



Integrating STEM Disciplines within a 5E Instructional Sequence

5E Phase	Description	STEM Disciplinary Connections	Example
Engagement	Elicit student ideas and experiences, motivate learning, and connect to real-world context.	Science (Earth Science, Environmental Science), Technology (Data analysis, information literacy)	Students sharing personal experiences with severe weather events (heat waves, storms), analyzing news reports, and exploring historical temperature trends, asking what causes these changes.
Exploration	Students engage in hands-on activities, collect data, and test initial ideas, like the thermal energy transfer lesson.	Science (Physics, Chemistry), Engineering (Experimentation, data collection), Mathematics (Data measuring, graphing)	Conducting experiments with Erlenmeyer flasks and beakers to observe heat transfer, using weather maps to predict severe weather conditions based on temperature differences, testing which materials retain heat.
Explanation	Students articulate evidence-based claims, refine understandings with STEM terminology, and make connections to scientific concepts.	Science (Physics, Earth Science, Chemistry), Technology (Scientific visualization, modeling)	Explaining convection currents using molecular models, defining terms like “thermal energy” and “convection,” and describing how atmospheric changes affect heat transfer, modeling greenhouse effect and changes to it.
Elaboration	Students apply learned concepts to new situations, solve problems, and extend their understanding	Science (Physics, Materials Science), Engineering (Design, prototyping), Mathematics (applied math calculations)	Designing and building insulation systems to mitigate heat transfer creating urban planning solutions to reduce heat island effects, calculating effects of increased surface temperatures on water evaporation and thus humidity.
Evaluation	Students reflect on their learning journey, assess their understanding, and communicate their findings.	All STEM Disciplines (Scientific writing, presentation), Engineering (design report, presentation)	Writing argumentative papers proposing solutions to lessen severe weather, prototyping heat-reducing structures, creating presentations about climate change mitigation strategies, building a mathematical model to represent changes in heat transfer over a specific period.