factors around, my two numbers that I'm multiplying, around, or no?
	Class: Yeah.
	Student (unidentified): Because they're still commutative.
	T: Is it? Is multiplication always commutative, or just with some numbers?
Line 30, 4:45	T: Okay. So in this case, we're multiplying. So, can we flip-flop it, or no?
	Student (unidentified): No.
	T: We can't? Why not? Why can't we?

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Nicky:  'Cause –
T:  Somebody tell me why we can't.  What?

Nicky:  Because we're using a mixed number.

T:  So how does that change it?

Nicky:  'Cause if you change it then you'd have more
than a whole when you just started out less than a
whole.
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Chapter 4: Interview with the Teacher (Fall '07)
Approximate time 5:01 - 9:15 (Times from start of video)

Slide:
After the teacher viewed the video she reflected on student
understanding of the Commutative Property for Multiplication.

No transcript available.

Chapter 5: The Distributive Property (Fall'06)
Approximate time 9:16 - 13:30 (Times from start of video)

Slide:
Case 2

*Student understanding of the Distributive Property as it applies to
multiplying two numbers greater than 1.*

Slide:
*On 10/27/06 the class has been summarizing their strategies for
multiplying mixed numbers, Bits and Pieces II, 3.3. Kristen has just
demonstrated that you can think of 10 ½ x 2 1/3 as:
2 1/3 + 2 1/3 + 2 1/3 + 2 1/3 + 2 1/3 + 2 1/3 + 2 1/3 + 2 1/3 + 2 1/3 +
2 1/3.*

Brooklyn takes a similar approach but uses a picture.

Line 1, 9:32	T: Brooklynn, talk to us about your drawing up here, 'cause I think that's what this table was trying to do, but we couldn't figure out a way to model it. So let's, let's look up here.
	Brooklynn: What I did, is I drew two and one third for the acres for each day, and then I added up two days, so these two days together would be four and two thirds, and I did that for each two days. And then I added them up and that would make them nine
Line 10, 10:01	and one third. And then I knew that I had a sixth over here, so I changed it to nine and two thirds and then, um, I had, let's see, I had day nine and ten, which were the extra ones I had, 'cause I only went to day eight, and I added that with the half a day, and I switched the two thirds to four sixths and that got me five and five sixths and then I added these two [9 2/6] and this [5 5/6] first I added these two [9 2/6] together and that got me eighteen and four sixths, and then I added this answer [5 5/6] to -
Line 20, 10:48	with the eighteen and four sixths, and that got me twenty-four and three sixths.
	Class: Um hmmm. Um hmmm.
	T: Could, could hers be a picture of Kristen's?
	Class: Yeah.
	T: Kristen used just numbers and she used a picture. Now, I want to, I want to talk to you about something that I saw lots of you do. And I want you to think about, I want to use that picture to think about why
Line 30, 11:07	it doesn't work. So look up here for a second, okay? If I have ten and one half groups of two and one third I saw some people trying to do ten times two is twenty, right? And then a half times a third equals one sixth putting them together and getting twenty and one sixth. Okay. Why can we not just do that? Why does that not work? That doesn't give us enough. Why? Why not? Allie, why not?
	Allie: 'Cause you have to multiply both numbers. Like you have to multiply ten times, um, a third and

Line 40, 11:49   ten times two, and then a half, um, a half by a third
                        and a half by a two.

                        T: Oh. So, do I have - can you guys see okay? Do I
                        have ten groups of two and ten groups of a third in
                        this picture?

                        Class: Yeah.

                        T: Do you see how I have ten twos? But, what we're
                        forgetting about here is that we also have ten one
                        thirds in all of these days that she drew.   Right?
                        So I hear Allie saying even something different. I
Line 50, 12:17   hear Allie saying, "Let's do ten times two and ten
                        times a third,

                         Class: Yup, yup.

                        T: And then a half of two" I don't know, do, do I
                        have a half, do I have two groups of a half
                        somewhere?

                        Class: Um hmmm.

                         T: On this half day, on this half day, what do I
                        have?

                        Class: One -

Line 60, 12:41   T: So one, is that a half of two?

                        Class: Yes.

                         T: And then do I also have to do a half of that
                        third?

                        Class: Yeah, yes.

                        Becca: Mrs. _____, it's still the same answer, ten
                        and two thirds and then

                         T: You're absolutely right. What - go ahead [to
                        Jesse].

                         Jesse: It's the same way when you're multiplying
Line 70, 13:00   whole numbers. Like, fifty-six times twenty-two. You
                        can't just split, um, split the fifty fifty-six into
                        fifty and six and multiply them separate. You have to
                        multiply them together. You can't split both of them.
                        You can split one but not both, like
                        [Jesse goes to the board]
Slide:
Jesse demonstrates what he means.

Slide*:*

Showing what you can't do (50 x 20 and 6 x 2) *and what you can do* (22 x
50 and 22 x 6)

Chapter 6: The Distributive Property Continued (Spring '07)
Approximate time 13:31 - 17:54 (Times from start of video)

Slide:
4 months later students are now wrestling with decimal multiplication.

Line 1, 13:43   Michaela: I did it in fraction form, so I did, um, three and two tenths times one and one tenth and I got three and two hundredths because three times one is three and then, um, two times one is two and ten times ten is a hundred and in decimal form it does, it looks like this.

         Allie: Ellie?

         Ellie: Well, what I did was, I did thirty-two tenths, um, times -

Line 10, 14:25   T: Okay.

         Times eleven tenths. And what did you get?

         Ellie: Um, three hundred and fifty-two hundredths.

         Jesse: Yeah, that's what I did.

         T: Okay. So we need to talk a second. How is that different from what this group did to multiply?

         Allie: Well, they made improper, but we timesed the wholes with the -

         T: But is that okay? Did - when we multiply with fractions could we do that?

Line 20, 14:56   T: Could we?

         Class: No.

         T: Could we just multiply whole by whole, fraction by fraction I don't think we can because you're getting a different answer.

         T: What, what is our algorithm, guys?

         Class: Switch to improper fractions and multiply across.

         T: Okay. Okay. Because the algorithm you guys are using when we did multiplication of fractions we
Line 30, 15:16   discovered that didn't work. We can't just do whole number times whole number, fraction by fraction.

         Kristen: You have to do a whole number times a whole number, and then one of the fractions times the whole number and

         T: Yeah. There are a lot more steps. Do you remember that?

         T: So if we use this algorithm where we switch over to improper fractions, we're going to end up with three hundred and fifty-two hundredths. Could you

Line 40, 15:38   guys write that as a decimal number, though, 'cause
                      we're trying to switch it back over to decimals now.
                      Three wholes and fifty-two hundredths. Okay, are we,
                      are we okay? You guys see what, what happened there? I
                      think we just, we didn't use the right algorithm,
                      'cause we can't do whole number times whole number
                      and fraction and times fraction. We gotta - like
                      Kristen said, it's much more involved, the steps.
                      Okay.   Thanks, guys.

Slide:
After the class has done Bits and Pieces III, 2.1 and 2.2, Teri reflects
about what she has learned about her students' understanding. (The
student work you see in the background is from 2.2)

[Teri reflecting on Bits and Pieces III, 2.1 and 2.2 --- no transcript
available.)

Chapter 7: Interview with Teacher (Fall '07)
Approximate time 17:54 - 25:00 (Times from start of video)

Slide;
After the teacher viewed the video she reflected on student understanding of both fraction and decimal multiplication.

[Interview with teacher, Fall '07 --- no transcript available.]