**10 Considerations for Using the USI Probes**

1. Probes should be used more than once- as an initial elicitation and then revisited again after students have had the opportunity to build an understanding. Probes should never be “graded” when used initially to determine where students are in their thinking. After students have had the opportunity to learn and revise or refine their initial ideas, the second use of the probe can be used to provide evidence of understanding.

2. Support a classroom culture of “developing understanding” instead of “getting the right answer.” Refrain from immediately correcting students. Make it safe for students to surface their ideas, regardless of whether they are right or wrong, knowing that everyone will eventually “figure it out” and discover the best way of thinking about a concept or phenomenon.

3. Accept that students are not coming to class as blank slates. They already have ideas about basic principles, concepts, and familiar phenomena, many of which are developed outside of the classroom. Sometimes students aren’t even aware that they hold these ideas. Provide opportunities to draw out their thinking as well as opportunities to reflect back on how their thinking has changed.

4. Whenever possible, provide opportunities for students to test their predictions and engage in the process of “finding out.” However, not all probes lend themselves to this approach, especially ones that are more abstract or at a scale that can’t be tested. In some instances, students can turn to text or other media for information or teachers can guide students in developing explanatory models of abstract ideas.

5. Students’ alternative ideas about concepts and phenomena can be tenaciously held and resistant to change. Be aware that students often will not give them up fully until new evidence is convincing to them. Furthermore, if students are merely told the best answer and not given the opportunity to grapple with and work through their ideas, they may revert back to their misunderstandings, even after giving the “best answer.”

6. Science often involves a gradual revision, refinement, and at times even a discard of existing models or theories when new ones with greater explanatory power are presented. The way students’ ideas evolve often mirror the nature of science. Expect that they will move toward accepting a scientific model or explanation gradually. Let them know that what they are experiencing is the way science works in the real world. Bring in historical examples to show this or even current ones, such as scientists’ revising their understanding of the corona virus as they gain new evidence and understanding.

7. Encourage students to test, revise, and reason with the models and explanations they develop to support their answer choice to a probe. Make sure students do not merely adopt someone else’s model or explanation without reasoning it through themselves. This is especially important when students are working in groups to develop models and provide evidence that support their explanations.

8. Encourage risk taking in thinking and talking through ideas. Set norms so everyone’s ideas are respected. Provide students with strategies to give each other constructive feedback that will help them revise or refine their explanations.

9. Encourage students not to accept an answer choice to a probe because the majority of the class chooses it. Sometimes the best answer choice is the least selected answer.

10. Critique explanations, arguments, reasoning, and models as a regular part of classroom discussions when using the probes.