

# Graduate Programs Instructional Framework (2020-2021)

## Center for Science Teaching and Learning



Elements of Ambitious Science Teaching	Instructional Design Strategies	High-Leverage Practices and Strategies
<i>provide a shared image of rigorous and equitable science instruction</i>	<i>occur before unit and lesson planning and enable effective instruction</i>	<i>occur moment-to-moment, are central to effective teaching, and provide a common language for talking about teaching</i>
<p style="text-align: center;"><b>ANCHOR LEARNING</b></p> <p>Teachers anchor students’ learning experiences in complex and puzzling science phenomena.</p> <p style="text-align: center;"><b>STUDENTS’ IDEAS USED AS RESOURCES</b></p> <p>Students’ hypotheses, experiences, cultural knowledge, and questions are treated as resources to help the class build toward big science ideas.</p> <p style="text-align: center;"><b>TALKING IS THINKING</b></p> <p>Teachers provide varied opportunities for students to reason through talk.</p> <p style="text-align: center;"><b>STUDENTS ENGAGE IN SCIENCE PRACTICES FOR A PURPOSE</b></p> <p>Students use ensembles of scientific practices for testing ideas they believe are important to their developing explanations and models.</p> <p style="text-align: center;"><b>MAKING THINKING VISIBLE AND “WORK ON IDEAS” TOGETHER</b></p> <p>Student thinking is made visible and subject to commentary by the classroom community.</p> <p style="text-align: center;"><b>SCAFFOLD TALK, WRITING, &amp; PARTICIPATION</b></p> <p>Students have access to specialized tools and routines that support their science writing, talk, and participation in activity.</p> <p style="text-align: center;"><b>COMPLEX UNDERSTANDINGS GET BUILT OVER TIME</b></p> <p>Learning experiences are selected to help students build toward cumulative and nuanced understandings of big science ideas.</p>	<ul style="list-style-type: none"> <li>• Identifying big ideas in science</li> <li>• Selecting complex and puzzling science phenomena to anchor instruction</li> <li>• Selecting and adapting appropriate tasks and technologies</li> <li>• Planning for uncertainty in tasks</li> <li>• Preparing for safe and meaningful engagement in science and engineering practices</li> </ul>	<ul style="list-style-type: none"> <li>• Teaching toward a clear learning goal</li> <li>• Representing student reasoning</li> <li>• Constructing and organizing public records</li> <li>• Eliciting and responding to student ideas</li> <li>• Orienting students to one another and to the discipline</li> <li>• Positioning students as sense-makers</li> <li>• Making sense of students’ participation to inform instruction</li> <li>• Making connections explicit (<i>big idea, phenomena, nature of science, etc.</i>)</li> <li>• Managing time and pacing</li> </ul>
	<b>Instructional Sequences</b>	
	<i>provide an overall structure to a unit of instruction</i>	
	<ul style="list-style-type: none"> <li>• Eliciting students’ initial ideas</li> <li>• Supporting on-going changes in thinking</li> <li>• Pressing for evidence-based explanations</li> </ul>	
	<b>Instructional Activities</b>	
	<i>rehearsable activities that occur during a lesson and provide an overall structure to lessons</i>	
	<ul style="list-style-type: none"> <li>• Facilitating small and whole group discussions for a purpose (<i>eliciting, sense-making, etc.</i>)</li> <li>• Facilitating effective openers and closures of lessons</li> <li>• Monitoring, selecting, and sequencing small group work for a purpose</li> <li>• Effectively launching a task</li> <li>• Facilitating effective share-out sessions</li> <li>• Enacting meaningful “just-in-time” instruction</li> <li>• Enacting formative assessment tools to inform instruction</li> </ul>	<p style="text-align: center;"><b>Strategies</b> <i>(used across practices)</i></p> <ul style="list-style-type: none"> <li>• Using <u>discourse moves</u> in whole class and small group settings (<i>probing, pressing, revoicing, adding on, agree or disagree, putting an idea on hold, wait time</i>)</li> <li>• Using appropriate <u>questioning</u> (<i>low/high cognitive demand</i>)</li> <li>• Using <u>participation structures</u> for a purpose (<i>individual, small group, whole group, share-out, gallery walk, etc.</i>)</li> </ul>

adapted from Cartier et al., 2013; Grossman et al., 2009; Kazemi, Franke, & Lampert, 2009; LTP project; Thompson, Windschitl & Braaten, 2010; ambitiousscienceteaching.org

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