

Criteria for Evaluating Phenomena*

A phenomenon is any object or event that can be experienced and that can be observed and/or measured either directly by one's senses or by use of technological devices.

According to *A Framework for K–12 Science Education* and the *Next Generation Science Standards (NGSS)*, teachers should expose students to phenomena and guide them to engage in science and engineering practices to explain those phenomena. By carefully selecting phenomena to share with students, teachers can guide them toward the scientific understanding of the world as described by the elements of the disciplinary core ideas (DCIs) in the *Framework* and *NGSS*.

But some phenomena are much more effective than others at helping all students learn, so it is essential to consider many factors when selecting phenomena. The criteria below are meant as a guide in evaluating the usefulness of phenomena for classroom instruction.

Before beginning, identify the DCI element you wish to target with the phenomena, and then ask the following questions.

1. The phenomenon ...
 - addresses **the entire** DCI element (*Continue to next step.*)
 - addresses **only part** of the DCI element (*Continue to next step only if the phenomena addresses the parts of the DCI element you wish to address.*)
 - does not** address any part of the DCI element (*End of evaluation. Do not use this phenomenon. Seek a different phenomenon.*)
2. The phenomenon is observable to students, either through firsthand experiences or through someone else's experiences (such as a recording or set of measurements).
 - Yes (*Continue to next step.*)
 - No (*End of evaluation. Do not use this phenomenon. Seek a different phenomenon.*)
3. The phenomenon is likely comprehensible to students. For example:
 - The relationship to the DCI element is clear and easy to comprehend.
 - Any experimental procedure, calculations, and measurements are unlikely to detract from the learning experience.
 - Additional ideas and reasoning skills needed by students are appropriate (given students' grade level and prior experiences).
 - Yes (*Continue to next step.*)
 - No (*End of evaluation. Do not use this phenomenon. Seek a different phenomenon.*)
4. The phenomenon is suitably attention-getting, relevant, thought-provoking, and requiring of explanation that **all** students are likely to be motivated to engage in learning the targeted DCI.
 - Yes (*Continue to next step.*)
 - No (*End of evaluation. Do not use this phenomenon. Seek a different phenomenon.*)
5. Use of the phenomenon is efficient in that the benefits justify any financial costs and time devoted to using the phenomenon with students.
 - Yes (*Evaluation completed—the phenomenon is promising.*)
 - No (*End of evaluation. Do not use this phenomenon. Seek a different phenomenon.*)

* Based in part on the *Project 2061 Curriculum Analysis Procedure*