

Investigating the Impact of Formative Assessments on Student Engagement in a Secondary Science Classroom

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Background

I conducted my capstone project at Burlington-Edison High School in Burlington, Washington. The fundamental aspects of this classroom research project were established when I realized that my chemistry students have varying levels of motivation and engagement not only with the content, but also with the general idea of what it takes to be a successful student. In order to measure student engagement in my chemistry courses, I examined how the use of varied formative assessments can be used to improve motivation, self-efficacy and overall academic achievement in the classroom.

“The guided practice helped me improve my learning of chemistry concepts when I didn’t know what to do.”

Research Questions

Primary Question

How will the use of formative assessments in the science classroom improve student engagement?

Sub-Question #1

How will the use of formative assessments be used to increase student self-efficacy in the science classroom?

Sub-Question #2

How will the use of formative assessments improve student motivation?

Sub-Question #3

How will the use of formative assessments improve student learning?

Sub-Question #4

How will the use of formative assessments help to inform my instructional practices to increase student learning?

“The practice worksheets helped me the most because I could practice to improve my skills.”

Treatment

This research study was conducted in a college preparatory general chemistry course that consisted of two class sections (N=55). The treatment took place between February and March 2018 while students learned about chemical reactions including key concepts such as balancing chemical equations, stoichiometry and limiting reagents. Student engagement, motivation, self-efficacy and overall learning were measured using a combination of student surveys/questionnaires, exit slips, feedback forms and formative assessments to establish baseline data and overall change in student attitudes.

Student Engagement

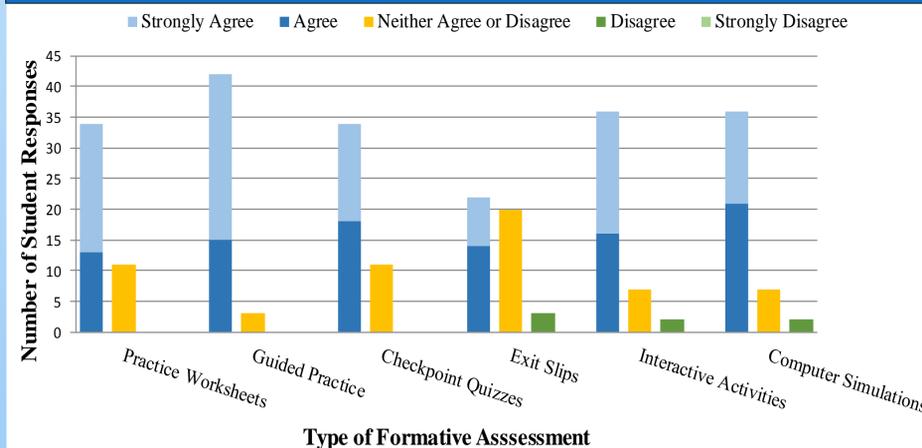


Figure 1. “I feel that my engagement about chemistry concepts has improved over the past two months by completing...”, (N=45).

“The checkpoint quizzes helped me learn concepts better because seeing that I did well on something makes me feel better about my performance.”

“Interactive activities like the Balancing Chemical Equations game (simulation) helped me to visualize and understand it better.”

Student Learning

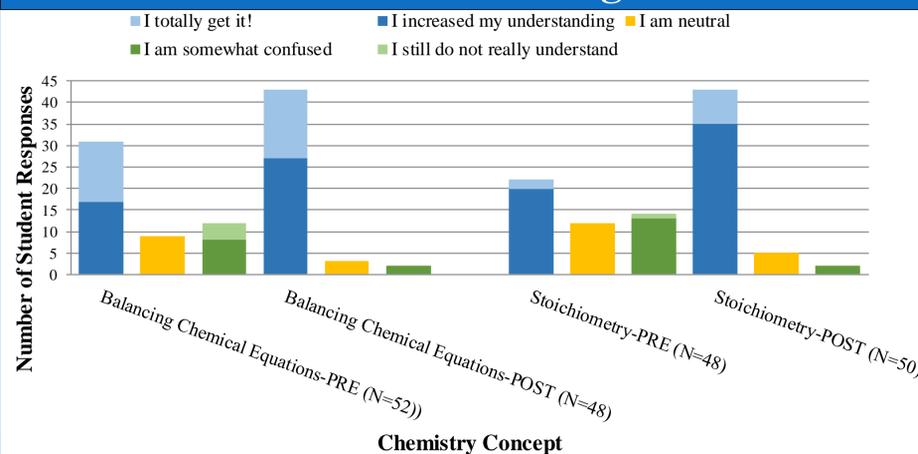


Figure 2. Student attitudes of conceptual understanding from exit slips

Self-Efficacy

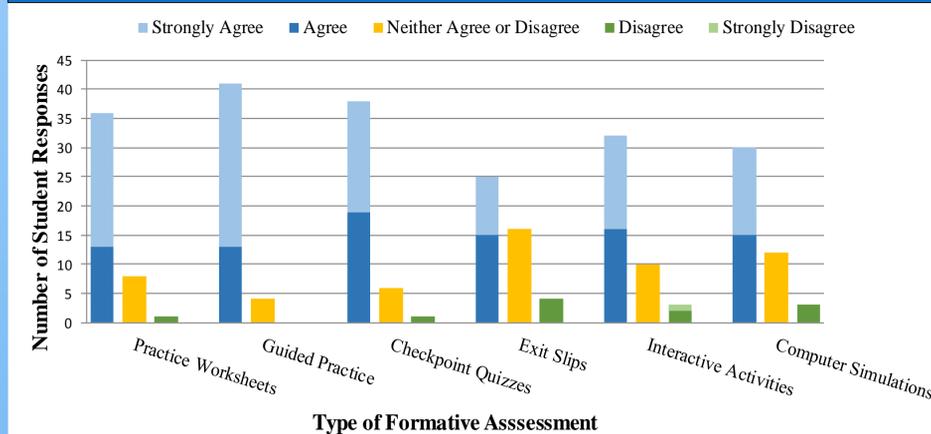


Figure 3. “I feel that my overall belief about being successful in chemistry has improved over the past two months by completing...”, (N=45).

“Doing all of these tasks have helped me keep my grade up and helps prepare me for tests in the future.”

Conclusion

At the end of the treatment, it became quite apparent that student engagement, motivation, self-efficacy and overall learning improved through the use of varied formative assessments. Formative assessments with the greatest impact on students were the guided practice, checkpoint quizzes and the practice worksheets. Students responded very positively to the use of formative assessments as they took on a more active role in the learning and instructional process.

“Receiving feedback from the teacher helped me most because if I get feedback, I know what I am doing wrong and how to figure things out.”

Value and Future Implications

One of the biggest takeaways from this classroom research project is that formative assessments can be used to not only help improve student learning, but also student motivation and engagement in the classroom. During the implementation of this research project, I was able to shift one of my core educational philosophical practices to emphasize the importance of learning for the sake of learning, rather than to earn points or a grade. An essential component for this change is allowing time for continuous and reciprocal feedback through the use of formative assessments between students and teacher to actively engage students in the learning process.