

Video activity: coded version

Link to video: <https://sms.cam.ac.uk/media/3099035>

Background / context: This video clip¹ comes from a Mathematics lesson of Year 6 in England. This clip shows a teacher inviting the students to reason about conversions with grams and kilograms. Prior to what is shown in the clip, the teacher asked the students something they would need to know in order to carry out the task. A student responded that 1kg equals 1,000g. The teacher wrote that information on the board below the acronym WINK: 'What I Need to Know'. The teacher also drew a number line on the board and wrote zero and one kilogram at the ends of the line. The exercise shown in this clip consists of a set of cards with different weights expressed in grams and kilograms. The students should put the cards on the number line where they think they go.

Purpose of the activity: This provides an opportunity to see these dialogic strategies used in the classroom. The goal is to observe and identify the characteristics of dialogue in the clip. In particular, when observing the video and transcript:

1. Identify an example of the teacher following up a student's contribution (to invite building on others' ideas).
2. Identify an example of the teacher challenging a student's contribution.

Detailed notes are included at the bottom of this document for further reflection.

Transcript for video clip			
Clip turn	Speaker	Transcript	Codes
218	Teacher	OK, I've got some little cards for you and I want us to put them on our number line <i>((pointing to number line on whiteboard))</i> . This number line says 0 kilograms and 1 kilogram. So we're going to come up and stick them on our number line where we think they go. So my first one is 300 grams <i>((holding up card))</i> . Who thinks they know where that might go on my number line? <i>((Several hands raised))</i> Aria. Come and explain why you've put it where you've put it.	IRE
219	Aria	<i>((Moves to front of class))</i> I think, erm, 300 grams should go there <i>((places card on number line))</i> because I think halfway between 0 kilograms and 1 kilogram would be 500 grams, and I think that 300 (inaudible) close to 500 grams. So I think that's (inaudible).	R
220	Teacher	Would it be helpful to mark on halfway? <i>((Hands Aria the whiteboard pen))</i>	

¹ Note: This footage was collected during the "Classroom dialogue: Does it really make a difference for student learning?" project funded by the UK Economic and Social Research Council (ES/M007103/1) in 2015-17: <http://tinyurl.com/ESRCdialogue>.

221	Aria	Yes	
222	Teacher	Pop on halfway then. ((To class)) How else could we be really specific about where 300 grams could go? ((Aria marks 500 grams on number line, on whiteboard)) Matthew.	IRE
223	Matthew	If you looked at it, 300 grams would be a lot closer to 500, as Aria said, than it would be to 0 kilograms. So it would be-, I think it would be further along.	RE, Q
224	Teacher	So you're disagreeing with where it's going at the moment. You'd like it moved closer to 500?	IB
225	Aria	I think I agree with Matthew.	
226	Teacher	You agree with Matthew. Go on then, move it if you want to.	IRE
<i>After a few turns, a student stuck 0.9 kg on the number line. Another student is hesitant about the previous answer and challenges the positioning as follows...</i>			
268	Dillis	I think it will be-, because 0's bigger than 0.-, is 0 bigger than 0.9? Would it be before the 0 kilograms?	R
269	Teacher	OK, good question, Dillis. I like your questions this morning. What do we think? Which one is bigger: 0 or 0.9? ((Some hands raised)) Cody.	IB
270	Cody	0.9.	
271	Teacher	Because?	IRE
272	Cody	Because 0 would also be 0 grams, but 0.9 kilograms would be 90 grams-, 900 grams, and 900 grams is bigger than 0 grams.	R
273	Teacher	OK. Dillis, in this number ((pointing to whiteboard)) there is 0. There is no units. If I put a decimal point here, there'd be no tenths. This number is bigger ((pointing to 0.9 on whiteboard)) because I've got a 9 in the tenths. Michael.	R
274	Michael	I also got confused with what Dillis did, but the only reason it confuses you, it won't be confusing if you converted to grams.	R
275	Teacher	Ok.	
276	Michael	Cos right now it looks like it would actually be smaller, way smaller than 1 kilogram. It actually looks like it would be closer to 0 kilograms.	R
277	Teacher	I agree, and the problem we've got is we've got this one recorded in grams ((pointing to first card on whiteboard)) and this one recorded in kilograms ((pointing to second card)), which is why it could be confusing. Which is why it was really good that Ashton said this is 900 grams ((pointing to second card)). So, if this is 300 grams ((pointing to first card)), halfway is 500 grams ((pointing to number line)), I know 900 grams ((pointing to second card)) is nearly 1,000 grams. It's a really good tactic, Michael. Thank you for spotting that. Really good tactic to convert	B, R

them to the same unit. So this is 300 grams (*(pointing to whiteboard)*), this is 500 grams or halfway, this is 900 grams. I'm going to write '900 grams' underneath it (*(writes on second card on whiteboard)*), and that, Dillis, might help you spot it.

Further notes:

In this episode, after a reminder of weight units, the main task was explained: for students to place cards with weights expressed in grams or kilograms on a number line with 0 kg and 1 kg marks drawn on the board. Students were invited to place cards where they should go, and to explain why. This sparked some rich discussions between them. In the 23.5 minutes of the episode (much longer than the shortened clip), a remarkable 27 different students out of the 29 present took turns.

In high-attaining and high-dialogue (HAD) classes, teachers planned talk-intensive tasks in at least some of their activities. In Clip Turn 219, the task goal (i.e. sticking cards onto the number line) was clearly stated, and simultaneously the expectations for student contributions were established (i.e. giving reasons for their decisions).

The teacher encourages students to develop their ideas (e.g. 224) and respond to others' ideas. Furthermore, she also builds on students' contributions (e.g. 277).

Although rare, student-student querying and contrasting of positions appeared to be especially fruitful. In HAD lessons, it was supported by the task and/or teacher's management of it (e.g. Turns 217-219). The presence of querying is intertwined with elaboration, and knowledge is developed through extending what has been said, as well as disagreeing with peers.

This clip also exemplifies the potential of having an object for co-building, in that case the number line that students had to annotate and complete collectively. The task helped create a rich space for dialogue in various ways. The teacher facilitated the involvement of many students who talked about their actions in placing cards on the number line. This evoked multiple perspectives on where a card should be placed, and the number line allowed for different ideas and changes in understanding to materialise during adjustment of the cards' positions, executed through elaborations and querying of students' own and others' ideas (i.e., the '300 grams' card moved as a result of Turn 223 by a student). Manipulation of artefacts in this way, especially on a large display screen, can make the difference or agreement between perspectives more salient and help participants to make their understandings and reasoning explicit to peers or the teacher (Hennessy, 2011). Here

the competing viewpoints were, in effect, critiqued and coordinated. Importantly, contributions were assessed concerning their value for achieving the common goal, rather than focusing on who was right.

Multiple perspectives were welcomed throughout the task, and the teacher refrained from evaluating them before the ideas were discussed by students. The openness resided not only in the task design, but also in how the teacher managed the discussion. One example of this is the teacher's responses to Dillis' question about whether 0.9 kg was smaller than 0 and should thus be placed *before* it (Turn 268). She opened up the space for the class to answer first, and only later intervened. Her prompt (269) led to Cody's explanation (270-272), and to Michael's metacognitive interpretation of the origins of Dillis' confusion (274-276), which the teacher built on to arrive at an important point of the lesson: the cards were expressed in different units, making comparisons harder (277).

As Resnick et al. (2018, p.7) put it, in this episode the process of shared reasoning that reaches a better informed conclusion is teacher-led but student-owned. All in all, expectations of students were high. It is apparent that a dialogic ethos was well established given that multiple students with different levels of understanding contributed with their perspectives and questions, sometimes even without prompting.

Characteristics of dialogue in this clip:

- Teacher makes "why" and "how" follow-up questions
- Teacher encourages students to state when they disagree with their peers
- Teacher confirms agreement with the students' ideas
- Teacher asks for the students' ideas
- Teacher refers back to students' prior contributions
- Teacher provides informative feedback
- Students offer explanations / justifications
- Students challenge their peers' ideas
- Students confirm agreement with their peers' ideas
- Students build on teacher's contributions