VIDEO NOTES: *5th Grade Math Lesson on Reasoning about Fractions*

Video Links: 5th Grade Math Lesson on Reasoning about Fractions
Common Core State Standard: Number & Operations - Fractions CCSS.Math.Content.5.NF.B.4a
Compass Component and Rating: Questioning and Using Discussion Techniques (3b), *Effective Proficient*
Engaging Students in Learning (3c), *Effective Proficient*
Using Assessment in Instruction (3d), *Effective Proficient*
Lesson Objective: Multiply a fraction by a fraction

Common Core State Standard(s)
CCSS.Math.Content.5.NF.B.4a: Interpret the product (a/b) × q as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations a × q ÷ b. For example, use a visual fraction model to show (2/3) × 4 = 8/3, and create a story context for this equation. Do the same with (2/3) × (4/5) = 8/15. (In general, (a/b) × (c/d) = ac/bd.)

Compass Component 3b: Questioning and Using Discussion Techniques (Rating: *Effective Proficient*)		
Indicators	**Evidence**	**Common Core Connection**
Teacher uses open-ended questions, inviting students to think and/or have multiple possible answers.	• Teacher asks a question, which has several possible correct answers, requiring students to use higher order thinking. She asks, *"What is the same about all of the correct representations?"* (10:42) This question also reinforces content knowledge as students review the processes used to arrive at a correct response.	Students spend the majority of the class time working on one problem. They discuss the inaccuracies found in sample solutions of the problem and discuss the processes used to arrive at a correct solution. Students work diligently, not only to solve the problem, but to understand the math processes and skills needed to determine an answer. (CCSS.Math.Practice.MP1) Students analyze sample problems provided, as well as present their own work to the class. During their discussions and presentations, students justify their answers and
Discussions enable students to talk to one another without ongoing mediation by the teacher.	• Students work in small groups, posing questions to each other and talking out their confusions. (5:02) This process is important because it allows students to act as teachers and reinforces	

	content as they explain the material to their classmates.	critique the work completed by others. (CCSS.Math.Practice.MP3)
Students initiate higher-order questions. (*Highly Effective* indicator)	• While one student explains the work at the board, another student asks for clarification, *"I got confused on what the stripes and the orange pieces meant."* The student at the board then provides an explanation. (7:55) This process is important because it allows students to act as teachers and reinforces content as they explain the material to their classmates.	
Students invite comments from their classmates during a discussion. *(Highly Effective* indicator)	• During small group work, students discuss their misunderstandings about the content. One student requests, *"Explain to me why you think the second one is wrong."* Another student then responds, *"Because over here it has this last fourth but it's not split into three pieces like these three are."* (4:45)	

Compass Component 3c: Engaging Students in Learning (Rating: *Effective Proficient*)		
Indicators	**Evidence**	**Common Core Connection**
Most students are intellectually engaged in the lesson.	• Students are intellectually engaged as they struggle to understand the math problems and discuss their reasoning and challenges within their groups. (6:06)	Using the context of a story about the school's track, students use multiple visual fraction models to understand multiplication of fractions by fractions. By asking students to analyze sample problems, the teacher focuses on conceptual understanding of why multiplication of fractions works the way it does. This depth of conceptual understanding is rigorous for fifth grade and prepares students for future in-depth mathematical analysis. (CCSS.Math.Content.5.NF.B.4a)
Students have some choice in how they complete learning tasks.	• Teacher provides students with a choice for how they can complete they work. She says, *"If you would like to continue working by yourself you may do so. If you want to turn to people at your table, you may do so."* (4:30) When students can choose whether or not they need the assistance of classmates, it allows them to	

	have ownership over their own learning.	
Materials and resources support the learning goals and require intellectual engagement, as appropriate.	• Teacher provides students with visual and numerical representations of the problem. There are several options provided, so students can find one that makes the most sense to them. (1:22) This addresses different learning styles and supports students in accessing the content more successfully.	
There is a mix of different types of groupings, suitable to the lesson objectives.	• Teacher provides students with individual work time, time to discuss in small groups (4:48), and whole-class discussion (6:50). This allows them to prepare and organize their own thoughts, work through the answers in greater depth with small groups, and finally hear all the responses from the class.	

Compass Component 3d: Using Assessment in Instruction (Rating: *Effective Proficient*)		
Indicators	**Evidence**	**Common Core Connection**
The teacher elicits evidence of student understanding during the lesson. Students are invited to assess their own work and make improvements.	• In this lesson, the teacher elicits evidence from the students to develop conceptual understanding while students are working individually (3:05) and while they are presenting to the class. (7:19)	
Feedback includes specific and timely guidance for at least groups of students.	• The teacher circulates during independent work time (3:05), as well as during the small group discussion. She provides feedback and guidance when students struggle with one of the representations.	
When necessary, the teacher makes adjustments to the lesson to enhanceunderstanding by groups of students.	• When students begin to struggle individually, the teacher concludes the independent work time and allows students to discuss the problem with a classmate.	

	(4:19) • Based on student questions, the teacher realizes that she made assumptions about students' understanding. She adjusts to this by asking clarifying questions (*"Then can anybody tell us what do the boxes that don't …that are orange but don't have blue stripes in them represent?"* [8:20]) to ensure that students thoroughly understand the models.	

WHAT COULD THIS TEACHER DO TO IMPROVE?

What did the teacher do in this lesson?	***Highly Effective* Indicators**	**What could the teacher do to move to *Highly Effective*? (example actions)**
Students are asked to reflect on the lesson and identify what piece of knowledge they will take away from the lesson. However, the teacher provides students with the 'piece of knowledge' and they simply copy it into their notebooks.	Students have an opportunity for reflection and closure on the lesson to consolidate their understanding. (Engaging – 3c)	Ask students to independently identify the important 'piece of knowledge' from the lesson. This will allow them to do the active thinking and reflect on the lesson themselves. This reflection could be used to assess students' progress towards mastery. If students simply copy down the sentence provided by the teacher, they are not consolidating any learning.
During this lesson, feedback is only provided by the teacher.	Feedback to students is specific and timely, and is provided from many sources, including other students. (Assessment – 3d)	During the whole-class discussion, ask students to provide feedback to their classmates. The feedback could focus on the presentation/explanation of a problem, or something that occurred during small group work. For example, a student might say, "X explained the third representation very clearly and it helped me to understand that one mile was actually the whole, not the track."
While students present the results of their group work, the teacher asks the majority	Students extend the discussion, enriching it. (Questioning – 3b)	Transfer the responsibility of extending the conversation from teacher to students by expecting

of clarifying questions, henceforth driving the discussion.		students to ask questions of their classmates, in addition to presenting their solutions. Provide students with guidelines from which they extend the discussion and create a student-centered analysis of the solution models.