



Literacy goes hand in hand with the ability to perform well with scientific problems.



There has been a decrease in textbook use in science classes compared to other subjects at schools.

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Reimagining science texts for 21st century schools

With its heavy emphasis on reading, writing, and math skills, No Child Left Behind did more than simply reduce the amount of instructional minutes available for science: it also missed an opportunity to connect science to other academic disciplines and harness its power as not just a body of knowledge, but a mode of inquiry. At one time, science was considered a disappearing curriculum, especially at the elementary grades.

But times are changing. The relationship between literacy and science is more symbiotic and interconnected than ever before. Rather than creating silos between literacy and science instruction, new science standards being adopted by districts were developed with literacy skills, like engaging in argument from evidence and obtaining, evaluating and communicating information, at their core. And likewise, across the country, ELA standards have undergone their own transformation, breaking down subject silos with more emphasis on informational reading and nonfiction. This makes more room for science topics when teaching literacy skills and comprehension strategies. Consequently, there's an opportunity to reimagine what we consider to be ideal "science texts."

Reading as a scientific behavior

Science educators are in a perfect position to benefit from these connections because as it happens, informational reading is essential to scientific inquiry. According to the Strategic Education Research Partnership, real scientists spend the majority of their time working with texts: writing them, reading them, and interpreting them for themselves and others.

Any curriculum meant to prepare students for twenty-first century careers needs to accommodate this reality - and that means putting informational reading front and center as the single most important skill for

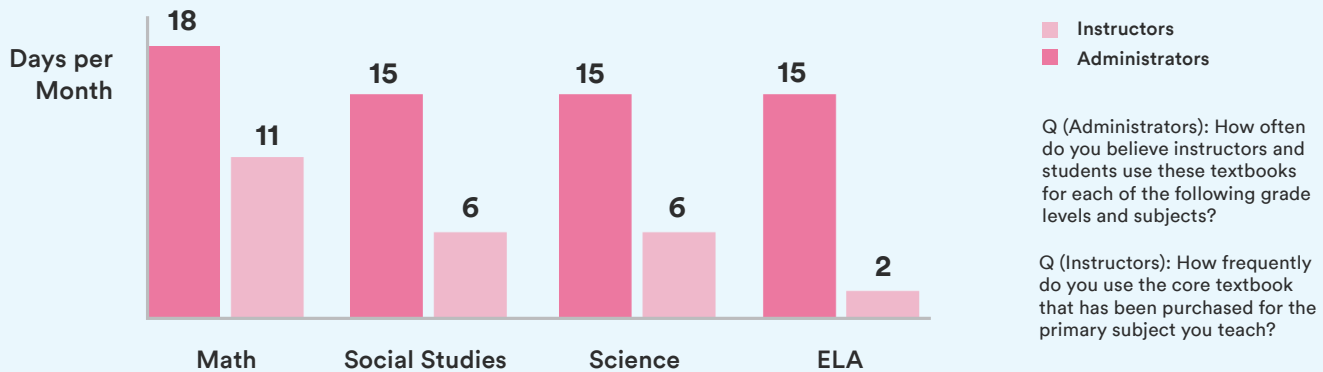
“Future-proof science curriculum requires content that exposes students to real-life phenomena.”

“Informational reading is essential to scientific inquiry.”

science success. Future-proof science curriculum requires content that exposes students to real-life phenomena. This can take many forms - video and hands-on experimentation are just a couple examples - but incorporating text-based phenomena instruction is key to the symbiotic instruction of science and literacy. This requires a fundamental shift in the types of texts used for science instruction. The monolithic, singular narratives of textbooks must be traded in for a range of authentic texts that encourage student inquiry and exploration of real-life scientific phenomena.

Science teachers agree: they are using textbooks even less frequently than their colleagues teaching other content areas.

Question: Do you currently use a textbook as a core content for each of the following grade levels and subjects?



Source: EY-Parthenon K-12 Classroom Content Platform Usage Survey N=741

Strengthening literacy connections in science and engineering practices

With new science standards fully or partially adopted by a majority of states, it's no longer enough for twenty-first century students merely to know science. They must do science. Excelling in literacy is fundamental if they are to cross that bridge between knowledge and practice, but adapting to this new approach won't be easy. To find more ways to seamlessly integrate the two skills, administrators and science educators will need to change how they understand the relationship between the two disciplines and reevaluate the science texts they provide educators.

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One way to ensure science and literacy enrich each other is to leverage nonfiction texts as the source to explore phenomena. In ELA instruction, an anchor text is used as a jumping-off point to teach new skills. Meanwhile, students in science classrooms begin their investigations with an “anchoring phenomenon”—that is, a complex, observable, real-life context that forms the basis of a question or a problem.

What happens when educators fully use text-based content as an anchor for inquiry-based science instruction? Authentic, high-interest science texts can serve as a foundation for more specific questions. For example, one educator invited students to explore the question of whether males are necessary for a population to survive, using a National Geographic blog post about female lizards' reproduction, with the ultimate goal of teaching about narrower scientific concepts related to genetic heritability. Approaches like this engage students in science and engineering practices, teaching them to gather and interpret evidence, while also reinforcing the reading comprehension skills they are learning in their ELA lessons.

Using texts to break down subject silos

In the fight for instructional minutes, science is among the first to subjects to go in favor of more time spent on literacy and math. In many elementary schools, students receive 2.3 hours of science instruction on average per week, compared to compared to 11.7 hours per week on English language arts (ELA) and reading. But, science does not need to come at the expense of other content areas, especially literacy instruction. In fact, studies have shown correlations between reading and

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science achievement, and some researchers have speculated that this is because the same core skills drive students’ success in both areas.

Cognitive scientists have known for decades, the most important factor in reading comprehension is not generally applicable skills like finding the main idea. Rather, it’s how much knowledge and vocabulary the reader has relating to the topic. If a major goal of ELA instruction is boosting reading comprehension, science content plays a key role, since it bolsters students’ knowledge of the world around them. Science-specific literacy is literacy, and when taught effectively, students can apply the reading skills they learn in other contexts to science texts and vice versa. Studies have observed better outcomes in literacy learning when students are taught skills intertwined with content.

The way forward

The new, more complex science standards provide a meaningful opportunity to promote meaningful, inquiry-based science education - but taking advantage of them will require teachers to integrate science with literacy using a more interdisciplinary approach than ever before. Continuing that conceptual evolution will look different at different grade levels, and administrators hoping to help will need to meet teachers where they are. The transition is well underway, and educators are beginning to work their way toward it - starting with new approaches to science texts.

What’s possible with dynamic, reflective science texts? When educators incorporate current events and examples from

the real world, students are better able to make connections between scientific concepts and the world around them. As we can already see, science standards and science instruction are increasingly complex - but when more accessible texts are instructionalized for science, standards can become less intimidating - and students get the addition benefit of literacy practice. By setting the bar higher for what 21st century science content should look like, we can set students up for success not just in the face of changing standards, but also in an ever-changing world.