Research results

We measured the effectiveness of integrating comic and illustrated trade books (CTB) into science instruction by comparing student science attitudes and science-vocabulary knowledge prior to and after the unit. Figure 1 shows the changes in student science attitudes over the course of the unit. The science attitude score was generated by summing student responses on six five-point Likert scale items adopted from Gogolin and Swartz (1992). The results showed a statistically significant increase in attitudes, t (36) = 2.64, $p < .05$, Cohen's d effect size = 0.43. This effect size corresponds, approximately, to an increase in student performance from 50th to 66th percentile score.

Figure 1

Changes in science attitudes over the Earth Materials and Systems Unit
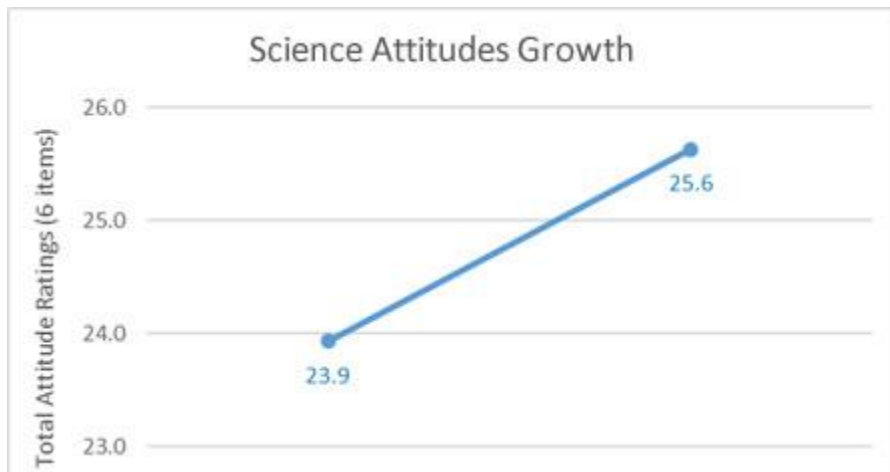
Note. This graph includes only the data from 38 students who took both pre- and postunit science-attitudes assessment.

Figure 2 shows the changes in student science-vocabulary knowledge—measured as percent correct on a vocabulary measure designed to align with the unit curricula—over the course of the unit. Here we report on student performance aggregated across three tasks: matching words with pictures, matching words with definitions, and sentence completion.[1] The results indicate an increase in student performance of 16.9% (from 54% to 70.9% correct.)

Figure 2

Changes in science-vocabulary knowledge over the Earth Materials and Systems Unit

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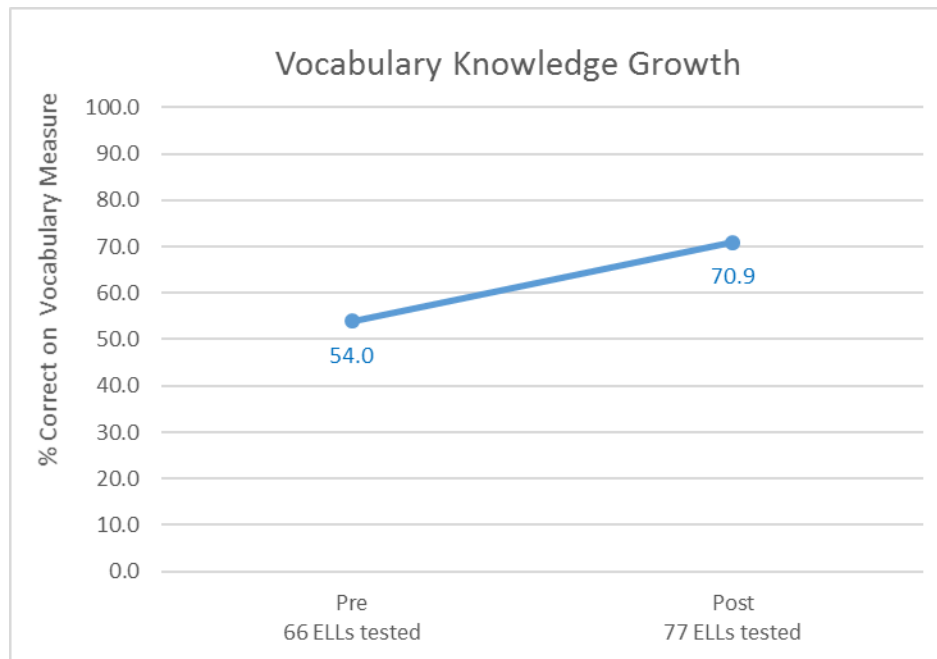
[1] The latter task, served as a measure of student functional vocabulary (e.g., 'are part of, 'is made up of") associated with science language functions (e.g., the ability to express part-whole relationships).

Appendix A:

Summary Writing Graphic Organizer

I. **Summary study skill:** Fill in the Detail boxes. Then write a short (one to two sentences) summary of the passage.

#1

Passage 1

| Detail | Detail | Detail | Detail |

Summary

#2

Passage 2

| Detail | Detail | Detail | Detail |

Summary

#3

Passage 3

| Detail | Detail | Detail | Detail |

Summary

#4

Passage 4

| Detail | Detail | Detail | Detail |

Summary

II. **Summarize passages #1 through # 4 in one to two sentences using the sentence frames below. What is the main idea of the reading selection?**

This reading selection is about…	This reading selection describes/explains…

_____

_____

_____

_____

_____

III. **What are the three science ideas that you will remember from the reading selection?**

1. _____

_____

2. _____

_____

3. _____

_____

IV. **What new vocabulary will you remember from the reading selection?**

_____

_____

Appendix B:
Summative Assessment Rubric
(Writing prompts II and III on the Summary Writing graphic organizer)

	Beginning (1)	Developing (2)	Accomplished (3)	Exemplary (4)
Content	I have yet to learn how to identify important scientific ideas from the reading.	I am able to identify one important scientific idea from the reading.	I am able to identify at least two important scientific ideas from the reading.	I am able to identify at least three important scientific ideas from the reading.
Accuracy	I have yet to learn how to describe scientific ideas with accuracy and detail.	I am able to describe some scientific ideas I identified from the reading with accuracy and detail.	I am able to describe most scientific ideas I identified from the reading with accuracy and detail.	I am able to describe all scientific ideas I identified from the reading with accuracy and detail.
Mechanics	I am able to write about science ideas but have yet to learn how to make my grammar or spelling errors less frequent.	I am able to write about science ideas but with three or more errors in grammar or spelling.	I am able to write about science ideas with only one or two errors in grammar or spelling.	I am able to write about science ideas using correct grammar and spelling.