Patterns Physics Resource: Student Talk Road Map for Community Building, Academic Talk, and Data Discussions

Student discourse is a cornerstone of Patterns Physics and constructivist learning. This guide offers a vertically articulated, year-long roadmap for cultivating productive, equitable talk: we start with community-building exchanges, progress to academic talk around the big ideas, and then enact a multi-level release of responsibility for data discussions, culminating in fully independent students. For a quick overview of these supports in action, see the video on data-discussion talk moves. See the Patterns Sequence Design Principles for a deeper understanding of how student talk integrates with the curriculum.

Task	Talk Structure	Low Barrier Talk, Focused on Community Building, and Establishing Equitable Talk Norms			
Community Building Talk	Specific Scripts	Example 1: Three Awesome Things About Me	Example 2: Tidy or Messy	Example 3: Animal for the Day	Example 4: Early, On Time, Late
	General Scripts	Community Questions are student-led with Discussion Scripts, where the teacher may supply the questions			
	General Prompts	Community Building Questions: List of 20 prompts/questions			

Task	Talk Structure	Academic Talk focused on Processing and Synthesizing the Big Ideas

Academic Talk	Specific	Example 1: Task 1.3 Connection Question Student-led using this script	Example 2: Task 1.5 Connection Question Student-led using this script	Example 3: 1.7 Interconnecting Everything Student-led using this script	Example 4: Task 2.1 Community Building + Building Background Question Student-led using this script
	General Scripts	General Exit Ticket Script for Student-led use, see an example Exit Ticket prompt from Task 1.5			
	General	See General Talk Structures and Slide-based supports in the Poster and Common Slides File			

Sensemaking Talk for Equitable, Student-Centered Learning with Data Discussions					
Task	Level of Support	Orienting to the Data	Analyzing the Data	Making Sense of the Data	Applications and Limitations
1.3 Ball on Floor Experiement	Suggested	Teacher-led with the graphic organizer	Student-led with this Data Script	Teacher-led with graphic organizer	Teacher-led with graphic organizer
	Level 1 support	Teacher-led with an annotated pre-filled graphic organizer	Teacher-led with an annotated pre-filled graphic organizer	Teacher-led with an annotated pre-filled graphic organizer	Teacher-led with an annotated pre-filled graphic organizer
1.5 Ball on Ramp Experiement	Suggested	Teacher facilitated with the graphic organizer	Student-led with this Data Script	Student-led with Data Scripts, then transition to Teacher-led	Teacher facilitated with the graphic organizer
	Level 1 support	Teacher-led with an annotated pre-filled graphic organizer	Teacher-led with an annotated pre-filled graphic organizer	Teacher-led with an annotated pre-filled graphic organizer	Teacher-led with an annotated pre-filled graphic organizer

1.6 Playing with Paragraphs Experiment	Suggested	Teacher facilitated with the graphic organizer	Student-led with this Data Script	Student-led with Data Scripts, then transition to Teacher-led	Student-led with this Data Script
	Level 1 support	Teacher-led with an annotated pre-filled graphic organizer	Student-led with Data Scripts, then transition to Teacher-led	Student-led with Data Scripts, then transition to Teacher-led	Teacher-led with an annotated pre-filled graphic organizer
2.4 Elastic Energy Experiment	Suggested	Student-led with this Data Script	Student-led with this Data Script	Student-led with Data Scripts, then transition to Teacher-led	Student-led with this Data Script
	Level 1 support	Teacher-led with an annotated pre-filled graphic organizer	Student-led with Data Script, then transition to Teacher-led	Student-led with Data Script, then transition to Teacher-led	Student-led with Data Script, then transition to Teacher-led
3.2 Investigation into the impact of a shoe	Suggested	Teacher-led with the graphic organizer	Student Leader led with facilitator cards	Student Leader led with facilitator cards	Student Leader led with facilitator cards
	Level 1 support	Teacher-led with an annotated pre-filled graphic organizer	Student-led facilitator cards with Data Scripts	Student-led with Data Script, then transition to Teacher-led	Student-led with Data Script, then transition to Teacher-led
3.4 Data Mining for Newton's 2nd Law	Suggested	Student Leader facilitated with the graphic organizer	Student Leader facilitated with the graphic organizer	Student Leader facilitated with the graphic organizer	Student Leader facilitated with the graphic organizer
	Level 1 support	Teacher-led with the graphic organizer	Teacher-led with the graphic organizer	Student-led with Data Script, then transition to Teacher-led	Student-led with Data Script, then transition to Teacher-led
4.2 Finding the patterns in waves	Suggested	Student facilitated with the graphic organizer	Student facilitated with the graphic organizer	Student facilitated with the graphic organizer	Student facilitated with the graphic organizer
	Level 1 support	Student-led with this Data Script	Student-led with this Data Script	Student-led with this Data Script	Student-led with this Data Script

	Level 2 support	Student-led with Data Script, then transition to Teacher-led	Student-led with Data Script, then transition to Teacher-led	Student-led with Data Script, then transition to Teacher-led	Student-led with Data Script, then transition to Teacher-led
5.4 Optimizing a solar cell	Suggested	Student facilitated with the graphic organizer	Student facilitated with the graphic organizer	Student facilitated with the graphic organizer	Student facilitated with the graphic organizer
	Level 1 support	Student-led with this Data Script	Student-led with Data Script	Student-led with this Data Script	Student-led with this Data Script
	Level 2 support	Student-led with Data Script, then transition to Teacher-led	Student-led with Data Script, then transition to Teacher-led	Student-led with Data Script, then transition to Teacher-led	Student-led with Data Script, then transition to Teacher-led

Teacher-led with an annotated Pre-filled Organizer: The teacher provides a strategically annotated and partial pre-filled graphic organizer, along with step-by-step guidance for students to be successful. This includes explicitly discussing each pre-filled and unfilled box, defining terms, and explaining how or where students in the future would find the information needed to construct a response. The teacher either models strong responses or gathers multiple responses from students for each box and gives constructive feedback about why the response meets the intention of the box or what could be improved in the response to do so.

Teacher-led with the graphic organizer: The teacher provides step-by-step guidance for students to be successful. This includes explicitly discussing each box, defining terms, and explaining how or where students in the future would find the information needed to construct a response. The teacher either models strong responses or gathers multiple responses from students for each box and gives constructive feedback about why they meet the intention of the box or what could be improved in the response to do so.

Teacher facilitated with the graphic organizer: The teacher provides minimal guidance for students to be successful. For key boxes, the teacher orchestrates and guides student responses. Occasionally, in this mode, the teacher may model strong responses.

Student-led with Data Script: Students use the data script to direct their data discussion. The teacher monitors groups, stepping in to model or guide to keep student groups moving forward effectively. If too many groups need help simultaneously, the teacher may need to bring the class together for a teacher-led discussion to move forward efficiently.

Student Leader led with facilitator cards: The teacher may gather student leaders from each group (teacher selected, student selected, or students sitting at the A1 spot) before the data discussion and check in with them that they each have a strong enough understanding of the Orient to the Data and Analyzing the Data to facilitate the conversation up to that point with these Data Discussion Facilitator Cards. The students do not need to have made sense of the pattern yet; this will ideally come about authentically during the Making Sense of the Data section. Teachers can be supportive in maintaining small groups, but if too many groups need help simultaneously, the teacher may need to bring together the class for a Teacher-led discussion to move forward efficiently.

Student Leader facilitated with the graphic organizer: The teacher may gather student leaders from each group (teacher selected, student selected, or students sitting at the A1 spot) before the data discussion and check in with them that they each have a strong enough understanding of the Orient to the Data and Analyzing the Data to facilitate the conversation up to that point using the graphic organizer. The students do not need to have made sense of the pattern yet; this will ideally come about authentically during the Making Sense of the Data section. Teachers can be supportive in maintaining small groups, but if too many groups need help simultaneously, the teacher may need to bring the class together to move forward efficiently.

Student facilitated with the graphic organizer: Students use the graphic organizer to guide their data discussion. The teacher monitors groups, stepping in to model or guide to keep student groups moving forward effectively. If too many groups need help simultaneously, the teacher may need to bring together the class for a Teacher-led discussion to move forward efficiently.