Safebrush High School teachers engaging in the Formative Assessment Design Cycle

1. Set Goals and Explore Student Ideas	The biology teachers at Sagebrush High School wanted to know if their 10th grade students were able to provide evidence-based explanations to describe patterns and cause and effect relationships in natural selection.
2. Design and Revise Tools	Teachers began with a set of questions that they usually asked students to answer after they had engaged with a model of natural selection (Table 2). Rather than treat these questions as part of a report on the investigation, the teachers decided to revise the questions as a way to find out how students were drawing on evidence from graphs of data generated by the model. Once the questions were in draft form, a teacher typed them up and brought them back to the group, where the teachers read them carefully, anticipated how students might respond, and made edits to improve the wording.
3. Enact and Collect Data	After students finished collecting data from their model of natural selection and made graphs of their data, teachers provided students with written copies of the assessment questions. They gave students time to work on the questions individually and then held a whole-class discussion to reveal student thinking. Teachers then collected students' written responses to the questions.
4. Reflect & Identify Next Steps	During their common planning time, teachers sat together and read through a sample of student responses (see Table 2), focusing on individual student responses to better understand what students were saying, and also identifying patterns across students. Patterns they identified included: • Students were able to correctly identify that the birds with beaks represented by the plastic sampler spoon were the most successful, suggesting that they were able to interpret the graphs they had made of the data generated by the model. • Only some students (e.g. 2 and 4) cited evidence in their response. The teachers reflected that students may not have understood that this was a requirement of the question, and discussed rewording it to cue students to provide evidence. • Several students (e.g. student 1) used language such as "only the strong survive" that suggested they were thinking of the everyday meaning of fitness, rather than its evolutionary meaning based on reproductive success (e.g. student 2). The teachers noted that, moving forward, they would be careful to identify the scientific meaning of fitness with students, and also highlight examples of organisms that were not necessarily the strongest being more successful. • Teachers were not sure what student 3 meant in using the term 'random' to discuss selection and beaks. This led teachers to reflect on the way they constructed the model of natural selection, and how the student may not fully understand the role of random variations in natural selection. They planned to revisit the role of randomness in future lessons, and noted ways that they could change the way they used the model for the class next year.