

FIGURE 1: Rubric for formatively assessing oral scientific argumentation.

Intrapersonal	Claims	Evidence	Reasoning	Relevance
	Students offer claims [tentative answers] to address questions under discussion.	Students use evidence to support their ideas.	Students use reasoning to explain how data serve as evidence for their claim[s] and/or explicitly connect multiple pieces of evidence.	Students' contributions are relevant to the scientific question that is the focus of the argumentation activity.
Interpersonal	Listening	Critiquing	Co-Constructing	Regulation
	Students reference the contributions of others and/or ask one another to clarify or elaborate their positions. Students indicate listening through their body language.	Students offer helpful critiques for arguments made by others.	Students construct or refine their thinking in ways that build on what others have to say.	Students manage the discussion in such a way that respectful, equitable, and productive discourse can occur.

FIGURE 2: Tips for recognizing and supporting intrapersonal aspects of oral argumentation.

	Recognizing What you might hear students say when making a claim	Supporting Useful teacher prompts
Claims	<ul style="list-style-type: none"> • I believe that _____. • I think that _____. • I predict that _____. • My claim is _____. • One idea I have is _____. 	<ul style="list-style-type: none"> • Is someone willing to share what they think? • We have just discussed . . . evidence. What claim or claims does this seem to support? • Does someone think something else? • What question do we still need to answer?
Evidence	<ul style="list-style-type: none"> • The data we collected suggests that _____. • The evidence says that _____. • I observed that _____. 	<ul style="list-style-type: none"> • What might be some evidence or data that supports what you think? • What could you use to support your ideas? • What observations support your ideas?
Reasoning	<ul style="list-style-type: none"> • The evidence supports what I said because _____. • How it happens is that _____. • The evidence matters more/less because _____. 	<ul style="list-style-type: none"> • How does your evidence support what you think? • How are different pieces of evidence connected to one another?
Relevance	<ul style="list-style-type: none"> • How is that related to your question? • Can you connect that idea to your question? • Are we digressing here? Let's remember that the topic/issue is _____. • Are we getting off-topic? How does this relate to _____? 	<ul style="list-style-type: none"> • Students making use of their readings, evidence sources, etc., during discussion.

FIGURE 3: Tips for recognizing and supporting interpersonal aspects of oral argumentation.

	Recognizing What you might hear students say when making a claim	Supporting Useful teacher prompts
Listening	<ul style="list-style-type: none"> • So, what you are saying is _____. • What do you mean when you say _____? • I didn't fully understand. Can you say that again? • I don't think that is what they meant. I think what they meant was _____. 	<ul style="list-style-type: none"> • In your own words, can you rephrase what was just said? • Can someone repeat the argument that was just made? • What are your thoughts about the idea that _____ just gave us?
Critiquing	<ul style="list-style-type: none"> • I understand what you are saying, but _____? • If that was true, then wouldn't _____? • Have you thought about _____? • I see it in a different way. I think that _____. 	<ul style="list-style-type: none"> • Can anyone challenge the ideas offered? • Does anyone have another way of seeing this? • Do any of you disagree? • Why do you disagree?
Co-constructing	<ul style="list-style-type: none"> • Building on what _____ said, _____. • Kind of like what _____ said, _____. • Our group thought that _____. • I disagree with what _____ said because _____. • Earlier, people were talking about _____ and I think that _____. • Now that you said that, it makes me wonder _____? 	<ul style="list-style-type: none"> • Is there a way that we can combine these ideas? • How does that relate to what others said?
Regulation	<ul style="list-style-type: none"> • I'd like to hear what _____ has to say about _____. • Do we agree enough to move on? • I think we are stuck. Should we talk about a new piece of evidence, or does someone have a different idea? • Let's let other people talk and see if there are any new ideas. 	<ul style="list-style-type: none"> • I'm hearing a lot of good ideas, but they are only coming from a few people. How can you support one another to ensure that everyone feels comfortable talking? • How are you working well as a group and how could you improve to make sure all ideas are considered and strengthened? • How can we respond to one another's ideas and not just add our own separate ideas?

Ideas That Guide Our Formative Assessment Framework

Key idea	Source
Oral arguments consist of both the content voiced by students (<i>argument</i>) and the back-and-forth process of building ideas (<i>argumentation</i>). This distinction allows for two bundles of components: the intrapersonal, which deals with the argument itself, and the interpersonal, which deals with the process of argumentation.	Osborne, Erduran, and Simon 2004
Participants in oral argumentation are accountable to facts and logic, which means that a valid argument is both scientifically accurate and relevant to the question at hand. In addition, participants are also accountable to the learning community, which means a valid argument takes into account the contributions of others.	Michaels, O’Conner, and Resnick 2008
Opportunities for collaborative discourse can act as a scaffold for developing argumentative reasoning. The social interactions that take place between students are essential for this development. This idea elevates the important link between the intra- and interpersonal dimensions.	Kuhn and Udell 2003