

Founding America's First Research University

Johns Hopkins put American higher education on the path to world domination

BY KARL RHODES

In 1872, Daniel Gilman, president of the University of California, Berkeley, articulated his vision of what a university should be. During his inaugural address, he argued that the mission of a university should be “to advance the arts and sciences of every sort and to train young men as scholars for all the intellectual callings of life.”

Gilman further stated that universities should elevate scientific research to the same level as the study of language, history, literature, and art. “Give us more and not less science,” he demanded. “Encourage the most thorough and prolonged search for the truth which is to be found in the rocks, the sea, the soil, the air, the sun, and the stars; in light and heat, and magnetic forces; in plants and animals, and in the human frame.”

Such ideas were radical in 1872, a time when most American colleges still focused on teaching Latin, Greek, and mathematics to undergraduates. The advancement of knowledge — especially scientific research — was rarely encouraged.

Near the end of his speech, Gilman imagined what Berkeley would be like 100 years in the future. “I see a flourishing University,” he prophesized. “Students are flocking from east, west, and south, from South America, and Australia, and India, from Egypt and Asia Minor, with the ease and rapidity of a locomotion not yet discovered.”

Gilman’s address was eloquent enough but not sufficiently persuasive. He struggled to sell his plan to state legislators who had their own agendas. He also encountered an aggressive farm lobby that wanted the fledgling land-grant university to focus primarily on agricultural and mechanical arts. After two years of slow progress and growing frustration, he resigned to become the first president of Johns Hopkins University — transplanting his dream from Berkeley to Baltimore.

Back on the East Coast, funded by the unfettered bequests of Johns Hopkins — a recently deceased business owner and investor — Gilman and the university’s trustees established the first research university in the United States. It was a hybrid of the German model that emphasized graduate research and the British model that focused on undergraduate education. The founding faculty members added the uniquely American features of greater academic freedom and closer collaboration between professors and students. They made the laboratory and the seminar the primary centers of learning. They conducted research and published the results in academic journals, including several they started themselves.

The founding of Johns Hopkins was “perhaps the single, most decisive event in the history of learning in the Western Hemisphere,” according to the late Edward Shils, a University of Chicago sociologist. Shils’ assessment may go a bit too far, responds Jonathan Cole, former provost of Columbia University and author of *The Great American University*. “Nevertheless,” Cole adds, “Gilman’s molding of Hopkins’ mission represented the beginning of the great transformation in American higher learning.”

The Economic Impact of Higher Ed

Before the 20th century, American colleges and “universities” were small, and their economic impact was negligible. Today, American research universities contribute to the economy in at least three primary ways. First, they have a direct impact by employing people and purchasing goods and services. Second, they help students acquire human capital — knowledge and skills that are useful to employers. And third, they increase productivity by conducting research that creates new knowledge or applies existing knowledge in innovative ways.

Johns Hopkins is a good example of the first and second of these channels. In the university’s 2014 fiscal year, it paid \$3.9 billion in wages and spent \$1.5 billion on goods and services, including construction. During the spring of that year, more than 20,000 students were enrolled in for-credit programs at Hopkins. But the third channel — creating and applying knowledge — is more complicated. Nationally, Hopkins has ranked first in research spending for 38 consecutive years. In 2016, the university spent more than \$2.4 billion on research and development, according to the latest survey by the National Science Foundation. No other university came close to that figure. Globally, basic research advances knowledge, a public good. Anyone anywhere might then apply that knowledge in ways that add to economic growth. Locally, however, Hopkins’ high volume of basic research has not produced a regional concentration of high-tech spinoffs in Maryland, such as those in California’s Silicon Valley or North Carolina’s Research Triangle.

For a university to have that level of economic impact on its home region, a high number of its graduates must find jobs that keep them there, according to research conducted by Jaison Abel and Richard Deitz, regional economists at the New York Fed. One way to make that happen is to promote university research that creates spillovers into the local economy that create more jobs requiring high levels of human capital.

In recent years, Hopkins has done more to facilitate such spillovers, but progress has been slow, according to Stuart Leslie, a professor in the History of Science and Technology Department who is writing a history of the university. “Our work to build a biotech industry and a pharmaceutical industry using faculty research is very difficult because it runs against a really long-standing prejudice against application,” he says. Traditionally, Hopkins professors have created knowledge for the sake of creating knowledge — not for commercial applications. It’s an ethos that harkens back to Gilman and the founding faculty.

But regardless of Hopkins’ regional impact, it has made a singular contribution to the national economy. The university created a model of graduate study and research that has flourished in the United States. This model has helped develop dozens of top research universities that have become global leaders in the advancement and dissemination of knowledge in many academic fields of study, including disciplines that have proved invaluable to economic development both globally and regionally.

“If you are purist on causality, it’s tough to say that universities generate innovation and economic growth,” cautions Adam Jaffe, an economist at Brandeis University who studies the process of technological change and innovation. “But if you are willing to say, ‘It’s only a correlation, but the correlation is quite robust — it has developed in a lot of places in a lot of different ways,’ then I think the story is compelling.”

Promoting Science

Early American colleges, such as Harvard and Yale, followed the British model of Oxford and Cambridge. Undergraduate students mostly pursued a classical course of study.

The University of Virginia, which started classes in 1825, experimented with a more varied and flexible curriculum that stirred debate over the value of the classical course. At Yale, for example, a trustee resolution suggested that the study of “the dead languages” should be eliminated. This proposal prompted what is now known as the “Yale Reports of 1828,” which reaffirmed the conventional wisdom of sticking to the classical course. American colleges mostly adhered to Yale’s advice for three more generations — partly because the market demanded it — but some universities experimented with various electives and, in some cases, separate schools for scientific studies. Yale formed such a school in 1847, but its resources were severely limited.

Gilman graduated from Yale in 1852 and traveled to Europe, where he visited Noah Porter, a Yale professor who was studying philosophy at the University of Berlin. This trip likely was Gilman’s first exposure to the German model of higher education, and he was impressed by its emphasis on research and graduate studies. He detailed his many observations of Berlin and other universities in letters that he sent back to the United States.



Daniel Gilman, founding president of Johns Hopkins University

Gilman “accumulated meticulously large stores of knowledge regarding education, the history of learning and science, the achievements of great scholars and scientists, the development of educational institutions at every level,” noted Abraham Flexner, an expert on higher education who graduated from Hopkins in 1886 and published a biography of Gilman in 1946. “His ideas were not original; he sought them here, there, and everywhere, combining and adapting them to American needs and conditions.”

Gilman returned to Yale to help raise money for its scientific school. “His task was, in essence, to win adherents to the teaching of science,” Flexner wrote, but “the classicists fought hard to maintain their monopoly.” In 1856, Gilman published a pamphlet calling for greater opportunities for Americans to study basic and applied science. Because these opportunities were lacking, he lamented, the United States was “far behind European nations in many important branches of industry.”

In 1866, Gilman became essentially the chief operating officer of the scientific school, which was making good progress with increased funding and a new corporate structure that further separated it from Yale. “While Yale College continued to operate on traditional lines, the Scientific School embraced modern subjects,” Flexner wrote. Forward-looking “Yale men,” he noted, started to hope that Gilman might become the university’s next president, but when the job went to Porter, Gilman went to Berkeley.

Founding Johns Hopkins

While Gilman was accumulating ideas in Europe and experience at Yale, Johns Hopkins (the man) was amassing a fortune in Baltimore as a wholesaler of groceries, a financier of various enterprises, and a major shareholder in the Baltimore and Ohio Railroad. Hopkins died in 1873, leaving \$3.5 million to start a university and \$3.5 million to establish an affiliated hospital. There were few strings attached to these gifts, but he advised the trustees to never sell the B&O stock, a recommendation they followed and would later regret.

After Hopkins' death, the trustees began researching various models of American higher education. They asked the presidents of three universities — Charles Eliot of Harvard, Andrew White of Cornell, and James Angell of Michigan — to advise them. “White made encouraging suggestions from his experience at Cornell, Angell was skeptical, and Eliot could not imagine more than a fledgling regional college in Baltimore,” wrote Roger Geiger, a Penn State education professor who in 2015 published *The History of American Higher Education*. “But all agreed that the best person to lead such a venture was Gilman.”

Reverdy Johnson Jr., chairman of the trustees' executive committee, offered the job to Gilman in an 1874 letter. “The Institution which I represent,” Johnson began, “is the recipient of a fund of some three and a half millions of dollars — with no shackles of state or political influence, and with no restriction but the wisdom and sound judgment of the Board of Trustees.” The institution, he added, would be “entirely plastic in the hands of those to whom its founder has entrusted its organization and management.” In short, Hopkins would not suffer from any of the impediments that Gilman was struggling against at Berkeley.

“The trustees of the university believed in Gilman from the start: He had no opposition to overcome, no vested interest to combat, no tradition to defy,” Flexner wrote. Gilman took the job and opened the university in 1876 with 54 graduate students, 12 matriculates, and 23 special students.

In Hopkins' third annual report, Gilman cannily attributed the university's emphasis on graduate education not to himself but to the trustees. He said the trustees found strong demand “for opportunities to study beyond the ordinary courses of a college or scientific school.” The best evidence of this demand was “the increasing attendance of American students upon the lectures of the German Universities.”

To attract such students, Gilman sought professors who were devoted to specific disciplines and eminent in their fields with “power to pursue independent and original investigation, and to inspire the young with enthusiasm for study and research.” He hired three professors immersed in science: Henry Rowland (physics), Ira Remsen (chemistry), and H. Newell Martin (biology). He also hired three professors steeped in classical instruction: J.J. Sylvester (mathematics), Basil Gildersleeve (Greek),

and Charles Morris (Latin and Greek).

“Sylvester and Gildersleeve were the elder statesmen. The rest of the faculty members were about 30, which is astonishing when assembling what was supposed to be a world-class faculty,” Leslie says. “How do you get a great university without a great faculty? And how do you get a great faculty without a great university? You have to think about it differently. You have to think about assembling a *future* great faculty.”

Many young professors from the early years at Hopkins never became outstanding scholars, but they trained hundreds of Ph.D.s who spread Hopkins' research-centric model of learning to many other American universities.

“The numbers are staggering by today's standards,” Leslie says. Rowland died at 52 after training more than 100 Ph.D.s, including more than 30 who went on to chair departments at other universities. “Remsen was not a great scholar at all, but as a trainer of people who would train other graduate students at other universities, he was unmatched,” Leslie says. “This was also true of William Welch in medicine. He set up an environment in which great medical researchers flourished and went on to do tremendous things all over the world.”

In economics, Hopkins awarded its first Ph.D. in 1878 to Henry Adams, who later became a co-founder of the American Economic Association along with Richard Ely, who was among Hopkins' first professors of political economy.

Imitation and Acclaim

Gilman corresponded frequently with Eliot, the president of Harvard. Eliot understood the importance of science. He was familiar with the German model of graduate education, but he also was bound by the ancient traditions of America's oldest college. He famously stated that the German approach would suit Harvard freshmen “about as well as a barnyard would suit a whale.”

Harvard was not alone in its complacency. “By 1890, the German ideal of advanced scholarship, professors as experts, doctoral programs with graduate students, and a hierarchy of study had few adherents in the United States outside of Johns Hopkins,” wrote University of Kentucky professor John Thelin in his 2004 book, *A History of American Higher Education*.

Hopkins took full advantage of this head start. It graduated its first Ph.D.s in 1878, and by 1889, it had produced a total of 151 — more than Harvard and Yale combined, according to Geiger. “Hopkins' Ph.D.s were soon sought by ambitious universities throughout the country.”

The university's first obvious imitator was Clark University, which opened in Worcester, Mass., in 1889 with G. Stanley Hall (a former Hopkins professor of psychology) as its founding president. Clark was the first all-graduate studies institution in the United States. It focused on mathematics, physics, chemistry, biology, and most importantly, psychology.

The University of Chicago was not a Hopkins imitator, according to Cole, but its first president, William Harper, came from the same school of thought as Gilman. Beginning in 1890, and 14 years after the founding of Hopkins, Harper created “a small undergraduate body and a much more elaborate and important research enterprise,” Cole says. “He recruited extraordinarily able faculty members by raiding a lot of the prestigious eastern universities. He essentially killed Clark University by stealing almost all of their very good psychologists.”

Hopkins’ emphasis on research also attracted talented professors. “Harvard was forced to adopt the model because Hopkins began to raid some of Harvard’s faculty who were interested in doing research,” Cole says. “They revered the German universities and the opportunity to produce new knowledge rather than simply to transmit existing knowledge.”

Harvard’s Eliot was not an early adopter of the Hopkins model, Cole says, “but when he got into it, he got into it in a big way. He not only adopted it, he quintessentially adopted it.”

As Harvard surged ahead, Hopkins lost momentum. The university struggled financially after its endowment — almost all of it still in B&O Railroad stock — stopped generating cash in 1887. Also, the university started to lose some of its most distinguished faculty to retirement, death, and academic free agency. By the time Gilman retired from Hopkins in 1901, Eliot and Harper were beating him at his own game. But at the university’s 25th anniversary celebration, they gave him credit for much of their success.

“We are celebrating the close of the first period of University Education in these United States,” Harper said. “During this first period, the Johns Hopkins University has been the most conspicuous figure in the American University world, and, to its achievements we are largely indebted for the fact that we may now enter upon a higher mission.”

Eliot’s tribute went even further. Eating crow from his infamous barnyard quote, he said, “I want to testify that the graduate school of Harvard University, started feebly in 1870 and 1871, did not thrive, until the example of Johns Hopkins forced our Faculty to put their strength into the development of our instruction for graduates. And what was true of Harvard was true of every other university in the land which aspired to create an advanced school of arts and sciences.”

READINGS

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American Dominance

In 1910, Johns Hopkins still was struggling financially, but its reputation was intact. It appeared in Edwin Slosson’s book of 14 *Great American Universities*. “Slosson chose universities with the largest instructional budgets,” Geiger noted. “Johns Hopkins, with a slightly smaller budget, was grandfathered in” at the expense of MIT. In another 1910 tome, written by Flexner under the auspices of the Carnegie Foundation, Hopkins’ medical school was deemed the best in the nation, an excellent model for others to emulate.

In the early 20th century, European research universities were still considered better than American research universities on average. Nobel prizes, for example, mostly went to professors in Germany, France, and Great Britain. But American research universities were improving rapidly under the Hopkins model. By then, they had developed strong ties to their European colleagues — including those in Germany.

When Hitler came to power in 1933, American universities were well-positioned to garner the lion’s share of academic talent flowing out of Germany. The United States welcomed these refugees “with open arms as well as with university appointments, research fellowships, and a level of academic freedom they quickly learned to cherish,” Cole says. “It’s hard to say what might have happened if our system had not been receptive to the German researchers.”

Following World War II, the United States continued to invest heavily in higher education, producing armies of Ph.D.s. who facilitated the rapid expansion of American higher education. Gilman’s international vision for Berkeley came true at Johns Hopkins, at Berkeley, and at dozens more American universities that have become magnets for the brightest scholars from all over the world. Hopkins currently serves more than 4,000 of the 1 million international students who are enrolled in American universities. The United States hosts almost twice as many international students as any other country, according to the U.S. Department of Commerce. America also has the largest number of colleges and universities — even more than China, whose population is four times larger.

Economists may debate the degree to which American higher education has driven U.S. innovation and economic growth, but there’s no question that America’s top research universities are the envy of the world — thanks in part to the intellectual entrepreneurship of Daniel Gilman at a new university in Baltimore. **EF**

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