

## Discourse Moves for Unit 6: Model Fit

### **Eliciting a hypothesis:**

*Ask a student to make a conjecture about the suitability of their models to the class data. Don't be concerned at this point if students only attend to individual runs.*

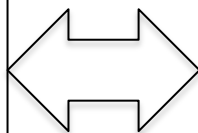
#### *Box 1: Observations of the model*

"How do the parts of your model work together to produce a pretend measurement?"

"What did you notice when you ran your model?"

"What do you notice about the shape of the data produced by your model?"

"What do you notice when you run your model again and again?"



#### *Box 2: Fitting features to class data*

"What makes your model a good or a bad fit with our class data?"

"How close is the median of the pretend measurements generated by your model to the median of the real measurements?"

"How close is the IQR of the pretend measurements generated by your model to the IQR of the real measurements?"

### **Building Collective Understanding:**

*1. Restate that student's hypothesis or have someone else restate the hypothesis to make the hypothesis public (yes-anding/making it public).*

- "So you notice that \_\_\_\_\_?"
- "\_\_\_\_\_, can you restate that in your own words? What does \_\_\_\_\_ think this model shows us about \_\_\_\_\_?"
- "\_\_\_\_\_ claims that the model is a good/bad fit with our data because \_\_\_\_\_."

*2. Ask any extension/clarification questions if necessary to help others understand.*

- "What do you mean when you say \_\_\_\_\_?"
- "Can you show us where you see that on your model/class data?"
- "\_\_\_\_\_, can you come point to how the display shows us that?"
- "I'm not sure I understand what you mean by \_\_\_\_\_."
- "Is that what you expected your model to do? Why/why not?"
- "How does your model explain the differences we see in our measurements?"

### **Eliciting a response to the hypothesis:**

*Ask other students to respond to the hypothesis, making sure they clearly explain or show their reasons for agreement/disagreement.*

- "\_\_\_\_\_, is that something you agree with? Why?"

- “Do you agree with \_\_\_\_\_’s claim that \_\_\_\_\_?”
- “What do you think about \_\_\_\_\_’s claim that \_\_\_\_\_?”
- “Who can respond to \_\_\_\_\_? She thinks that the model is a bad fit because \_\_\_\_\_.”

***Connective statements/questions (What stays the same/what changes?):***

*Ask questions or make comments to encourage shifts in thinking from individual runs to aggregate patterns in relation to the class data.*

- “Which models seem to do the best job helping us think about why the measurements were not all the same?”
- “When we ran some of our models, they did not simulate (make) every measurement in the real data. Is that OK? Why?”
- “What changes when you run the model again and again?”
- “What stays the same when you run the model again and again?”
- “What might be the advantage of more model runs for trying to determine whether a model is a good fit? Why not just run the model once?”
- “What does the median of the sampling distribution of the medians tell us?”
- “What does the median of the sampling distribution of the IQR’s tell us?”
- “What might you revise about this model to make it fit better with our data?”

***Pulling it together:***

*Make a brief summary statement with a “big idea” that students have come to through discussion. Think of it as a restatement, but you may want to add something extra to help make this idea salient.*

- “I think that what we can agree on is that sometimes one run of the model might fit the data (or not fit) the data well, but we need to run the model many times to see how it simulates many samples—to see if many samples tend to fit our real data.”
- “What I hear you saying is that there are different ways of thinking about whether or not a model is good. We can ask if the pretend measurements made by the model tends to approximate the shape of our data or its best guess of the real length or the precision of the measurements.”
- “What we’ll need to continue thinking about is why the center made by the pretend measurements of the model is a good fit to our data but the precision (IQR) of the pretend measurements of the model is not a good fit to our data and why that might be happening.”
- “We’ve agreed our model is not quite a good fit yet. Let’s keep thinking about how we could change our model(s) to make the fit better or to make it easier to understand.”
- “We’ve talked a lot about what our model is good at representing. Tomorrow we’ll think more about how models help explain why our measurements (or production values) were different.”

