



# MULTIMODAL KNOWLEDGE BUILDING

## Meaningfully using digital tools to foster disciplinary learning

By **Miranda Fitzgerald**



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*i*t doesn't take long into a school year before teachers experience an all-too-common frustration: the challenge of identifying rich digital tools and materials for reading and writing that support student learning.

The explosion of educational technologies exacerbates the challenge of identifying digital tools that promote meaningful literacy learning in K-12 classrooms. With such an abundance of websites, applications, and software marketed to students and teachers, how should teachers choose high-quality technology resources? Further, once teachers make a selection, how can they be sure that the tool will foster digital literacies and promote knowledge building?

In my work designing and researching digital tools for elementary grades project-based learning (PBL) in science, I have developed a deep appreciation for carefully selecting digital tools and designing reading and writing tasks that leverage the affordances of technology. Here, I present portraits of how young students used digital tools for reading and writing in elementary classrooms to

build and communicate knowledge and I share my recommendations for the classroom.

## Reading, viewing, and simulating

There are many ways students can build disciplinary knowledge during content area instruction, including reading informational text, viewing videos and images, and using simulations. Although the use of videos and simulations requires digital tools, digital texts offer a range of helpful features such as text-to-speech, pop-up definitions for vocabulary, and rich images or embedded video that can illustrate new and challenging ideas.

In one third-grade PBL unit, students learned about force and motion in order to design and build moving toys. Students used digital tools to interpret and use information presented in multiple modes for meaningful purposes.

For example, students viewed video instructions in an app called WeRead about how to build small moving toys. They then followed those instructions to build their first models. Students also read multiple digital texts in WeRead, which provided the option to play the text aloud. One text supported students to build knowledge about how engineers plan and design solutions. Through interactive reading and discussion, the teacher supported students to use the ideas in the text to revise their own toy designs.

Finally, after students conducted investigations of how friction affects the motion of toys, they used ideas from an online simulation, from PhET Interactive Simulations, that illustrated the force of friction to develop scientific models explaining how friction affected the motion of their own toys.

This example illustrates what I mean when I describe rich, digital resources to support digital literacies and disciplinary knowledge building. The text, videos, and simulation are examples of high-quality digital resources for reading and interpreting information. Beyond this, these resources provided opportunities for students to use multimodal texts in meaningful ways to extend classroom experiences and to build knowledge about important science ideas.

## Multimodal writing

Many digital tools are now available that enable children, even in the earliest grades, to create multimodal compositions by combining text, audio, video, and images, and to collaborate with one another in real time while doing so.

In another PBL unit, as third graders learned about birds that lived in their community, they collaborated to compose and share multimodal writing. Students selected a bird that they wanted to learn more about, researched the bird using print and online field guides (both in WeRead and on websites such as that of the Cornell Lab of Ornithology), and proposed solutions for protecting the birds.

To share their learning, students created multimodal presentations based on their observations and research. The teacher supported students to use an online composing tool, an app called Collabrify Writer, which enabled real-time collaboration. This way, multiple students could work together on a single document to enter text and embed their own photographs or videos, as well as ones they found online, to synthesize their learning from multiple sources.

This example illustrates how students in K–12 classrooms can use digital tools to develop skills for creating multimodal, digital compositions to communicate disciplinary learning. The type of tools described not only allowed students to gain experience using technology to produce writing, but also enabled them to collaborate in this endeavor.

## Drawing and animation

Students can also communicate disciplinary knowledge using drawing and animation tools. These tools may be particularly supportive of and appealing to students who struggle to communicate their ideas in writing.

During a fourth-grade PBL unit, in which students investigated sources of energy, students used a drawing and animation tool called Collabrify Flipbook to develop scientific models that represented and explained the process of energy transfer in hydroelectric dams. They drew and animated this process and labeled important parts of their models.

Similar to the multimodal writing tool described earlier, the drawing and animation tool also enabled students to collaborate in real time. Productively collaborating on this task required students to talk with one another about how to represent important scientific concepts as they created their animations.

This example illustrates that, beyond using word processing tools for communicating disciplinary knowledge, young students can also be supported to use digital drawing and animation tools to build knowledge together and collaboratively communicate disciplinary learning.

## Be strategic

Although these examples are from elementary classrooms, the types of digital tools and literacy learning tasks described are relevant to attaining ambitious learning goals across grades.

As these examples suggest, when strategically selected and paired with meaningful reading and writing tasks, the affordances of high-quality digital tools can be leveraged to support both digital literacies and disciplinary knowledge building. ■

## A SELECTION CHECKLIST

**I offer the following recommendations to guide educators' selection of digital tools:**

- Do not settle for educational technologies designed for drill or rote memorization.
- Choose tools that promote discussion and collaboration during reading and writing.
- Pair digital tools with rich reading and writing tasks guided by meaningful questions.
- Select tools that challenge students to interpret and communicate information using multiple modes.
- Seek tools that level the playing field for students with a range of reading and writing skills.