textbooks are expensive. Open educational resources (OER) and open-source textbooks—textbooks that are licensed so that users can edit and reuse them—are a solution to the cost concern.

But there's more than money at stake. When an instructor assigns an open-source textbook on the syllabus, what does that say about learning? Compared with closed-source textbooks, open-source textbooks are better aligned with the values of academia, a community built on the free exchange of ideas. Colleges and universities are not only centers of learning but also generators of knowledge. Similarly, open-source textbooks are an invitation not only to read but also to contribute something new.

Tools like GitHub make it easy for faculty to collaboratively author open-source textbooks, but great content is only a part of great teaching. The progress made in developing open platforms must parallel the progress made in promoting open-source textbooks to ensure that the complete ecosystem around learning is aligned with the values of academia.

Not Just Price, but Pedagogy
The common complaint about commercial textbooks is cost. Between 2006 and 2016, college textbook prices increased by 73 percent. That rise in prices took place contemporaneously with the enactment of the Higher Education Opportunity Act in 2008, which addressed textbook prices by, for instance, requiring price disclosures to professors. So despite legislation designed to reduce prices, commercial textbook prices remain high. And when high prices mean a student cannot afford the textbook, that student may fail the course, which is an even costlier problem.

This is why textbook cost is only a part of the story; the dream was never for cheaper textbooks but, rather, for student success. Instead of a question of textbook cost, the question is one of textbook value. Because if a commercial textbook—even a very expensive textbook—guaranteed good grades, wouldn't we all rush out to buy it?

But the price of learning isn't measured by money. It's measured by hard work: asking questions, making connections, refining knowledge. Learning is a generative and a community activity: working through tough problems in small groups. Perversely, commercial closed-source textbooks, regardless of their cost, reinforce many of the wrong attitudes toward learning: a closed-source textbook says that learning is about obeying authority, about reading rather than editing or writing, about assimilating the correct answer. And if you find that depressing, consider what a rented textbook says about learning.

Open for the Win
The opposite of the commercial closed-source textbook is the open-source textbook. Such textbooks fit into the broader category of OER, by which I mean any resource (including, for example, text, video, and interactive widgets) for teaching and learning released under a license that permits reuse. A Creative Commons license is the typical example. Warning: just because you pay nothing to view a resource does not mean that you can edit the resource.

Nevertheless, because they're low-cost or free, open-source textbooks address issues of affordability, accessibility, and equity. Moreover, because they are generally editable and reusable, open-source textbooks provide an opportunity to reinforce a constructivist understanding of learning. An open-source textbook is, after all, a textbook and thereby addresses the practical need for an expert, authoritative reference. And yet, it immediately calls that authority into question. Because it's editable, it invites students to reflect on their learning and on how the exposition could be improved and, ideally, to propose some specific edits. Like many open-source software projects, an open-source textbook allows users to file “bug reports.” And because an open-source textbook is reusable, it permits other instructors to not only “adopt” the text but also “raise” the adopted text as if it were their own.

In short, open-source textbooks are aligned with the values we want to encourage about learning. We want both instructors and students to not only purchase but also take ownership of their educational resources. We want students to see knowledge not as a thing they receive but as something growing out of a community to which they contribute. There is no monetary price at which a closed-source textbook communicates those values.

Not Just Content, but Student Experience
The fight for open-source textbooks is only a proxy battle in a broader war over pedagogical content knowledge. There's content knowledge (knowledge of "what" to teach) and pedagogical knowledge (knowledge of "how" to teach), but pedagogical content knowledge (PCK) is the knowledge of how to shape content to make it broadly accessible to learners. For instance, PCK...
includes an understanding of students’ common misconceptions along with effective strategies for addressing them.

For an IT crowd, one useful metaphor is to think of PCK as user experience (UX). Content is certainly a part of UX, just as a teacher needs content knowledge. But UX is about how that content gets deployed to the user, just as PCK is about helping learners engage with content knowledge. In this analogy, pedagogical knowledge might be akin to knowing how to program, whereas PCK is knowing how to use programming skills to deliver great content.

Traditionally, the textbook is the reference for content knowledge, and PCK is that bridge that the teacher provides. But as the textbook becomes increasingly interactive, frequently paired with online homework systems and other computer-graded assessments providing rich feedback, the hope is that the interactive textbook could encompass both content knowledge and PCK. Such a book would be a boon for student success. This is the basic premise of adaptive learning technology.

In this scenario, however, who controls that platform? Faculty? Historically, feedback from students is what permits an instructor to iterate on his/her teaching; the same is true for digital resources. Mining student data is mining for PCK. Website analytics can lead to an understanding of where students get stuck in the text and, hopefully, can uncover which online activities are most effective at getting students unstuck—that’s PCK. If the student data is held and analyzed by publishers, then publishers, rather than professors, will be masters of PCK.

Is that really a problem? I think so. When interactive textbooks are closed-source textbooks running on closed-source platforms, faculty may no longer understand how their own students are receiving formative feedback. As a result, those with the deepest content knowledge will be disconnected from the pedagogical feedback loop. These concerns are not so far off: already it can be challenging to perform a Quality Matters assessment when the key components of the course are behind publisher paywalls.

Creating Open Platforms for Open Content

Colleges and universities recognize their role as disseminators of content knowledge. Examples of university-level commitments to OER include the University of Minnesota’s Open Textbook Library, Ohio State University’s Affordable Learning Exchange, and Rice University’s OpenStax. Even research groups are getting in the game, such as the American Institute of Mathematics with its Open Textbook Initiative. But in light of the concerns around PCK, we need open platforms to deploy that open content.

To fill this need, my team and I at Ohio State University designed Ximera, a system that serves interactive textbook content stored on GitHub and captures the resulting learner interactions with xAPI. GitHub provides a place for the many authors (and student contributors) to write the interactive, open-source text together. Git (the technology behind GitHub) makes it easy to collaborate on complicated documents. The open-source software community already understands how to use the Internet to collaboratively author “technical texts” (i.e., computer programs). Rather than trying to rediscover such a workflow, the community of educators should steal it. As digital textbooks encompass not only content but also how to teach that content, the textbook itself increasingly resembles software.

Storing OER on GitHub provides many spillover benefits. One key benefit of git is object permanence. Each version of the textbook is labeled with a commit hash, which provides an unambiguous way to refer to previous versions of the interactive textbook. To understand how updates to the text may affect how students interact with the text, this history of all past versions is essential. Another benefit of git is “branches.” With git we can be fixing typos in a student-facing version of the text (the “master branch”) while also making wild experimental changes in a non-public version (the “development branch”).

Conclusion

The significance of these open platforms is to put the best content-deployment system into the hands of the strongest content experts. Already at Ohio State, we’ve used this workflow to provide lower-cost interactive textbooks while also engaging more of our faculty and staff in the design of the textbook and other online pedagogical resources. It’s a win for both our students and our instructional staff.

Notes


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