Talk Science

Professional Development

Transcript for Talking Point: Why is Talk Important?

1. Introduction

In the United States, there is a national consensus regarding the importance of academically productive talk in school. All major teacher organizations and all recent National Research Council reports advocate involving students actively in "communication" — both talk and writing — using evidence to voice their scientific claims, conjectures, predictions, and explanations. But why? How does talk promote learning? And why is it particularly critical in science?

Talk in the science classroom is important for a number of reasons.

- It provides a window into student thinking, helping teachers see more clearly what students don't understand, as well as what they do understand.
- It guides — or apprentices — students into the fundamental practices of science.
- It encourages students to reason with evidence.
- It builds confidence and creates a willingness to take risks, with big payoffs for student learning.
- Finally, talk "builds the mind" — across multiple disciplines.

In this Talking Point, a teacher and a sociolinguist discuss each of these points, with accompanying videos that show talk in action. Jen Smith is a third grade teacher in the Boston area. Sarah Michaels is a sociolinguist from Clark University.

2. Classroom Video

In the clip that follows, Jen Smith and her third graders are talking about how much space several different candles take up. This is part of an investigation in the Inquiry Curriculum in which students grapple with the notion of volume – or how much space an object takes up in the world. As the discussion proceeds, it becomes clear that there is a great deal of confusion about what it means to take up space. Does it mean the space an object takes up on a table? Or three dimensional space? In order to understand what volume means, everyone has to be working with the same understanding of what taking up space means.

[classroom video starts]

Teacher: If we were to look at these candles in terms of how much space they take up in our world, let's put them

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in order. We like to put things in – in lines like we've been doing lately. So let's put these in order of how much space they take up. Who thinks they might be able to look at these and decide which candle takes up the **most** space? What do you think? Which candle takes up the most space, Brittany?

Brittany: Um that.

Teacher: Why don't you come up and we'll start our line right here. Sit properly please.

[Brittany moves forward and chooses a candle]

Teacher: [Holding up candle Brittany chose] Do people agree this looks like it takes up the most space?

Students: [Many students talking at once.] No, No, Yes.

[Brittany chooses another candle]

Teacher: Oh. [Holds up the second candle] People think this one takes up the most space?

Students: [Talking at once.] Yes. No. No. Yes.

Teacher: Let's hear. [To Brittany] Okay go ahead back so we can all see. [To entire class] So we have these two. Let's hear some explanation why you think this one takes up the most space in our world [lifting the second candle], versus people who think **this** one takes up the most space in our world [lifting the first candle]. [Motions at students to her right] Can you guys back up? I'll try and turn a little more so you can see a little better. What do you think? Let's hear what people think. Simon?

Simon: I think the shorter one because it's wider.

Teacher: Takes more space. Wider.

Student: No, they're the same.

Teacher: Same?

Simon: [Speaking at the same time.]

Teacher: So that changes your mind if they're the same width, now you think this one takes up more space?

Simon: Yeah.

Teacher: Schuyler?

Schuyler: I thought that one from the first because that one's also taller, so it needs more space to, um for higherness. So.

Student?: You mean height?

Schuyler: Yes, so now it's the same size and it's higher, so it takes up more space.

Teacher: So, you're saying they're the same width, but this one

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is higher. So, it takes up more space?

Schuyler: Yes.

Teacher: Is there anyone who still thinks this one might take up more space? What do you think Emily?

Emily: Because that's looks a little fatter than that, so.

Teacher: Let's take a look at it.

Emily: I think they're the same exactly and they're just because, well going down and around they're still like that way or width around. They're the same. Wait, what kind of like more space are we doing? Height more space or width?

Teacher: Just space in the world.

Emily: I think that one.

Teacher: Honor?

Honor: Um if there's like a room, if there's a house that high then it wouldn't matter. But if there was one this high, the big one, would take up more, because it's taller and it would need more space.

Teacher: So you think the amount of space these take up depends on the room that they're in or the house that they're in?

Honor: Like if it was taller than both of them, it wouldn't really matter.

Teacher: Okay so let's think about in our classroom right now, which of these takes up more space? I'd like to see again, is there anyone who still thinks this one takes up more space? And let me hear why. Nate?

Nate: From this angle, I don't really see a difference.

Teacher: Between how much space they take up?

Nate: Yeah. But the taller, I think it takes up more space – but the taller if you're going to go like that it was going to be from the floor to how much high it would be, the taller one would be. But right now, I think we're talking about like, how fat it is.

Teacher: So that's a good point. N's saying when we talk about how much space something takes up, are we just talking about the wideness of it? Like people were saying this one might be wider. Or does how much space something takes up include height too? What do you think? Does how much space something takes up just talk about width and fatness? Or, does it also talk about height, as well? What do you think Marnier?

Marnier: Well, like those two way – like they're the same width, but…

Teacher: They are.

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Marnier: I think that, the height difference, um like that one – like if you cut the bigger one, it would look the same as that one. But, like then, you would have like – like say like that we have like a line, they would be in like a different order.

Teacher: That's what we're trying to figure out. So what order– which one of these do you think would be first in line for the most space it takes up?

Marnier: The…[points to the tall one]

Teacher: This side, okay?

Marnier: The tall one.

Teacher: What do you think about what Nate's bringing up? If we're talking about space it takes up, is it talking about fatness and wideness only? Or, are we talking about height as well? What do you think Brittany?

Brittany: Well just like Nate and Marnier – – they––they […] the same height, well the same size.

Teacher: Around?

Brittany: Yeah. And like the shorter one won't really take up that much space, but the taller one will because it's taller, and the other one's shorter.

Teacher: Okay. Is there anyone else who still thinks this might be the one that takes up the most space? [pause] All right, so I'm going to put this first in line as our taking up the most space. Eli, you want to say something?

3. Window Into Student Thinking

Why is talk so important for student learning? For one thing, **talk provides a window into student thinking**. If students talk about the content they're studying, teachers can see more clearly what students don't understand, as well as what they do understand. This is sometimes referred to as "making thinking visible." Through student discussion, both teachers and students have the opportunity to see which concepts are clear and which are not. We saw a good example of this during the classroom video. As students began to talk about volume, Jen realized that there was a great deal of confusion about what the word "volume" actually means.

[Classroom video]

Teacher: Do people agree this looks like it takes up the most space?

Students: [Many students talking at once.] No, No, Yes.

Teacher: Oh. People think this one takes up the most space?

[Talking at once.] Yes. No. No. Yes.

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[end classroom video]

[Jen and Sarah discuss the classroom video]

Jen: When I started the conversation, I thought for sure they were all going to pick that tall one. When she first picked that candle, I thought okay, good, we got it. And we'll, you know, I'll have some kids explain why and that'll be the conversation and we'll be able to pick the next one and move down the line. I mean we didn't even get the line made in this whole conversation, I remember. It took a long time coming back to it another time. So at that point I'm kind of thinking okay so we have these two, and my mind is racing, how I'm going to get them to figure this out when it seems so obvious to me which one takes up the most space. That's when I do the stalling…

Sarah: You bought some time, you bought some time.

Jen: …what do other people think, I'm ask-, you know I'm trying to gauge first of all, how many kids are confused. And then let's, let's hear some ideas and this is my way of thinking, okay, where am I going to go with this? I think I was trying to get to someone who I thought might be able to articulate *really* what it means to take up space and help kids really see what that means and hope that we could go from there. But they were truly very, very confused so…

Sarah: One of these really interesting things about science talk is that we use language in an everyday sense and in a technical sense, and space in the world might communicate clearly to those in the know, adults or whatever that its 3D space. But space in the world still could mean space on the table, and so it's, it's one of those interesting things where you think it's obvious and clear, but if you're working with a slightly different meaning for space, it makes a lot of sense.

4. Apprenticeship in Science

Talk is essential to scientific work and learning. For evidence to have weight in the scientific community, it has to be explicated, argued for, and made public, so that others can evaluate it and think with it.

Scientists use language in every aspect of what they do, discovering things, convincing others, and communicating with the public. In the following clip, we return to Jen's third graders as they talk about the volume of three different-sized candles, and it becomes apparent that there is a lot of confusion about what the word volume actually means. Then Jen talks about how her classroom practices with talk mirror what scientists actually do.

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[classroom video starts]

Teacher: Do people agree this looks like it takes up the most space?

Students: [Many students talking at once.] No, No, Yes.

[classroom video ends]

Jen: This particular lesson, you know, because it was clear that there was a lot of misconception or confusion, they weren't quite there, there was that conversation that we had [gestures with her hands to indicate the students in a circle], and then, let's go back to your workgroups, where they were doing their own investigations, work on it some more, get your hands into it, and really play with them and feel the objects, and then we'll come back and talk again, which I think is very much what scientists do in life. You know, there's a lot of come together and talk, what did you figure out, what have you discovered, where are you at. Let's go back to our labs and work on it some more, and then come back and talk some more when we've made new discoveries. So I think it mimics very much what scientists really are doing, um, and how they really work.

[Sounds of students talking. Screen Caption: Ordering four blocks by volume"]

Kelly: If you're really going to think about it, though, I mean Gwen's idea and Nick's idea, they both relate somehow, because they both start with D… [voice becomes indistinct as others chime in]

Nick: No, I agree with Bailey's new idea. I agree with Bailey's new idea. Yeah, I agree with that.

Gwen: But guys, are we…

Kelly: I agree with Bailey's, because if you're going to double C, it would be the same as… [picks up a block and reads letter off the bottom, indistinct]

Student: So everybody's disagreeing with Nick's idea that he had before.

Nick: Yeah, and I disagree with my idea that I had.

Student: So we're all on the same page, and Gwen…

In this clip, the students were taking stock of how their ideas related to one another. Nick acknowledges that he has changed his mind and now agrees with Bailey's new idea, and Kelly provides specific evidence for Bailey's claim, providing further support for her position. They finally achieve consensus based on convincing evidence, and are all on the same page. What these third graders

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accomplish is precisely what scientists do with their colleagues in building on one another's thinking to generate consensus and public knowledge.

Text on final screen

Well-structured talk supports students to participate in and acquire the fundamental practices of science:

- Students reason with data and models and representations.
- Students articulate their ideas so that others can understand and critique them.
- Students grapple with their own and others' ideas to improve them and achieve shared understandings, generating public knowledge.

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