STORYLINES
EFFICACY IN HIGH SCHOOL BIOLOGY

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Master of Science in Science Education

FOCUS QUESTION

Does a biology storyline curriculum increase student engagement and comprehension of the Next Generation Science Standards (NGSS) concepts when compared to a traditional linear-unit curriculum?

BACKGROUND

Storylining is a curriculum replacement that engages students with a phenomenon and continues to be driven by student-generated questions. Concepts are spiraling in nature and are revisited in ever-increasing depth as the curriculum unfolds.

CONTEXT

This project was conducted at Billings Central Catholic High School (BCCHS) in Billings, MT. BCCHS has a population of slightly over 300 students. Students at BCCHS typically take biology as freshmen. This project looked at data from 154 biology students over the course of two years.

METHODOLOGY

The first year followed a conventional linear-unit curriculum. Storylines were introduced during the second year. At the end of each year, students completed the NWEA MAPS 9-12th Grade NGSS Life Science computerized test. Students also completed two surveys, one to assess student perceived abilities in the NGSS Science and Engineering Practices on a Likert rating scale while the other survey was verbal to gather student impressions on engagement and concept retention.

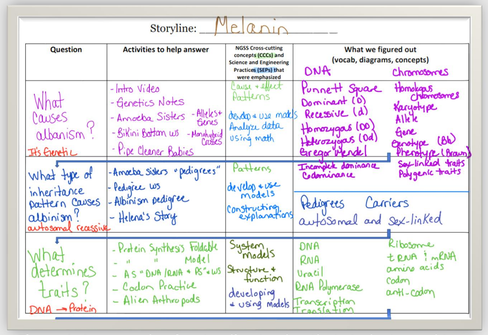

Figure 4. An example of a storyline tracker that students used to connect driving questions to NGSS components and prompt the next question in the storyline.

DATA ANALYSIS

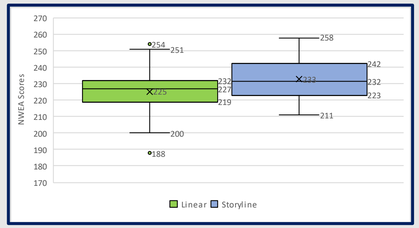

Figure 1. Student NWEA MAPS test scores, (*N*=154).

Students in the storyline curriculum scored an average of seven points above the students who used the linear-unit curriculum on the NWEA MAPS 9-12 Life Science Test. Storyline scores also showed a higher maximum and minimum score (Figure 1).

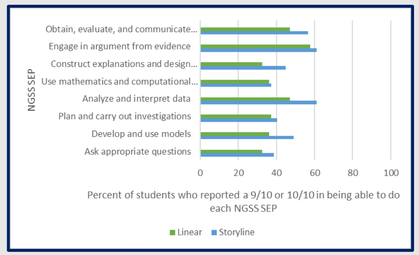

Figure 2. NGSS Science and Engineering Practices student survey results, (*N*=154).

Results from the End of Course Student Survey showed that students who used the storyline curriculum reported a higher perceived ability to do all eight of the NGSS Science and Engineering Practices, with the highest score in the ability to analyze and interpret data (Figure 2).

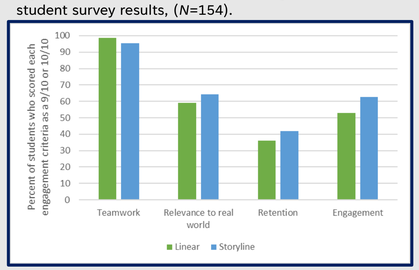

Figure 3. Engagement student survey results, (*N*=154).

Students in the linear-unit and storyline curriculum reported almost equally in teamwork skills, while storylines showed higher results in relevance to the real world, retention, and overall engagement with the material (Figure 3).

RESULTS

Students reported overwhelming support for storylines. Storylines showed higher scores in comprehension, engagement, and coherence while providing students with an authentic learning experience connected to real-world data.

"(Storylining) was more intriguing and you could see the connections easier."

"Storylines used things that we could see in the world right now."

"I liked that storylining wasn't random and that it brought up subjects that we had learned all year."

Student Comments

CLAIM – EVIDENCE - REASONING

There is a strong relationship between the use of storylines and student comprehension and engagement. The data shows that storylines increased both of these while also increasing students' sense of coherence. Students could see how each phenomenon was related to other concepts in biology and then apply that to future scenarios. Each storyline hooked students with a relevant phenomenon, clearly connected previously learned concepts to new material, unfolded in a way that allowed students to create coherence in their own mental framework, and applied the NGSS Science and Engineering Practices to empower students to effectively work with real-world data.

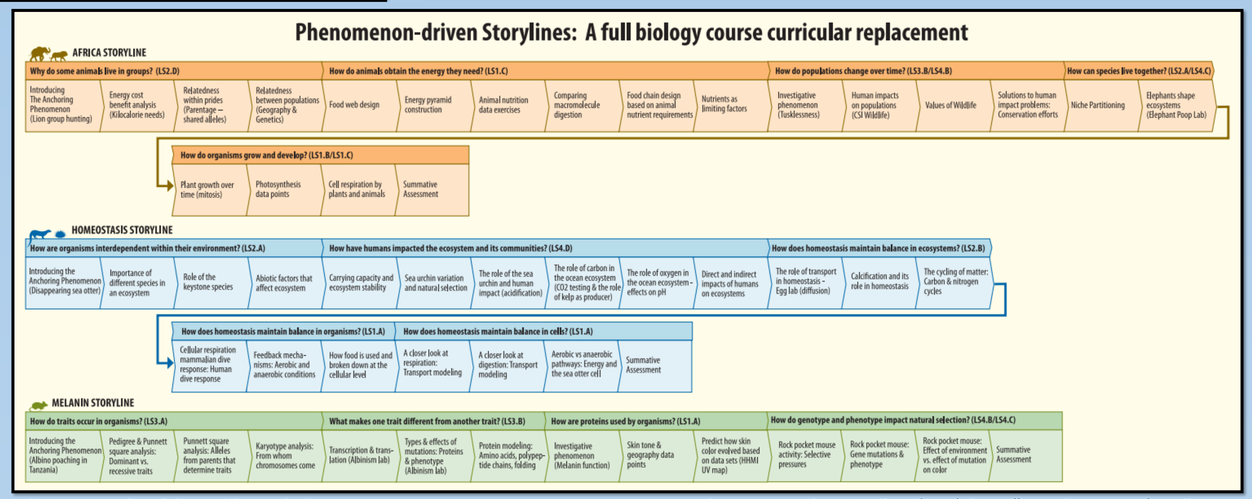

Figure 5. A portion of the storyline curriculum.

Phenomenon-Driven Storylines. (2016). https://www.drcrean.com/storylines