



Promoting Inquiry-Learning Through the Use of Interactive Science Notebooks

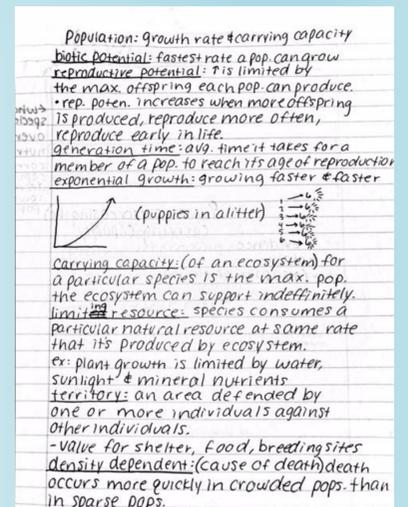
Introduction

Having adopted them in full in 2014, the Lewiston School District is ahead of the rest of the state in the implementation of the Next Generation Science Standards. I joined my science team in the fall of 2016, just prior to implementing this classroom research project. In keeping up with my colleagues I continue to search for ways in which I, too, can align my curriculum and activities to NGSS with a focus on inquiry-based learning in my classroom. A tool that can help me do this and which was the focus of this project is the interactive science notebook. Students in the four sections of environmental science students were divided into a comparison and treatment group and the effects of the use of the ISN were evaluated over the course of two curricular units, “Population Dynamics” and “Human Populations”.



Research Questions

1. Does the use of interactive science notebooks increase student achievement with regard to state content and literacy standards that are addressed on summative assessments?
2. Does the use of interactive science notebooks have a positive effect on students’ attitudes about learning science?
3. Does the use of interactive science notebooks promote students’ abilities to make scientific claims and support them with evidence and reasoning?



Data Collection

Table 1
Data Triangulation Matrix

Questions	Data Source 1	Data Source 2	Data Source 3
Does the use of interactive science notebooks increase student achievement on NGSS and content objectives that are addressed on summative assessments?	Pre- assessments measuring prior knowledge and growth during the curricular units.	Teacher journaling of both comparison and treatment groups throughout curricular units	Post- assessments measuring student growth in knowledge after treatment
Does the use of interactive science notebooks have a positive effect on students’ attitudes about learning science?	Pre-treatment Likert survey assessing student attitudes	Student interviews post-treatment	Post-treatment Likert survey assessing student attitudes
Does the use of interactive science notebooks promote students’ abilities to make scientific claims and support them with evidence?	Pre- assessment evidence-claim constructed response items to demonstrate prior abilities and student growth	Teacher journaling of informal and formal formative assessments throughout curricular unit.	Post- assessment evidence-claim constructed response items to demonstrate student growth

Participants

Ninety-nine environmental science students, mainly in their junior year of high school, participated in this cross-sectional study. Two sections, 43 students, served as the treatment group and 56 students in the remaining two sections served as the comparison group.

Treatment

Students in the treatment groups were required to have a composition or spiral notebook dedicated to the course. While the content and handouts were much the same for both the treatment and comparison groups, students using the ISN were required to keep everything in them and were given extra time for reflection and revision of writing, along with other interactive pieces. Students in the comparison group were left to organize their materials the same as they had before—to their liking.

Results and Conclusions

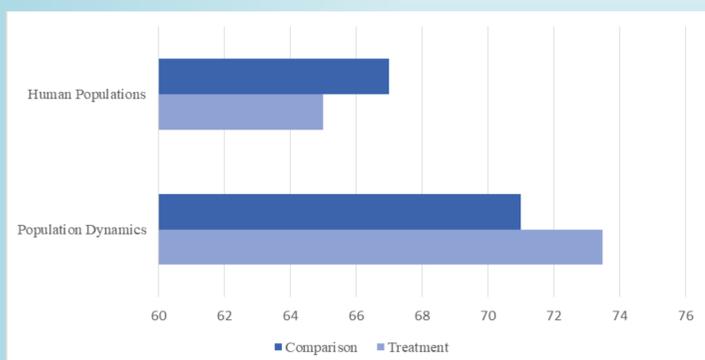


Figure 4. Average normalized gains on summative assessments. Treatment (N=46); Comparison (N=53).

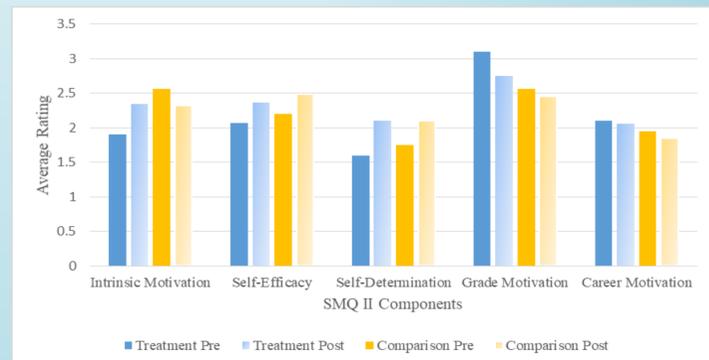


Figure 7. SMQ II Likert survey results by average component scores; Treatment (N=46); Comparison (N=53).

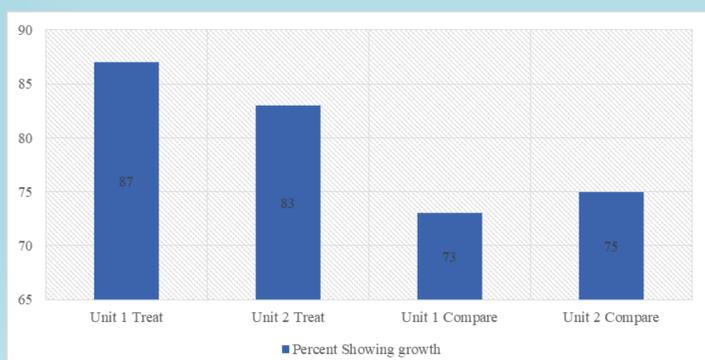


Figure 5. Constructed response growth. Treatment (N=46); Comparison (N=53).

Results show positive gains for the for students in the treatment group on constructed response items, however overall test scores (normalized gains) do not show significant differences between the treatment and comparison groups. Likert survey results also fail to establish a relationship between notebook use and attitudes. Student interviews revealed neutral to positive feelings, overall, about the use of interactive science notebooks; combined with my own journal entries and minimal frustrations, there is enough evidence for me to commit to using the ISN in future courses, albeit with some modifications in my approach.