Formative Assessment Probes Evaluation

During the 2017-18 school year, eight Kindergarten-5th grade teachers in one California school district were asked to use a sample of 18 Page Keeley formative science probes with 244 students before instruction. The teachers supplied feedback about their lesson plan and how it changed after the use of the formative assessment probe. For 16 out of 18 of the probes used, the teachers had positive comments about the use of the probes for stimulating conversation and identifying misconceptions. They stated that the probes were "…quick, easy, and helped focus my instruction," "…very effective pre-assessment tool[s]," and "…a great conversation starter!" The teachers were "…able to find class-wide misconceptions through the use of the probe" and students "…engaged in deeper conversation." Only two probes were described as not being as useful as the others or lacking in support/clarity.

Two of the teachers also used the probes again as a "post-assessment"[1] to gauge student learning after instruction. Analysis of scores showed statistically significant improvement from pre- to post-test. In two classes, the change in knowledge for two probes was measured with a paired t-test and the gains were determined to be statistically significant. In the *Places Where Animals Live* probe, before instruction, 21% of the students answered the probe correctly. After the instruction 85% answered correctly. Using a two-tailed paired t-test for analysis, these results are considered extremely statistically significant [n = 32; t = 7.4833; p <0.0001]. In the *Places Plants Grow* probe, before instruction, about half of the students responded correctly. After instruction, 78% responded correctly. Using a two-tailed paired t-test for analysis, these results are considered statistically significant [n = 32; t = 2.7378; p = 0.0102]

Conclusion

The use of formative assessment probes can be beneficial for identifying misconceptions and for spurring discussions in science lessons. By pointing out specific areas of confusion or a lack of knowledge, teachers can target instruction to help improve student understanding. The Page Keeley formative assessment probes used in this study for grades K-5 were overall well-received and viewed as useful additions to the science lessons. For the two classes for which post-instruction outcome data were collected, use of the probes resulted in statistically significant positive learning gains.

Limitations

There were several limitations to this study. Although analysis of the performance data revealed positive results for student learning, it should again be noted that these formative assessment probes were not specifically designed to be used as post-lesson assessments. It is possible that the results of the analyses reported above were impact by a testing effect in the classes that used the probes as both pre- and post-tests. Such an effect could have occurred if teachers shared the correct responses with their students after the pre-test, or if students remembered the questions on the assignment from pre- to post-test. Future studies should capture overall student learning with an independent science assessment. The relatively small sample size (1-2 teachers per grade level in one school) limits the generalizability of the results. Additionally, without a comparison group, it is difficult to gauge how

[1] It should be noted that formative assessment probes are not designed to be used as assessments post-instruction. In this case, given the short-term nature of the study, they were deemed to have the best fit to gauge student learning. In future studies, a separate assessment should be used.

much knowledge is gained from the lesson alone without the use of the probe. Future studies should attempt to assess student thinking and learning at a more in-depth level, particularly about specific and persistent misconceptions. It would also be helpful to capture details of how teachers targeted misconceptions. Finally, future studies should provide teacher support materials for use with the student prompts.