

Coherent Science Content Storyline Strategies Summary Chart

	A. Identify One Main Learning Goal	B. Set the Purpose with a Focus Question or Goal Statement	C. Select Activities That Are Matched to the Learning Goal	D. Select Content Representations and Models Matched to the Learning Goal and Engage Students in Their Use	E. Sequence Key Science Ideas and Activities Appropriately	F. Make Explicit Links between Science Ideas and Activities	G. Link Science Ideas to Other Science Ideas	H. Highlight Key Science Ideas and Focus Question Throughout	I. Summarize Key Science Ideas
Purpose	One main learning goal provides a focus for the teacher when planning for all student experiences during the lesson.	A focus question or goal statement sets the purpose for the lesson for students and is intended to help students connect to the subject matter they'll learn about in the lesson. The focus question can be used to elicit students' initial ideas.	Activities help students develop the science content storyline. While selecting activities that are fun or affordable or manageable is a good thing, these are not sufficient reasons for selecting an activity.	Content representations (CRs) can help students construct the science content storyline. CRs must closely match the main learning goal, and students need to interact with them (not just listen to the teacher talk about them).	The appropriate sequence of key science ideas and activities helps the teacher focus on the science content storyline and the students develop it.	Making explicit links between science ideas and activities helps students construct the science content storyline. Don't assume students will see the intended links. Being explicit helps them think about the ideas and not just the procedures before, during, and after each activity.	Making explicit links between science ideas and other science ideas helps students construct the intended science content storyline and develop strong conceptual understandings.	The science content storyline is easier to follow if the main learning goal, supporting science ideas, and the flow of events are highlighted at key points during the lesson.	A summary statement helps to tie science ideas and the storyline together at the end of the lesson and can be used to link ideas and activities to the main learning goal.
Key Features	Each lesson has one main learning goal. Main learning goals <ul style="list-style-type: none"> are complete sentences that are worthy of a full class period/lesson, are important science concepts that students don't already know, are grade-level appropriate and matched to standards, and are scientifically accurate. 	A focus question or goal statement <ul style="list-style-type: none"> is written in everyday language, helps students anticipate the lesson's main learning goal, is revisited throughout the lesson (see strategy H), and can be used to bring closure to the lesson (see strategy I). 	Activities matched to the learning goal do one or more of the following: <ul style="list-style-type: none"> Challenge common student ideas (misconceptions) related to the main learning goal. Provide observable evidence of a phenomenon that can be explained using the main learning goal. Present new information about the main learning goal in ways students can understand. Provide opportunities to use and apply the ideas related to the main learning goal in real-world situations. Provide opportunities to synthesize and make connections related to the main learning goal. 	CRs matched to the learning goal <ul style="list-style-type: none"> are scientifically accurate, present ideas in ways students can understand, do not reinforce common student ideas/misconceptions, reveal and help students wrestle with common student ideas/misconceptions, and do not distract from the main learning goal with too many new terms or details. <p>Students engage in using CRs by</p> <ul style="list-style-type: none"> modifying or creating CRs, analyzing the meaning, and critiquing CRs. 	Science ideas and activities must be sequenced across lessons and within a lesson. <i>Across Lessons</i> <ul style="list-style-type: none"> The progression of ideas and activities should be informed by national documents, such as the NGSS, and local curriculum. <i>Within a Lesson</i> <ul style="list-style-type: none"> Include only a few key science ideas that are closely matched to the main learning goal. 	Links between science ideas and the activity are made before, during, and after the activity. Science ideas are stated in complete sentences and indicate how the idea is related to the activity students will do, are doing, or have done. The teacher poses questions that engage students in thinking about science ideas related to the activity and not just a topic or procedures.	Things to look for: <ul style="list-style-type: none"> Two (or more) science ideas are being linked. The ideas being linked are closely matched to the main learning goal. You can state each idea in a complete sentence. This strategy is about linking ideas together, not about linking ideas to activities or linking activities to activities. The link can be made by the teacher and/or the students. 	Highlighting can be accomplished by <ul style="list-style-type: none"> referring back to the focus question throughout the lesson; writing key science ideas on the board or chart paper; telling students, "This is a key science idea"; having students write key science ideas in their notebooks; revisiting key science ideas multiple times in a lesson; and summarizing at key transition points in the lesson. 	The teacher can make a summary statement, but engaging students in synthesizing and summarizing (STL strategy 7) is more supportive of student learning. The summary should <ul style="list-style-type: none"> focus on conceptual understanding, match the main learning goal, and be scientifically accurate.

	A. Identify One Main Learning Goal	B. Set the Purpose with a Focus Question or Goal Statement	C. Select Activities That Are Matched to the Learning Goal	D. Select Content Representations and Models Matched to the Learning Goal and Engage Students in Their Use	E. Sequence Key Science Ideas and Activities Appropriately	F. Make Explicit Links between Science Ideas and Activities	G. Link Science Ideas to Other Science Ideas	H. Highlight Key Science Ideas and Focus Question Throughout	I. Summarize Key Science Ideas
Examples	<p>Water exists in three states of matter—liquid, solid, and gas—and undergoes changes of state <i>that can be observed</i>.</p> <p>Water changes states when it gains or loses heat energy, and these changes can be explained <i>in terms of molecular movement</i>.</p>	<p><i>Focus question:</i> “How can you make water seem to disappear?”</p> <p><i>Goal statement:</i> “We’re going to learn about what happens when water changes from a liquid to a gas.”</p>	<p>Types of activities:</p> <ul style="list-style-type: none"> • Observing phenomena • Constructing models • Drawing diagrams • Interpreting graphs • Discussing in small groups or whole class • Reading from a textbook or trade book • Answering questions • Carrying out a roleplay • Using simulations 	<p>CRs:</p> <ul style="list-style-type: none"> • Bar graph • Labeled illustration • Physical model • Role-play • Diagram • Online simulation 	<p><i>Within a lesson:</i></p> <ul style="list-style-type: none"> • Link to ideas from previous lessons • Introduce a focus question to set the purpose for students • Set up an activity by linking to key science ideas. • During the activity, make sure students are making links to key science ideas. • Follow-up to the activity helps students link the activity and science ideas. • Students need multiple opportunities to use and apply new ideas in a variety of contexts. • Students summarize at the end of the lesson. • Provide a link to the next lesson in terms of science ideas. 	<p>The teacher sets up an activity with a focus question (or elicit question) so students can make predictions and understand that they are going to use the activity to answer the question.</p> <p>During the activity, the teacher probes student ideas and challenges them to interpret and reason about what they are observing.</p> <p>After the activity, the teacher asks students to share their explanations and challenges them to make connections between the science ideas and what they did in the activity.</p>	<p><i>Beginning of lesson:</i> “Yesterday we learned water can change from liquid to gas in the air, where we can no longer see it. Today we’ll continue our exploration of how water changes and consider whether water in the air can ever reappear. If so, how does that happen? If not, why not?”</p> <p><i>End of lesson:</i> “Today we learned that the matter in ‘dead stuff’ decomposes and returns to the environment (the air or the soil). Tomorrow, we’ll think about what happens to energy during decomposition.”</p>	<p>“What have we learned so far about water molecules and how they behave in different states of matter?”</p> <p>“What ideas do we have so far about how decomposers help provide matter for plants?”</p> <p>“Write down this key idea in your own words in your science notebooks.”</p>	<p>“A key idea from today’s lesson is that condensation occurs when gaseous water-vapor molecules lose energy, slow down, and join together to form liquid water.”</p>