SCIENCE-TALK STRUCTURES

Listen and Compare

- Use Private Thinking and Reasoning Time
- Form **A/B** Partners
- **A** – explains her/his ideas*
- **B** – Silently listens to understand A's scientific thinking
- Reverse Roles:
- **B** – explains her/his ideas*
- **A** – Silently listens to understand B's scientific thinking
- (For triads and quads) Continue until all partners have reported.
- **All** – discuss ways their ideas* are scientifically the same and/or different

Re-voice and Compare

- Use Private Thinking and Reasoning Time
- Form **A/B** Partners
- **A** – explains her/his ideas*
- **B** – Silently listens to understand A's scientific thinking
- **B** – carefully re-voices A's ideas without judging, adapting, or commenting on correctness of ideas
- **A** – clarifies as needed
- Reverse Roles:
- **B** – explains her/his ideas*
- **A** – Silently listens to understand B's scientific thinking
- **A** – carefully re-voices B's ideas without judging, adapting, or commenting on correctness of the ideas
- **B** – clarifies as needed
- (For triads and quads) Continue until all partners have reported.
- **All** – discuss ways their ideas* are scientifically the same and/or different

Interpret and Compare

- Use Private Thinking and Reasoning Time
- Form **A/B** Partners
- **A/B** Partners exchange their written work for a task.
- Use Private Thinking and Reasoning Time to study each other's work and, without discussion, try to understand each other's scientific reasoning.
- **A** – reports his/her interpretation of B's reasoning
- **B** – clarifies as needed
- **B** – reports his/her interpretation of A's reasoning.
- **A** – clarifies as needed
- (For triads and quads) Continue until all partners have reported.
- **All** – discuss ways their ideas* are scientifically the same and/or different

***Scientifically Productive Talk focuses on and includes scientific reasoning, sense-making, representations, claims, explanation, argument, justification, and evidence.**

STRUCTURING STUDENT SCIENCE-TALK

Purposes:

- Support the development of student-to-student interaction that is consistently equitable, status-free, and scientifically productive (i.e. student interactions consistently include students' scientific reasoning, sense-making, representations, claims, explanations, argument, justifications, and evidence)
- Provide formative assessment information that drives instructional decisions

Student Outcomes:

- Equitable, status-free, and scientifically productive student-to-student interaction
- Increased metacognitive skills
- Increased capacity to articulate and clarify scientific thinking
- Increased science content knowledge
- Improved Science/Engineering Habits-of-Practice
- Improved Science/Engineering Habits-of-Interaction
- Increased accountability and engagement
- Increased self-efficacy as scientists

Protocol

- **Introduce the task and implement the structure.** Provide students with the task – carefully worded to assure emphasis on scientific reasoning, sense-making, representation, claims, explanation, argument, justification, and evidence.
- **Monitor the science-talk.** Listen for trends in student thinking. Select and sequence ideas for a plenary.
- **Facilitate a plenary discussion of student ideas.** Invite selected students to report about their thinking, their partner's thinking, and/or their combined ideas. Sequence student reporting, interject information, and question to focus, scaffold, and/or advance student thinking about core science concepts, practices, and connections.
- **Reflect about the process.** Ask student scientists, "How was today's Science Talk process helpful for you?" A process debrief is not always necessary, but is important periodically. It fosters student ownership and increases engagement and accountability.

Structures for the Science Dyad, Triad, and Quad

When students work in a Science Dyad, Triad, or Quad, the science talk:

- **Always** includes forming A/B Partners.
- **Always** begins with Private Thinking and Reasoning Time – time for each student to think about the task.
- **Always** focuses on each group member's scientific reasoning, sense-making, representation, claims, explanation, argument, justification, and evidence.
- **Always** ends with a discussion of ways their ideas are scientifically the same and/or different.
- **Always** follows a prescribed structure that provides students "practice" with status-free, and scientifically productive student-to-student interaction.

Listen and Compare	1. Partner A explains his/her ideas while B silently listens to understand A's thinking. 2. When teacher announces, "Finish your thought and switch roles," A and B reverse roles. 3. For Triads and Quads – Repeat until all partners have reported.
Re-voice and Compare	1. Partner A explains while B silently listens to understand A's scientific thinking. 2. When teacher announces, "Finish your thought and Partner B revoice," B carefully revoices A's ideas without judging, adapting, or commenting about the correctness or sensibility of the ideas. 3. A clarifies as needed. 4. When teacher announces, "Switch roles," Partners A and B reverse roles. 5. Repeat until all partners have re-voiced and reported.
Interpret and Compare	1. Two partners exchange their written work for the task. During Private Thinking and Reasoning Time the partners study each other's work and, without discussion, try to understand each other's reasoning. 2. Partner A reports his/her interpretation of B's reasoning; B clarifies as needed. 3. Partner B reports his/her interpretation of A's reasoning; A clarifies as needed.