



TEXTBOOK HEROES

How Digital Textbooks Make Learning More Impactful

Outstanding Educators Explain How They're Improving Education With Interactive Content



BY PHILIP PREVILE

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The Rise of Digital Textbooks

In the political world, there is a classic put-down that established incumbents sometimes say to the young, charismatic candidates seeking to displace them: “You’ve got a bright future ahead of you, and you always will.” It’s a line that, until recently, could easily have been used by traditional textbook publishers to describe their upstart digital competitors.

Digital textbooks have been hailed for their promise and potential for more than a decade. Their advantages over traditional print texts were many. They can embed video, audio and other materials within their pages, allowing students to approach subject matter through a variety of media. They are easily updated to reflect the latest knowledge. They feature quiz questions that allow faculty to quickly gauge student comprehension. They include online discussion forums where students can engage with one another about their learning. And they come at a cost that’s a fraction of their print counterparts.

Yet these advantages were long seen as theoretical rather than practical. Other than a small group of early adopters, digital course content never gained broad traction with faculty at American colleges and universities. Today, however, digital textbooks appear to have reached their tipping point—a decade

INTRODUCTION

of investment in digital course content and open educational resources (OER) has allowed the technology to finally live up to expectations. Digital textbooks are quickly gaining more widespread adoption because educators are recognizing that they're how students want to learn.

The industry itself knew this moment was coming. At the 2017 ASU+GSV Summit on innovation in education, a panel of participants from across the textbook sector agreed that the pace of adoption for OER—digital educational materials that are both more easily adaptable by instructors and more affordable than traditional textbooks—was gaining speed, and was unlikely to slow down anytime soon.

And now that it's become easy to both create online course content and deliver it through digital platforms, the early-adopter community is snowballing as more and more faculty choose to author their own course content and post it online for their colleagues to adopt. That movement is no longer just a collection of individual professors: increasingly, college administrations are encouraging the use of digital platforms and OER across their entire institutions. Governments are also taking action: last year there were [more than 70 bills](#) introduced in more than half the country's state legislatures supporting their adoption.

Those who do adopt digital textbooks are discovering that the technology is beginning to make good on its potential. And those who write them are experimenting with new ways of making textbook learning more active and engaging—and of making their course content more relevant in the classroom. They are the leaders of an emerging movement.

CHAPTER 1

Digital Natives: How they Learn, What they Need

It's become axiomatic to say that every successive generation of students is more technologically savvy—or technologically dependent—than its predecessor. Today's college freshmen were born in 1999, which makes them younger than Google. They grew up with Web 2.0. They know YouTube's constellation of celebrities better than Hollywood's. When it comes to education, they researched their very first school project on Wikipedia and coordinate group assignments with their peers on social media. Their purchasing habits, social interactions and learning routines follow entirely different pathways than previous generations, and they find it perplexing when longstanding institutions—such as banks, retailers, broadcast networks or universities—insist they step back through time to do things the old way.

To today's students, traditional print textbooks are the old way. They are

prohibitively expensive: a [2014 survey](#) found that 65 percent of college students decided not to buy a course textbook because of the cost. Print textbooks also have an obsolescence problem: today's

students know instinctively that information and knowledge change at a faster pace than the once-every-five-years schedule for new textbook editions. Studies have shown that today's students read books, magazines and newspapers much less than previous generations. The reading they do is on their smartphones and tablets.

And yet, these students have arguably been exposed to more information and knowledge than previous generations. Digital textbooks can incorporate audio and video clips, interactive maps, and even **primary-source historical documents** within their pages—providing the kind of integrated-media experience that they already cobble together for themselves online.

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P. 8



CHAPTER 2

Active Learning: New Pedagogy Meets Digital Textbooks

The habits of today's new generation of students are not the only things that are changing in the college classroom. Increasingly, faculty are moving away from the traditional textbook-chapter-plus-classroom-lecture routine and towards what's known as **"active learning."**

The broadest definition of the concept, first articulated by authors and active-learning pioneers Charles Bonwell and James Eison, is that active learning is "anything that involves students in doing things and thinking about the things they are doing." In practice, active learning involves less time spent lecturing and more time on a variety of classroom activities, including minute papers, think-pair-share activities, case studies and problem solving. Active learning seeks to help students make connections between new knowledge and lived experience, so that what they learn resides fully in their individual intellect.



READ
MORE ON
P.10

Digital textbooks can help achieve this goal because they can embed many active learning tactics and exercises within the body of the text. Embedded audio and video clips encourage students to make connections between different representations of concepts and ideas. Quizzes can be administered through digital textbooks and results tabulated in real time, allowing faculty to quickly gauge student comprehension, identify gaps in learning and adjust class activities accordingly. Minute papers can be posted online, anonymously or named, for use in classroom discussion.

Digital textbooks are also more easily customized to suit individual teachers' in-class needs. Professors control the timing and release of textbook chapters to students. Professors who adopt a digital textbook can use the quizzes, discussion questions and case studies that are included—or replace them with their own.

Each digital textbook can develop its own online community of faculty adopters who share assessment resources and provide feedback for future editions. In this sense, digital textbooks mark a philosophical shift from print traditions: they are steeped in the kind of open-

source, peer-to-peer collaboration that is common in the world of software development. Put another way: because digital textbooks connect faculty with a wide-ranging community of colleagues they also offer educators opportunities to implement active learning strategies.

CHAPTER 3

Just Write It: The Digital Author Experience

Every professor has a textbook in them: it's the sum of their lectures, course notes, writings and learnings on the subjects they are passionate about and teach regularly. Until recently, however, only a precious few ever got to write them. Without the publication and distribution resources of a publisher, there was no point in starting the manuscript. The print textbook industry has long been a gatekeeper of professorial prestige and reputation: the few faculty who wrote the textbooks were considered authorities within their disciplines. The marketplace for digital textbooks is far more open by comparison: the

barriers for entry are low, the production timelines are shorter and the need for printing presses nonexistent.

And because the marketplace for digital textbooks is so open, many faculty are choosing to dive in. They are authoring their own course content, combining traditional text with audio and video and tailoring their textbooks for active learning. For a generation of students who have been wondering when the tools of their university education would finally catch up with their lives, these authors are textbook heroes. In the following pages we'll hear those heroes' stories, as told in their own words.

The Trailblazer

Sara Eskridge
Adjunct Professor
of History
Randolph-Macon
College
Ashland, VA



PAIN POINT
Adapting high-tech
innovation to a low-
tech discipline



HISTORY
Interactive
timelines,
videos and other
primary sources
helped Professor
Eskridge's textbook
resonate with
students

I teach historical survey courses, mostly the U.S. History survey or specifics under that umbrella. In the past, schools have required the same textbook for all U.S. History survey courses. It was 1,300 pages long and you could tell no one would ever read it. It was also too expensive and included no primary sources, which all history professors want. You always had to supplement with photocopies or to assign a different book.

People told me that a digital textbook wouldn't be a good format for history. Organic chemistry maybe, but not U.S. history. They could not have been more wrong. I created my own digital textbook—I acted as lead author, and assigned chapters to a group of history professors. I now use it in my courses, and it's made the subject a truly interactive experience. With the digital textbook, students can hear the political speeches and the radio correspondents of the time, see the imagery of the time. I was able to include some 1930s newsreel footage. It includes Winston Churchill's Iron Curtain speech. And I think it's crucial that these primary sources are embedded in the text. It's very similar to just being on the internet.

A digital textbook gives me the option to make lots of use of online discussion features: I give students a primary source and a question, and the discussion happens online, anonymously if they want. Students don't need to worry about being controversial or unpopular. The discussion feature brings out their best. I recently had a foreign student who had difficulty participating due to the language barrier. I found that, by using the live discussion feature in the textbook, she was really able to become an active participant in the class.

My students this year were born in 1999. They don't want a paper book anymore. They are visual learners. That's how they learn best.

The Classroom Flipper

PAIN POINT
An old prerequisite course in need of an update

Our first and second year undergrads all take a course entitled Bones, Stones and Human Evolution. The course content had been pulled together by the faculty over many years, but it hadn't been updated in a long time and my department director asked me to rebuild the course from scratch. As I gathered all the information I realized that I had the material for a textbook, and that I could tailor it to a flipped classroom.

I was slated to teach the course in September 2017 so I started writing in spring 2017 and devoted my summer to making both the digital textbook and the video lectures. It was a very quick timeline. Every video lecture in the course also has a corresponding chapter, so students can progress through the textbook chapters and

the video lectures in parallel and it all fits with the course schedule.

I used lots of interactive timelines so you could find and learn about the key people in evolutionary theory. And I used lots of rollovers: there is a photo of a cheetah, and when students roll over the photo with their mouse, text will pop up to explain its evolutionary adaptations. Those are particularly effective.

When I look at my digital textbook from a cultural-evolution perspective, I think this is the latest technology in the transfer of information from teachers to students. People increasingly recognize the limits of paper textbooks. This technology has opened up new pathways. We'll see whether it sticks, but in my experience it's been very successful.



Thomas Morgan
Assistant Professor
School of Human
Evolution and
Social Change
Arizona State
University
Tempe, AZ



SCIENCE

By pairing video lectures with corresponding chapters, Professor Morgan was able to flip his class and freshen up an old course

PAIN POINT
Perpetually
outdated
textbook

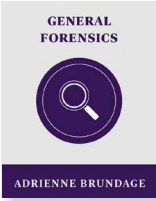
The CSI Debunker

Adrienne Brundage

Lecturer, Forensic Entomologist
Department of Entomology
School of Agriculture and Life Sciences
Texas A&M University
Galveston, TX

I teach general forensics. All the freshmen in our program have to take my forensics course. They've been brought up watching *CSI* and they don't realize that forensics is a real science.

The biggest problem with forensics textbooks is they don't move as fast as the technology. Their chapters on computing are always two years out of date. They are perpetually behind on genetics. And they would never have exactly the information I want in there, so there were lots of supplementary materials that I had to pull together. I was using the top textbook in the field and it was very thorough but it was not customizable and not updateable.



FORENSICS

Videos are a key learning tool in Professor Brundage's textbook, showing students how to practically apply the science

I was also frustrated on my students' behalf. Every time they publish a new edition students can't sell back their books anymore—but the new editions are still missing crucial material anyway. You can get print textbooks in digital format but they don't take proper advantage of the technology.

Forensics is an applied science and the digital textbook had many advantages in that regard. Students need to know how certain microscopes work, they need to know how to collect evidence. I use videos to demonstrate all that, so they can see the science being applied. I even have videos of me collecting evidence at a crime scene.

I deployed the textbook for the first time in the fall of 2017. I find that a lot more students are actually doing the reading. So these days in class I often say, 'I won't go into the full background—it's in the textbook. Let's go straight to the applied section.' Limited class time is better spent practising actual forensic stuff than covering background. This textbook has opened up so much more time to do learning in class.

The best thing about digital textbooks is that they are as up-to-the-minute as you want them to be. As new scholarly papers come out I put them into the textbook. When Charles Manson died—every forensics textbook addresses the Manson murders—I was able to update my chapter right away. It's never out of date.

The Convert

Andrea Hendricks
Associate Professor
Department of
Mathematics
Georgia State University
Atlanta, GA



PAIN POINT
Disparate, scattered
course content in
need of integration

Typical college algebra courses have prerequisites, but there is a movement among state schools across America to stop forcing students to take remedial math, and instead to give them the support they need in parallel with their algebra course. Our campus adopted this model in 2015 but it required two different software packages for students. And the links between the support material and its application to algebra were never evident, so the course needed a new textbook.

I've published four algebra textbooks with a major publisher, but those were for the previous pedagogical model of teaching. I approached my publisher and they knew the co-requisite courses were coming, but they had already sorted out their own solution. I thought their approach had some limitations. And it would take so long to get to print, for a course that is still new and evolving.

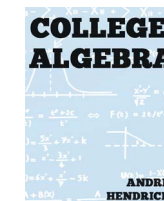
I started writing a new digital

textbook, using the Top Hat platform, in January 2017.

I had four colleagues contribute problems and exercise sets. I really liked writing in the Top Hat platform because I could curate all the resources. I finished the textbook in August and taught with it in the fall.

I've made the connections between the algebra and the support material as clear as possible. And I can release individual sections of the textbook on my own schedule. I assign only what I want them to see, so that they work their way through the material methodically, and I am certain they understand initial concepts before moving on to others.

Students love using my digital textbook. They like the fact that it's organized. Everything is in one place: homework, readings, videos. I always thought there needed to be a way to streamline all those different resources. It's exactly what they need.



MATHEMATICS

With homework, readings and videos all in one place, Professor Hendricks' textbook effectively streamlined disparate aspects of her course

PAIN POINT
A digital textbook
in search of a
publisher

Mark
Meckler

Sam
Holloway

**Sam Holloway and
Mark Meckler**
Associate Professors
Pamplin School of
Business
University of Portland
Portland, OR

The Craft Beer Evangelists

As told by Sam Holloway

Mark and I love craft breweries. Not just the products but their community impact in terms of local jobs, gathering places and social benefit. But most brewery owners don't have much experience running a business and don't have time to do a degree like an MBA. There was a need for sound business advice. Mark and I wanted to help, by offering brewers learning opportunities without taking courses.

At first we decided to write a book, but the traditional publishing deal isn't good for the author—you lose copyright and you keep only 10 percent as royalties. The industry's technology was changing fast and the book would be outdated by the time



BUSINESS

The ability to instantly update textbook content helped Professors Meckler and Holloway keep pace with a fast-moving industry

it was published. So we launched an e-commerce website where brewers could log on and spend 20 minutes to an hour learning about different aspects of how to manage their business. We never considered offering this material to students in the classroom, but a couple of other professors saw what we were doing and said, ‘The content you’ve developed for breweries is so interesting. Can I use that for my students?’ Of course our answer was ‘Yes.’

We started to promote the material at academic conferences—we’d host keggers—and it began to catch on. The appeal of the material is that the craft brewery business case is completely counterintuitive. In business schools, strategic management is always about growth and getting big. But for multinational brewers like InBev and Heineken, their strategy of staying big to keep everyone else small no longer applies. Small is an advantage now, but how? And how do you change strategic management for small? That’s what the book is about.

But as more professors used the material, we started running into problems we hadn’t anticipated. I was getting emails from students late at night who’d say to me, ‘My site login isn’t working and my exam is tomorrow.’ We needed a publishing partner.

“We approached the major firms but they were not interested in the project. Those companies are hurting, and this wasn’t the right time for them to take it on. Then I found Top Hat, and we transferred the material over to its platform. Now the late-night calls from students have stopped.”

PAIN POINT
Using brand new
lab technology
without a manual

The Digital Anatomist

Butler University recently received an Anatomage table as an endowment gift. It's a lifesize, interactive digital cadaver that teaches students human anatomy. Its digital imagery comes from three real cadavers that have gone through a 3-D imaging process. This was a big deal for us. Butler isn't a research university and we don't have the resources here to run a cadaver lab.

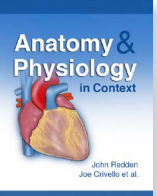
The Anatomage table is very sophisticated in terms of the ways you can manipulate the digital cadaver. But there was no manual for how to use it in the classroom, no student or faculty instructions on

how to progress through the body's different systems as you would with a real body in a cadaver lab. I contacted the manufacturer. They weren't interested in publishing a manual themselves, but said they would provide all the assistance they could for someone else to write it. So I began writing it.

I really like the fact that the both the tool and its manual are digital. It seemed appropriate. The Anatomage table is a remarkable piece of technology. You can peel back the skin on the digital cadaver to expose its musculature. You can isolate individual organs. And it's all there in my book.



Michelle Moore
Assistant Professor
Department of
Health Sciences
Butler University
Indianapolis, IN



HEALTH SCIENCES
The ability to quickly create a digital manual allowed Professor Moore to make a valuable piece of technology useful in a resource-challenged lab



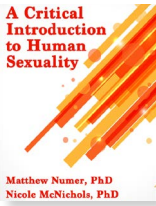
Matthew Numer
Assistant Professor
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PAIN POINT
Human sexuality
textbooks that are
afraid of sex

The Sexperts



Nicole McNichols
Lecturer
Department of Psychology, University of Washington, Seattle, WA



HUMAN SEXUALITY

In a rapidly-changing field, Professors Numer and McNichols are able to reference cutting-edge information within their constantly evolving textbook

Nicole: I was using a very traditional textbook that didn't capture certain topics the way I wanted, particularly social issues around gender, identity, transgenderism and sexual orientation. Anyone who is not cisgender or straight is treated as pathologized.

Matt: I'd agree. Traditional textbooks are sex-negative. There were some attempts, in introductions and things, to talk about diversity of sexuality. But once you got into the material, they treat sex as dangerous, something to be avoided.

Nicole: Many of the textbooks on the market now are updates of books written 20 years ago. They just don't reflect the way we think and look at sexuality.

Matt: Even though they've been updated, the historical, conservative perspective was still in there. The perspective is always heteronormative. There simply wasn't a textbook out there that met either of our requirements.

Nicole: This field is rapidly changing and sexuality a topic of public discussion. Within the textbook we can link to New York Times or Atlantic articles. Students can read the most cutting-edge information, and think about their own opinions and attitudes. And they can respond to one another anonymously in discussion groups within the textbook.

Matt: Blended learning works best—a combination of in-person and online, reading and interactivity. One student told me it's the only textbook he's ever read, which is a great improvement. You'd be surprised how boring a human sexuality course can be, because people have been afraid of the topic for so long.

The Pocketbook Economist

PAIN POINT
An expensive,
underused
textbook

I grew up in a small town in Pennsylvania, in the projects. There was lots of violence, few opportunities, no hope. I decided to graduate from high school, which was a bold ambition in my town. I graduated and moved to California and did my BA, then a PhD at UCSB, and they offered me a job teaching.

My primary motivation for getting involved with a digital textbook project is the cost of textbooks. My favorite introductory economics textbook is the one by Greg Mankiw. I actually love the book, his words, the man himself too. But it costs close to \$200 and I can't justify this cost for students.

Introductory economics is a very textbook-dependent course. The way it has been traditionally taught is very dull and offers little value for the money students spend. There was too much memorization, too much of a garbage-in-garbage-out model. Many

students were choosing not to buy the book because professors were giving them the Cliffs Notes version of the textbook chapters anyway.

We need to give students more, something that will stick in their heads. I contributed to two digital textbooks. I wrote the chapter on money for Macroeconomics, and the chapter on labor for Microeconomics.

When I transitioned to the digital textbook in class, I turned it into an experiment. I taught six weeks of microeconomics with the digital textbook on the Top Hat platform and then four weeks with a traditional textbook, and then I asked them for their opinions. Overwhelmingly they preferred the digital format.

The cost to students for the book is between \$65 and \$75. I like the fact that students always have it with them. The ease of access is a nice addition to the affordable price tag.



Cynthia Benelli
Lecturer
Department of
Economics
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California Santa
Barbara
Santa Barbara, CA



ECONOMICS
Motivated to save students money, Professor Benelli contributed to a pair of digital textbooks. Each costs about a third of the typical intro to economics textbook.

PAIN POINT

A textbook that
can keep science
relevant, and remain
relevant to the
science

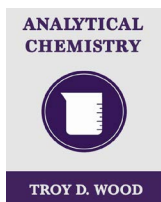
The Storyteller

Troy Wood

Associate Professor
Department of Chemistry
University of Buffalo
Buffalo, NY

I teach analytical chemistry. I had wanted to write a new textbook for a few years. I'd expected to do it later in my career, but a few things pushed me to do it now. The first was that, over the last four or five years of teaching, my students kept telling me that my stories and anecdotes were more helpful to their learning than anything they were reading in the textbook.

Analytical chemistry is all about measurement: how much of a specific compound is in a particular tablet, for example. The curriculum for analytical chemistry was set in the 1950s and it hasn't changed much, but the discipline itself has changed. There is so much more now than there used to be. The textbooks have



CHEMISTRY

A repository for resources, questions and homework, Professor Wood's textbook has centralized his always-up-to-date course work

responded by getting bigger and bigger, providing extremely long explanations that are really unnecessary. It had gotten to the point where it was impossible to cover it all in a single semester.

In my digital textbook, I try to get right to the point: tell students about what's happening now in the discipline, and make it as relevant as possible. My digital textbook has also become a focal point for all the resources I've built up over the years. I've authored classroom response questions for other publishers; now they are in my book. Some are designed as homework for them to complete off-site. Others are in-classroom problems with a two-minute time limit. But they are all in the digital textbook, and I can assign them when I am ready.

I also have online videos about things like titration and spectroscopy that I used to assign by embedding the links in the course Blackboard page. Now they're embedded in the book as well. Students have everything they need in a single place.

The idea of an instantly-updateable textbook really appealed to me. As the discipline of analytical chemistry evolves, the textbook evolves with it. If a case study becomes dated, I can replace it right away. No need to wait a couple of years for the next edition.

The Innovative Professor

Faculty in every discipline face similar challenges. Course materials whose effectiveness is quickly fading. Textbooks that aren't suited to active learning. Students demanding more value from their education.

The stories told by educators who have embraced digital textbooks provide a pathway through these obstacles. These professors all had come to the conclusion that the print textbooks they had long relied upon no longer met the needs of their courses. They all wanted to give students a more engaging resource for learning—and one that fit their budget. And they saw potential in a digital format that could incorporate a variety of media and be easily updated to reflect the latest developments in their field.

But the most powerful commonality among them is the sense of accomplishment they've derived from their project. They recognize that students have changed and that their teaching methods and resources need to change as well. And they chose to take the lead: they are championing better, more impactful learning. 📖

THE AUTHOR

PHOTO BY ASH NAYLER



PHILIP PREVILLE

Philip Preville is an award-winning journalist and a former Canadian Journalism Fellow at Massey College at the University of Toronto. He's currently a member of the Professional Advisory Council with the Department of English at Ryerson University.



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