starting to center their data and analysis functions on student success and expanding the availability of data to more people at the institution. When I was at Miami Dade College, we started a Data Academy, a reconceived research methods course for staff and faculty grounded in the college's strategic priorities and designed to facilitate the use of institutional, state, and federal data to ask smarter questions about student success. Similarly, initiatives like California State at Long Beach and at San Marcos, the University of Washington at Tacoma, and tech firms like Google have instituted "data fellows" programs to build data literacy and expand capacity.

Data for strategic decision making is an asset that should be made available to more faculty and staff. Accordingly, expectations for responsible data use by all employees should be specified, and professional development to improve data literacy should be supported. Intentional opportunities on campus and at conferences are a start. Some colleges might even consider embedding data literacy in job descriptions and performance expectations. In the same way that many institutions have called for data literacy as a core student-learning outcome, we might apply the same expectation for college leaders, faculty, and staff.

Not everyone who works in higher education has—or needs to have—a degree in statistics. But they all have an opportunity to use data and analytics to improve student success. They have resources at their fingertips, starting with colleagues who work in institutional research, business affairs, information technology, and even their math departments. Although those colleagues might be the usual "data people" at our colleges and universities, here’s the truth: We are all data people.

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Colleges Must Play a Role in Bridging Ethics and Technology

By SHOBITA PARATHASARATHY and DAVID H. GUSTON

THERE'S a growing sentiment in the country that technology doesn’t always serve the public interest.

Civil-rights proponents are frustrated by the use of facial recognition in policing, and concerned about both algorithmic bias toward and increased surveillance of marginalized communities. Others are worried that not enough deliberation is taking place before controversial experimentation, arguing, for example, that the Chinese scientist who successfully edited the genomes of human twins in utero last year crossed an ethical bright line. And last month, 1,200 college students—including some from Silicon Valley pipeline institutions like Stanford and MIT—pledged not to work for the big-data firm Palantir because of its contracts with Immigration and Customs Enforcement.

These examples make clear that colleges need to change their approach to technological progress. They can no longer ask themselves simply, How can we innovate? They must also fully prepare themselves to answer the question, How should we innovate? With spending on research and development in the United States exceeding half a trillion dollars annually, and two-thirds of it generated by the private sector, building the capacity to teach and study the ethical and societal dimensions of science and technology is of the utmost importance.

Colleges must train the next generation of scientists, engineers, and policy makers to think more critically about how new science and technology serve the public interest. They need to support faculty research on how to develop and govern science and technology so they respond better to public values and priorities. And colleges need to teach all students about the importance of science, technology, and innovation in their futures and how they can help create better futures for themselves, their communities, and their planet—even if they don’t know how to code.

The good news is that many colleges already have basic expertise and infrastructure in place. Decades ago, in response to an earlier generation’s catalog of worrisome technologies—from atomic weapons to industrial chemicals to recombinant DNA, interdisciplinary groups of scholars came together with a similar goal: to leverage knowledge and methods from the social sciences and humanities to maximize the public benefits of science and technology and minimize their drawbacks.

Going under the name STS (Science, Technology, and Society, or Science and Technology Studies), this field has taught us that social values are embedded not just in policies for science and technology but also in the processes of inquiry and design themselves. For example, algorithms designed to remove human judgment from decision making about setting bail still reflect centuries of racism embedded in our social structures. Simply tweaking the algorithm or diversifying the engineering workforce will not solve the problem; only transformative societal action will.

Today’s technological concerns tend to focus on the digital realm, including algorithms and other applications of artificial intelligence and machine learning, such as autonomous vehicles, smart cities, and the relationship between digital innovation and work. But in order to begin to deal with their consequences in a timely fashion, we must develop insights across technologies and from experience.

The point is not to argue over whether digital or biological innovations are going to change the world more profoundly. Rather, it is to recognize that themes about the public interest cut across technologies, including how they distribute risks and benefits, their implications for deeply held but hard to quantify values like human identity, citizenship, and democracy, and the question of who has actually participated in the visions for these technologies in the first place.

Although techniques have been designed to anticipate the ethical and societal implications of technology, more needs to be done. College leaders should expand STS research and programs and expand interdisciplinary educational opportunities that teach students across disciplines about the complex relationships of science, technology, innovation, policy, and society.

A new program at the University of Michigan at Ann Arbor, where one of us teaches, takes this approach. The technology-assessment clinic, housed in the program of science, technology, and public policy at the Gerald R. Ford School of Public Policy, teaches...
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a multidisciplinary group of students how to identify and evaluate the so- cial challenges posed by emerging teaching makes sense, you need a crys- tal-clear picture of what you want to accomplish with the technology. Here are some strategies I've found useful in my own teaching that can help you uncover which aspects of your course would be best served by bringing in technology and also help steer you toward the most difficult, challenging, and potentially public-interest, technol- ogy "through curriculum development, faculty research opportu- nities, and experiential-learning programs, in order to inspire a new generation of civic-minded technolo- gists and policy leaders."

Last month funders announced the first winners of $5.1 million in grants to start projects at member univer- sities. Examples of funded activities include one at Michigan to track the potential future impact of emerging technologies, another at Arizona State to train professionals at science museums to work with government, community organizations, or colleges on societal challenges posed by emerging technologies. More than 15 years ago, one of us called on colleges to create centers for responsible innovation to balance out the commercial values that they had been developing. The need for such mechanisms to grapple with the values embedded in our science-and-technology enterprise and bend them toward the public good is even stronger today. Colleges can lead the effort to put our technological futures in the hands of people wiser and more far-seeing than they are today.

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Before Adopting Classroom Technology, Figure Out Your Goals

By MICHELLE D. MILLER

In technology, as in so many things, just because you can doesn't mean you should. It takes college stu- dents one hot minute to figure out when technology is just a useless embellishment, and they're unforgiv- ing when you have no good answer for why you chose to go with digital materials when pencil and paper would have sufficed.

In order to determine whether incorporating technology into your teaching is a good idea, you should ask yourself the "magic wand" question. In a course-redesign pro- gram I direct at Northern Arizona University, I sometimes ask faculty members: If you could wave a wand and change one thing — a skill stu- dents lack, a misconception that stubbornly persists, a task students opt not to do but should — what would that one thing be?

You may find an area of your teach- ing that's ripe for the kind of trans- formation that the right technology can bring. For example, when I teach my introductory course in cognitive psychology, I find that students are pretty good at picking up terminology and identifying course concepts in- from patterns of data obtained in labo- ratory experiments. Getting students to make that mental leap is my magic-wand issue. To deal with the problem, I turn to technology: I assign an online labora- tory application that simulates classic experimental paradigms in abbreviated form. This online lab lets students see and experience — from the per- spective of a research subject — the procedures they've read about in the textbook. Most important, as they complete the lab, they can see whether the quantitative results they've gen- erated align with the theories they're learning about in class.

Use backward design. This is a powerful strategy for figuring out tech goals. Like the name implies, the idea is to start your planning with an end goal in mind. In the case of teaching, the end goal essentially corresponds to all the things that you hope students will know and be able to do by the end of the course. Once you've defined your end goals, use them to plan the semes- ter — making sure that everything students do (i.e., learning activities) and everything they turn in (i.e., as- sessments) are tightly aligned to those objectives.

I find that the backward-design concept is particularly well. Especially toward the end of the design process, when you are figuring out the details of how you'll arrive at the end goals you've laid out, you can dive back into the larger pool of technology options that caught your eye and choose the ones that map onto the goals.

Make tech choices through the lens of the learning sciences. I use this strategy most often to make goal-focused technology choices for my own courses. One of the best rea- sons to use technology in teaching is that it offers ways to put into practice the extensive body of research in cog- nitive psychology and related sciences on how human beings learn.

The research on attention, memo- ry, reasoning, problem-solving, and other learning principles is incredibly powerful. But it can be difficult to put those principles to use in your class- room without some kind of technolog- ical aid.

Take the concept of retrieval prac- tice. Retrieval practice is what you do any time you pull information out of your memory. It kicks in when you're