**7-26-21 Article Digital Science Notebooks Showcase Student Learning**

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**ECHNOLOGY INTEGRATION**

Digital Science Notebooks Showcase Student Learning

Interactive notebooks that hold bell work, lab data, and class notes serve as a portfolio of learning—for the benefit of both students and their teacher.

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As I reflect on what has undoubtedly been my most difficult year of teaching, I find myself evaluating strategies I relied on to make online learning productive for my students. Digital notebooks rise to the top: When I pivoted from requiring traditional bound notebooks from my biology students to requiring digital ones, all of us became more creative and learning was enhanced.

**THE BIOLOGY INTERACTIVE LEARNING LOG**

For over a decade pre-Covid, I had my students maintain what we called a BILL (Biology Interactive Learning Log) in a thick composition notebook, filled with daily bell work (e.g., formative questions about the previous day’s homework), course notes, study guides, and lab data from our classwork. For all of my students, the BILL was a collection of the work they’d done over the course of a unit of study that showed their learning growth, and for many, it was a great source of pride. Some even took their BILL with them to college to support the next phase in their biology coursework.

I also used each student’s BILL for formative assessment. Just about every day, as students worked through the activities in the notebook, I would walk around and check their work and provide oral or written feedback on what they were doing. This helped me to catch any misconceptions or misunderstandings immediately; I could have a conversation with struggling students in the moment.

**ADAPTING FOR ONLINE LEARNING**

When the 2020–21 academic year began, over 80 percent of my students were learning remotely. The analog BILL model I’d relied on for so many years simply wasn’t practical. But without the BILL, my students weren’t able to collect evidence of their learning, and I didn’t have the record I most needed to do formative assessments.

BILLs had to go digital. I turned to free Google Slide templates I found at [SlidesMania](https://slidesmania.com/tag/notebook-style/) that replicated notebooks. The results? Students appreciated being able to include more types of evidence of learning. Video clips such as Hank Green’s “[Crash Course](https://www.youtube.com/user/crashcourse)” videos, diagrams from the [BioNinja](http://ib.bioninja.com.au/) website, and models they found online such as the model of human hemoglobin at the [Protein Data Bank](https://www.rcsb.org/3d-view/4hhb/1) all made their way into the students’ digital notebooks.

They appreciated the flexibility and freedom that digital notebooks gave them—they could be more creative and make more connections among concepts. When I asked students what they liked about digital notebooks, they mentioned that they could truly personalize their online notebooks by easily adding in resources they had selected rather than adapting resources I had provided for them. Some students appreciated that their digital notebooks were portable and could easily be taken with them to be used in future biology classes. All in all, digital notebooks gave them more agency, which is always a good thing when it comes to engagement.

Also, BILLs became truly interactive. Before, I had relied heavily on activities that were done on paper, but once BILLs were digital, students could more easily collaborate with one another to complete a task, like a guided inquiry activity. They’d do them in pairs or groups, and even as a group during synchronous instruction. BILLs helped my students take more control over their learning, but they also helped me be more creative. My students enjoyed being able to work together in this way, as it allowed them to learn more easily from their peers and allowed them to bounce ideas off of one another.

Finally, I could integrate the notebook template into assignments in Canvas through the [Google Assignments LTI](https://edu.google.com/assignments/) (Learning Tools Interoperability), which allows me to distribute a copy of an assignment via Google Docs/Slides so that students can submit that work back to me in Google Assignments. Because my whole district uses Canvas as its LMS, we didn’t even need Google Classroom. Also, with the LTI, I could provide my students with continuous feedback, since I had unlimited, ongoing access to their files, rather than having to coordinate due dates for the notebooks. Because the digital notebooks paired so well with the learning management system, my instruction became far more efficient.

I know that going forward there will be some students who will prefer paper notebooks, and certainly they’ll have their place in terms of evidence of learning. But for assessment, I think digital notebooks will continue to be a mainstay in my classroom.