Extending Thinking and Collaborative Culture of Learning

What You Might See Aligned with FARROP Performance Levels, Extended Thinking During Discourse and Collaborative Culture of Learning

High School Science Lesson

*The italicized bold sections below indicate differences in the lesson from the proceeding rubric level.

Formative Assessment Practice	Beginning	Developing	Progressing	Extending
Brief Overview	Collaboration is not evident in this lesson nor is any discourse. The classroom culture is characterized by the teacher (and not the students) taking responsibility for the learning.	Collaboration and discourse are minimally evident in this lesson with student participation limited to answering questions. Occasionally, the teacher probes student thinking to deepen learning. Mostly the teacher takes responsibility for the learning.	The teacher and students are equally responsible for learning and the students are actively engaged in collaboration and discourse during the lesson. The teacher and students frequently build on one another's comments and questions to deepen learning.	The teacher and students are equally responsible for learning. Collaboration and extended conversation are evident throughout the lesson and all students are active participants in solving problems. The teacher and students regularly build on one another's ideas and provide feedback to promote a deeper exploration of ideas.
Specific example of what you might see	Students are learning about similarities in energy transfer across physical and life science systems. The lesson starts with the teacher displaying graphs of energy transfer patterns on the whiteboard and then reading a description of a physical system, e.g. the flow of water in a creek. She asks students which graph matches the description. After one	Students are learning about similarities in energy transfer across physical and life science systems. The lesson starts with the teacher displaying graphs of energy transfer patterns on the whiteboard and then reading a description of a physical system, e.g. the flow of water in a creek. She asks students which graph matches the description. After one student gives her opinion, the teacher tells her she's right and then provides a more elaborate explanation about why the	Students are learning about similarities in energy transfer across physical and life science systems. ***The lesson starts with students working in groups to review descriptions of various physical systems and correlate them with graphs of energy transfer patterns. While students are collaborating, they build upon one another's ideas to come to an agreement about which graphs match which descriptions. Students sometimes ask one other***	Students are learning about similarities in energy transfer across physical and life science systems. ***The lesson starts with students investigating energy transfer in physical systems. They work in groups to create Rube Goldberg machines, which are overly complicated, connected devices that together create a domino effect. As they work, they discuss what factors in the system speed up the marble that runs through the machine or slow it down. Student groups then create video explanations of how***

	student gives her opinion, the teacher tells her she's right and then provides a more elaborate explanation about why the physical system correlates with the particular graph. The teacher reads out a few more descriptions and repeats the same process with students. The students also have handouts at their desks of the descriptions and graphs. Next, the teacher asks students to work independently to write down on their graph handout how each graph correlates to a particular physical system. The teacher walks around the classroom while students are working, making comments focused on clarifying activity procedures. The students then move on to the next activity which is to read an article on energy transfer in food chains. The class reads the article aloud, round robin style. In their final activity for this lesson, students	physical system correlates with the particular graph. The teacher reads out a few more descriptions and repeats the same process with students. The students also have handouts at their desks of the descriptions and graphs. Next, the teacher asks students to work independently to write down on their graph handout how each graph correlates to a particular physical system. ***The teacher walks around the classroom while students are working, pointing out mistakes and omissions in their explanations. Sometimes the teacher will ask students questions to deepen their thinking, though at times, the teacher cuts off student responses to finish their thinking for them. The teacher-to-student interaction is frequently focused on clarifying activity procedures.*** The students then move on to the next activity which is to read an article on energy transfer in food chains. The class reads the article aloud, round robin style. ***Students then turn and talk to a partner about which they think is the most energy efficient organism for humans to eat.*** In their final activity for this	***clarifying question and express different viewpoints during this process, though at times only a few students in each of the groups do most of the talking while others feel less comfortable participating. The teacher checks in with different groups as they're working, asking them to explain their thinking. While much of the teacher-to-student interaction is focused on the content of the lesson, at times it can get caught up in clarifications of activity procedures.*** ***Then students move onto the next activity which is to work in groups to discuss and decide which they think is the most energy efficient organism for humans to eat. In this activity, students are expected to draw on what they learned in their analysis of physical systems and what they know about food chains. Student collaboration takes on a similar form as in the earlier activity, with added emphasis on reasoning from evidence. In groups, each student presents their proposed organism and rationale, while other students in the group respond by asking probing questions. Ultimately, each group chooses one organism.***	***the different devices in their machines influence energy transfer across the system, e.g. friction, speed, and slope. While students are collaborating on their machines and video explanations, they freely verbalize their reasoning and build upon one another's ideas to develop a collective understanding of energy transfer and to come to an agreement. Students ask one other clarifying questions and express different viewpoints in a respectful manner during this process. The teacher checks in with different groups as they're working, asking them to explain their thinking with questions and probes such as, "Tell me more about why you think some of the dominos are still standing. Does anyone else have a different opinion?"*** Then students move onto the next activity which is to work in groups to discuss and decide which they think is the most energy efficient organism for humans to eat. In this activity, students are expected to draw on what they learned in their analysis of physical systems and what they already know about food chains. Student collaboration takes on a similar form as in the earlier activity, with added emphasis on reasoning from evidence. In groups, each student presents their proposed organism and rationale, while other students in the group respond by

	write explanations of why a particular organism is the most efficient for humans to eat. To conclude the lesson, the teacher calls on a few students to share why they chose a particular organism. The teacher then explains to the whole class some parallels between the physical and life science systems they've been learning about.	lesson, students write explanations of why a particular organism is the most efficient for humans to eat. ***They are expected to draw on both what they learned about energy in physical systems and what they know about food chains.*** To conclude the lesson, the teacher calls on a few students to share why they chose a particular organism. ***The teacher then asks one or two other students in the class to build on the presented ideas, focused on parallels between the physical and life science systems.***	***To conclude the lesson, the teacher asks each group to present their chosen organism, along with their evidence and reasoning. This is followed by a whole group discussion on parallels found between the physical and life science systems. While some students are active participants in the whole group discussion, others are not. The teacher often capitalizes on student comments during the discussion to deepen learning for the whole class, though at times she focuses her comments and questions on correct and incorrect responses.***	asking probing questions ***and giving feedback.*** Ultimately, each group discusses all the evidence presented and chooses one organism. To conclude the lesson, the teacher asks each group to present their chosen organism, along with their evidence and reasoning. This is followed by a whole group discussion on parallels found between the physical and life science systems ***with students eagerly chiming in to share their conclusions, such as that the systems are similar in that more steps equal greater loss of energy.*** The teacher capitalizes on student comments during the discussion to deepen learning for the whole class. ***Throughout the lesson, students take responsibility for their own and their peers' learning, without reliance on the teacher to draw conclusions for them or to support one another through procedural aspects of the lesson.***