[RI]^2 Design Heuristic

	Process	Product	Example from the Vanishing Prairie Module CC
1	Explore possible issues, big ideas in science, and target practice(s)	Large scale issue, science themes and focal practices	Issue: Climate Change Science Theme: Ecology Practice: Modeling
2	Search level-appropriate NGSS PEs that relate to the science themes.	Bundled NGSS PEs that highlight content appropriate DCI and CCC.	• HS-LS2-1. Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales. • HS-LS2-2. Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales. • HS-LS2-3. Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.
3	Narrow the focus of the content to be covered and the issue	Specified science content and a focused issue	Science Content: Ecological interactions; Relationships between photosynthesis and cellular respiration Focused issue: The effect of climate change on a local ecosystem
4	Develop unit-level performance expectations (PE)	Unit level PEs	• Develop and use models to explore population size and growth. The models should account for biotic potential, environmental resistance, and population growth patterns (logistic and exponential). • Use an ecosystem model to make predictions regarding the stability/change of populations within a particular ecosystem in response to climatic changes. Engage in argumentation about the relative stability/change of an ecosystem. • A complete list of the PEs can be viewed here
5	Develop unit assessments	Unit assessments	• Summative model of climate change impacts on a species of student's choice. A description of this modeling project is available here, and a sample product is available here. • Test of ecology concepts.
6	Design unit outline	Unit outline	The unit outline for the Vanishing Prairie module is available here.
7	Develop lesson plans	Lesson plans	Individual lesson plans for the module are available here.
8	Implement the unit	Records of classroom implementation and student learning	During the implementation of the Vanishing Prairie module, we took notes during and/or following each class session. We also examined student work and compared early unit models with their final models and projects.
9	Review and evaluate the unit—Return to one of the earlier steps (1-7), make modifications and progress		Following the first implementation, we returned to step 5 to significantly revise the culminating project, which was a student generated model a species and the impacts of climate change on this species.