U.S. Higher Education Effectiveness

STEVEN BRINT AND CHARLES T. CLOTFELTER

This volume of *RSF* presents new evidence about higher education in the United States. As we use the term, *higher education* is synonymous with postsecondary education and includes two-year community colleges, four-year colleges, and universities that offer graduate training in addition to four-year baccalaureate degrees. As editors, we have been charged with writing an introduction that is more than a summary of the research papers to follow. Instead, we were asked to produce an overview of the key facts and themes about U.S. higher education and its effectiveness that will be important both for specialists and for readers who are new to the subject.

This volume focuses on *effectiveness*, a topic that has not been as prominent in scholarship as we believe it should be. Scholars of higher education have been principally interested in how colleges and universities work and what forces in their environments lead them to change. But most policymakers (and most of the public) do not want simply to understand institutions, but rather to know how to make them work better than they currently do. Because colleges and universities are central institutions in American society, their effectiveness should be considered a topic of national priority.

The meaning of effectiveness depends on what society expects to achieve through higher education. We begin by asking the basic questions: What are the functions of higher education in society? What does effectiveness mean in this context? And how can effectiveness be measured once it is defined? After this discussion, we briefly describe the historical development of American higher education and its current structure and challenges. We do so to set a context for the issues explored here, an analysis of the effectiveness of U.S. higher education in relation to system-level, campus-level, and classroom-level effects. This threefold division based on the primary actors involved in effectiveness policies and practices provides a useful heuristic for dividing the topics we consider in this issue.[1] Because we believe systems-level actions will be of the great-

Steven Brint is distinguished professor of sociology and public policy at the University of California, Riverside. **Charles T. Clotfelter** is Z. Smith Reynolds Professor of Public Policy, professor of economics and law, and associate dean for academic programs in the Sanford School at Duke University.

We would like to thank Cynthia E. Carr, Kevin Curwin, and Sarah R. K. Yoshikawa for research assistance. Direct correspondence to: Steven Brint at brint@ucr.edu, 1100 Hinderaker Hall, UC Riverside, 900 University Avenue, Riverside, CA 92521; Charles T. Clotfelter at charles.clotfelter@duke.edu, 178 Rubenstein Hall, Sanford School of Public Policy, 201 Science Drive, Durham, NC 27708.

1. These three levels of analysis should not be considered entirely distinct from one another. Initiatives that seem to be manifest mainly on campuses or in classrooms typically have national sponsors and partisans. Moreover, national policy takes root on diverse campuses. Campuses are more and less receptive and able to realize incentives and even controls fashioned at the national level.

est interest to readers, we devote more space to issues at that level than to those at the other two levels.

Although we discuss variation among the fifty states only very briefly here, the states represent a fourth analytically distinct level of analysis, and one that many higher education scholars have embraced to investigate differences in outcomes due to state-level variation in pricing, performance incentives, and regulation. Several papers in this volume explore the consequences of state policy variation.

WHAT DO POLICYMAKERS WANT FROM HIGHER EDUCATION?

We concentrate on the most fundamental purposes of higher education as these have been formed and promoted by national policymakers, by senior leaders on college and university campuses, and by teachers in classrooms.[2]

At the system level, we will take as our primary topics those that have been the focus of policymakers since the time of the great expansion of U.S. higher education following World War II. Policymakers have focused on higher education's capacity to develop the knowledge and skills students need for professional, technical, and managerial positions. As higher education has expanded from an elite to a mass system, policymakers have taken an interest as well in whether higher education opportunities are accessible to all and fairly distributed. This topic is important not only as a measure of social mobility opportunities but also because more equal attainments are potentially a way to bring greater equality to society (Goldin and Katz 2008). Finally, policymakers and researchers alike have focused on the volume and quality of higher education's production of basic and applied research, as well as of the doctoral students who will become the next generation of scholars and scientists (see, for example, Cole 2009; Geiger 1993; National Academies 2007).[3]

In the decentralized system of U.S. higher education, campuses are natural units for analysis because the policies developed on campuses influence the achievement of both system-level and classroom-level functions. Campus-level initiatives are so numerous that some selection is necessary. We have chosen to focus on a subset of initiatives that have been embraced by many campuses and can therefore be considered national trends at the campus level: the importation of business practices, new interdisciplinary designs for research and teaching, and policies to increase undergraduate graduation rates. The adoption of modern business methods for purposes of improving the efficiency of resource allocation has been a feature of American universities for a century, and it continues to stimulate widespread interest (see, for example, Christensen and Eyring 2011). Similarly, many campuses are emphasizing interdisciplinary initiatives and other organizational designs intended to improve collaborative interactions among the faculty (see, for example, Rhoten 2003; Weingart and Stehr 2000). And programs to increase the retention and graduation rates of enrolled students are on the agenda of nearly every public university (see, for example, Association of Public and Land-Grant Universities 2015).

At the classroom level, the sole aim broadly endorsed by the faculty and the public alike is for faculty to provide instruction that contributes to students' learning. This focus is in keeping with the traditional goals of higher education and is supported by empirical studies that find better outcomes for students who

2. To attempt to identify and discuss all of the purposes of higher education would be a challenging task and is beyond the scope of this volume. Indeed, senior professors at the University of Chicago, an institution renowned for its commitment to teaching and learning, have been addressing freshmen each year since the 1960s on "the aims of education," and each one of these lectures takes up a different set of themes (see http://aims.uchicago.edu/page/past-speakers, accessed February 23, 2016).

3. The social benefits of higher education—its association with higher levels of community engagement, better informed citizens, more stable family structures, and reduced crime levels, to name just a few—have been underappreciated by policymakers and researchers. We will perpetuate that bias here, though we do urge further investigation of the net social benefits of higher education (for overviews, see Bowen 1977; Hout 2012; Kingston 2015).

have achieved high grades in rigorous majors (Arcidicano 2004; Murnane, Willett, and Levy 1995) or have made significant gains in analytical and critical thinking while at college (Arum and Roksa 2014). The instructional practices and technologies that contribute to student learning are therefore key topics.

Measuring Effectiveness

It follows that the term effectiveness will reflect the extent to which and the quality with which higher education achieves these expectations. A focus on effectiveness leads to questions such as the following: Are students being prepared adequately for the labor market? Is the system accessible to students from all backgrounds? How large are the gaps in success between students from different backgrounds? Is research productivity high and is it contributing to human well-being? Are universities producing well-prepared graduate students? Are the new business methods contributing to greater effectiveness in the allocation of resources? Has the emphasis on interdisciplinary collaboration led to a greater capacity to tackle key national problems? How much are students learning? To what extent are the new instructional practices and technologies contributing to student learning?

Usable metrics for assessing effectiveness remain aspiration more often than reality. For example, no exams exist that can measure student learning adequately in each of the scores of disciplines in which they can major. But social scientists do have some ways of addressing questions of effectiveness.

At the system level, tracing gains over time is the primary method for assessing effectiveness. For example, we can determine whether graduation rates are increasing over time and whether the gaps in graduation rates between more and less advantaged groups are increasing or decreasing. Similarly, we can measure the growth in research publications over time and whether research is becoming more or less concentrated in a handful of top-performing universities. In some cases, we can also compare outcomes for U.S. higher education with results found in other developed countries. Have other countries exceeded the United States in the production of baccalaureate-level graduates or in the production of research—and, if so, why? Indirect measures of quality can also be useful. Does the United States remain the leading "importer" of students from abroad? If so, this provides strong circumstantial evidence that quality levels relative to the rest of the world remain high. Variation among states can also sometimes be exploited to determine the consequences of policy interventions for national level priorities. For example, one can measure the effects on the graduation rates of underrepresented minorities of changes in state financial aid policies from need-based to merit-based criteria or the effects on graduation rates from the adoption of performance funding policies.

We have found evaluation studies at the campus level to be underdeveloped. For the most part, we are forced to rely on case studies of single-campus interventions—as well as studies that focus on the unintended consequences of these interventions. Issues related to the Hawthorne effect and selection bias loom large in campus-led studies. The same interventions have been studied across a number of campuses only in a very few instances. By contrast, at the classroom level, it is sometimes possible to compare techniques of instruction using rigorous experimental designs to investigate the conditions that contribute to student learning. In these cases, students are randomly assigned to treatment and control groups to determine the effect of an intervention such as new courseware or daily reading quizzes. A few types of interventions, such as active learning methods, have been extensively studied using common assessments in multiple institutions. However, studies of many innovations remain limited to one or a few classrooms, leading to thin research evidence in support of some innovations that have been touted for their capacity to revolutionize teaching and learning.

Ideally, one might suppose that cost-benefit analysis could be employed to make decisions about how to invest resources to improve effectiveness, but that approach would require that outcomes be valued in dollars, surely a difficult trick to pull off for example in considerations of equity and public service. More feasible is the hope of judging effectiveness by

comparing the costs of alternative approaches that achieve the same outcome. For example, if the same level of learning could be achieved either by conventional lecture courses or by combining online instruction with small discussion sections, it is reasonable to judge the effectiveness of the two approaches by comparing their costs, both explicit and implicit. Empirical social science research can contribute to such an assessment and is a primary purpose of studies such as the ones included in this volume.

THE AMERICAN HIGHER EDUCATION SYSTEM AND ITS CHALLENGES

It is helpful to begin with a brief overview of the historical antecedents of the U.S. system of higher education and its current structure and problems to put the issues surrounding higher education effectiveness into context.

Historical Antecedents

In its earliest decades, American higher education was private, religious, and privileged. The first colleges were established to train ministers and educate gentlemen. They also enrolled small numbers of scholarship students who contributed to the motivational climate of the college without necessarily fitting easily into its dominant culture (Horowitz 1987). State governments followed by establishing publicly run colleges and universities, with more diverse purposes and clienteles. By 1900, still only about 725 colleges had been established, and they remained small by today's standards. Eighty-five percent of them were private. The typical private institution (the one attended by the median student) enrolled about five hundred students, and the typical public one had only about three hundred more (calculated from Snyder 1993, tables 23 and 24).

In the mid-nineteenth century, inspired both by the desire to see the benefits of education spread more widely across the population and an appreciation of the value of imparting practical knowledge, the state universities, especially those in the newer states of the Midwest and West, grew in scale. This growth was encouraged with the federal support provided by the Morrill Acts of 1862 and 1890, which gave state governments the wherewithal to build and expand public universities. The share of students attending public institutions increased sharply after 1900, rising from one-quarter to more than half by the mid-1930s (Snyder 1993, 66).[4] In addition to the vast expansion of public universities due to the Morrill Act, other institutional developments helped to increase the popularity of higher education, notably, the founding of two-year junior colleges, beginning at the turn of the twentieth century, as a means both to take pressure off universities and to respond to the aspirations for upward mobility among larger numbers of students (Brint and Karabel 1989). Another important development, the transformation of "normal schools," or teachers colleges, into comprehensive state colleges and universities offering a wide range of occupational and academic curricula in addition to preparation for teaching, began at the end of the nineteenth century and accelerated through the first half of the twentieth century (Dunham 1969). During the late nineteenth and early twentieth centuries, the development of a range of extracurricular activities, and particularly football rivalries (Riesman and Denney 1951), greatly contributed to the popularity of college in the American imagination.

The great expansion of U.S. higher education was, however, a product of the post–World War II era. At that time, leading policymakers concluded that jobs of the future would require higher level skills than before and that more young people would need to be equipped to complete college than previous generations had thought feasible. Our current system—its strengths and its challenges—is a product of this period of transition from elite to mass to nearly universal higher education (Trow 2007). The authors of the influential Truman Commission Report on higher education argued

4. Higher education enrollments expanded during recession periods, such as the 1870s and the 1930s, an indicator that higher education is a counter-cyclical industry; when economic times are bad, more young people consider higher education as an alternative to pursuing work, because they can try to improve their marketability with higher level credentials and because the opportunity costs are not as great (see Craig 1985).

that half of young people had the capacity to finish at least two years of college and one-third had the ability to finish the baccalaureate (U.S. Presidents Commission 1947). They also argued for a vast expansion of financial aid opportunities to allow students without economic means to achieve higher level degrees. Federal support took other forms in the twentieth century, including military-related research during World War II, the subsequent G.I. Bill (1944), which provided generous financial support for veterans to attend college, the National Defense Education Act (1957), which supported graduate students intending to become college and university professors, numerous other programs to give financial aid to students, and the direct funding of nondefense spending through agencies such as the National Science Foundation (founded in 1950) and the National Institutes of Health.

Current Size and Structure

The sector's importance can be seen in the steady growth of enrollments. In 2012, some twenty million students were enrolled, nearly a hundred times more than in 1900 and nearly ten times more than in 1950 (NCES 2014, table 303). In 1920, only 5 percent of young adults age twenty-five to twenty-nine had finished four years of college. That fraction grew to 8 percent by 1950, and escalated thereafter, reaching one-third by 2012 (table 104.20). One consequence was that post-baccalaureate credentials also became more common. Nearly twenty-five million Americans held advanced degrees (master's and above) by 2012, the combined size of the five largest American cities, and more than three million Americans held doctorates (table 104.30).

These students are enrolled in a highly tiered and multiply segmented sector of more than five thousand degree-granting institutions (Kena et al. 2015, figure 1). At the base of this structure are several hundred financially insecure, low-enrollment for-profit colleges (enrolling approximately 5 percent of all undergraduate students in 2013).[5] The ascending layers include: public two-year colleges (enrolling more than 30 percent of undergraduates); mainly private non-elite (and often religiously affiliated) baccalaureate-granting institutions (enrolling approximately 10 percent); master's-granting universities (more than 15 percent); and doctoral-granting institutions that produce comparatively little research (approximately 25 percent). The structure is capped by one small peak of the wealthiest and most selective private liberal arts colleges (enrolling fewer than 2 percent) and a larger peak composed of the nation's top research universities (enrolling approximately 6 percent).[6] The more stable and successful for-profits are found interspersed among the two-year and four-year baccalaureate-granting institutions (enrolling about 5 percent). Specialized institutions, such as art schools, business schools, and seminaries, enroll the final 2 percent of undergraduates (calculated from Association of American Universities 2015; NCES 2015b; and NCES 2015a, table 303.70). Many of the stronger institutions at each level aspire to climb higher in this structure, lending a dynamic quality to the system, with private, nonprofit colleges typically hoping to do so by becoming more selective and public institutions typically hoping to do so by adding higher-level degrees (Brint, Riddle, and Hanneman 2006).

The most important structural divisions among higher educational institutions in the United States are those due to selectivity and wealth, the highest degrees offered and the level of research intensity among those offering the doctorate, and the locus of governing authority. This assertion is supported by statistical analyses indicating that institutions defined by these structural characteristics tend to cluster together and the fact that presidents tend to identify with other colleges and universities that are similar to their own in terms of these criteria (Brint, Riddle, and Hanneman

5. These calculations include part-time students.

6. The top liberal arts colleges are members of the all-private Consortium on Financing Higher Education (COFHE). The top research-intensive universities, both public and private, are roughly coincident with the sixty U.S. members of the Association of American Universities (AAU). The two groups overlap somewhat. Harvard, Stanford, Yale, Princeton and several other private AAU members are also members of COFHE.

2006; see also Reuf and Nag 2014). These divides also have parallels in the organization of the main higher education associations.[7]

Selectivity is defined by high levels of rejection of applicants and high yield among those relatively few who are admitted. Nearly all of the most selective institutions are also among the wealthiest (Kuh and Pascarella 2004). These include the Ivy League institutions, such as Harvard, Yale, and Princeton, and others of similar standing, such as Stanford, Chicago, and Duke. These institutions appear consistently among the highest ranked colleges and universities in publications such as *U.S. News and World Report* and *The Princeton Review.* One way scholars have illustrated this stratification among four-year colleges and universities is to rank them by their average subsidy per student (calculated as educational costs of instruction minus tuition net of grant aid). Institutions with the largest subsidies also tend to have students with the highest average SAT scores and other very strong academic credentials (Winston 1999). Stratification among four-year institutions by selectivity has increased over the last several decades, as shown by a divergence in average SATs across institutions. Factors that may have contributed to this stratification include falling costs of transportation, popularized ranking systems, and the rise of standardized testing as a cheap means of certifying the academic aptitude of applicants (Hoxby 2009).

The second form of stratification among higher education institutions is one based on the prestige of the highest degrees awarded, the doctorate being the most prestigious and the associate degree the least. Research productivity requires consideration as part of this second ranking structure, because not all doctoral-granting institutions are research intensive. Indeed, the production of research is dominated by only a few universities. The Carnegie Foundation for the Advancement of Teaching named 207, divided into "very high research" (108) and "high research" (99) institutions, that accounted for 90 percent of the papers catalogued in the Web of Science in 2010 from high-quality peer-reviewed journals and more than five hundred thousand citations. They also received 84 percent of federal funding for research (personal communication, Cynthia E. Carr). As generators of scientific discoveries and producers of technological innovations, the "very high research" universities are among the most important institutions in the country (see, for example, Cole 2009; Geiger 1993).

Where wealth, selectivity, highest degree offered and research productivity are measures of interorganizational stratification, segmentation falls most clearly along lines of control—that is, whether institutions are publicly supported, private nonprofits, or for-profits. Those institutions labeled public obtain at least a share of their funding for educational programs from appropriations from state or federal governments. (However, in many states the larger share of funding now comes from private households in the form of tuition.) Private, nonprofit colleges and universities do not receive significant state subsidies, but rather rely on a combination of tuition charges and endowment income.

Measured by enrollment, higher education in the United States is heavily dominated by public institutions. In the fall of 2012, students in public colleges and universities made up more than 70 percent of all postsecondary students. Public four-year colleges and universities enrolled 39 percent of all students, and public two-year community colleges 33 percent. Private colleges and universities, almost all of which were four-year institutions, made up 19 percent of the total, leaving 9 percent in private for-profit institutions (NCES 2013, table 303.25). Over the last four decades, each of these segments of the postsecondary world has

7. The criteria and the corresponding higher education associations are: selectivity-wealth (the Consortium for Financing Higher Education); research intensity (the American Association of Universities); control (the Association of Public and Land Grant Universities, the Association of State Colleges and Universities, the National Association of Independent Colleges); and highest degree awarded (the American Association of Community Colleges). There is one overarching association that unites the segments and strata in the system (the American Council on Education).

grown, but the most impressive rates have been in community colleges and the for-profit sector. From 1970 to 2012, enrollment in public four-year colleges and universities grew at an average rate of 1.5 percent a year, as did enrollments in private not-for-profit institutions. Far outstripping these sectors, community colleges saw enrollments increase by 2.7 percent a year, a rate that doubled enrollments every twenty-six years.

But for growth rates no sector can touch the for-profit sector, where enrollments grew by an astonishing factor of 100 over four decades, from less than 19,000 in 1970 to 1.8 million in 2012, for an average annual rate of 10.9 percent. The growth of for-profits has been fueled by their extraordinary efficiency in finding and distributing financial aid to student-consumers. With rare exceptions, they are occupationally oriented and often specialize in training for marketable degrees in such fields as computer programming, electronics technology, physical therapy, cosmetology, or specialized mechanical trades. Many provide education exclusively online, typically to working adults. For this reason, they compete mainly with community colleges (Tierney and Hentschke 2007), though some do offer four-year degrees. In addition to marketing to older adults, for-profits have focused on minority students, students from lower-income backgrounds, and former military personnel (Deming, Goldin, and Katz 2012; Ruch 2001).

The stronger for-profits work very closely with employers to determine skills required for jobs, standardize curricula to home in on valued knowledge and skills, pay close attention to the way students dress and present themselves at work, and concentrate assiduously on the placement of their graduates (Rosenbaum, Deil-Amen, and Person 2009, chapter 6). By contrast, the weaker for-profits are little more than diploma mills, charging high tuitions and leaving most graduates with heavy debt but no marketable degree. On average, these students end up with higher unemployment rates and lower earnings six years after entering programs than comparable students who entered other institutions, and they have higher debt and default rates on their student loans (Deming, Goldin, and Katz 2012). Federal investigations have led to the closing of many individual colleges and some large chains (see, for example, Kirkham 2015).[8]

A division and hierarchy of disciplinary fields crosscuts this hierarchy of institutions. A common mapping of the disciplines is based on the four-fold distinction between "hard" (quantitative) and "soft" (interpretive) fields on one dimension and "pure" (knowledge for knowledge's sake) and "applied" (occupation-related) fields on the other dimension (Becher 1989). U.S. colleges and universities were founded on the preeminence of the liberal arts as the essential disciplines for the training of judgment and character. The sciences and engineering were peripheral fields throughout the nineteenth century, because of their association with the shop floor and applied work (Geiger 2015, chapter 6). But scientific and quantitative applied fields, such as engineering, gained ground during the Great Depression (Brint et al. 2005), and at least since World War II, the pure and applied sciences have been core fields in universities (Geiger 1993, chapters 6–7). They have attracted the most external funds and many of the brightest students. On average, students graduating in quantitative fields have a marked advantage in the labor market (Carnevale, Rose, and Cheah 2011; PayScale 2014). Masters and doctorate degrees are thus particularly important for students who graduate in nonquantitative fields (Mullen, Goyette, and Soares 2003).

8. Among the secondary structural influences on organizational identity and behavior, the size of institutions is most worthy of mention. Not only can larger institutions take advantage of economies of scale and name recognition, they may have an advantage in terms of adaptability, seen, for example, in the capacity to form faculty groups to pursue new research opportunities. Smaller institutions must market themselves in relation to some special features of their environments or, most often, the assertion of higher value of small classes for intense, high-quality, and more personalized educational experiences. As illustration, a study comparing selective institutions in the early 1990s showed that undergraduate courses in history at Harvard had an average class size of 140, but at Carleton College, history classes averaged just thirty-two students (Clotfelter 1996, 242, 245).

U.S. Higher Education in Comparative Perspective

Compared with other highly developed countries, the United States has more higher education institutions relative to its population. In 2012, using one global accounting of institutions, the United States had roughly eighty-five universities per hundred thousand population, a ratio that exceeded other developed countries, including Canada (fifty-four), France (forty-three), Germany (thirty-five), and Britain (thirty-three), and far exceeded the comparable ratios of China (seven) and India (two). The large number of U.S. colleges and universities is accounted for by the unusual role of small, private, not-for-profit institutions in the higher education ecology. Although about two-thirds of students attend public institutions, private not-for-profit institutions are very nearly as numerous as public institutions. Student enrollments in private colleges and universities can range from fewer than one hundred to more than thirty thousand, but their average size is just two thousand. By contrast, public universities rarely fall below five thousand students and can enroll as many as sixty thousand on a single campus.

As a percentage of its gross domestic product (GDP), the United States spends some 2.7 percent on higher education, a markedly higher share than the 1.6 percent average among the countries of the Organization for Economic Cooperation and Development, or OECD (OECD 2014, 239). Higher education is less completely financed by public monies in the United States than in many other countries, and consequently the private household contribution is larger. Indeed, public policy with respect to the financing of undergraduate education in the United States begins with the assumption that most students and their families will pay a good share of the total cost of education, an expectation that sets the United States apart from many other countries. Households provide a larger proportion of higher education funding in Chile and Colombia, but the United States is in the next rank, together with Japan, Korea, and the United Kingdom, with households accounting for more than 40 percent of the total. By contrast, household funding represents less than 5 percent of the total in much of Northern Europe (OECD 2014, 239–40).

One justification for this assignment of cost burdens is the sizable personal economic benefit that is associated with obtaining a college degree, as discussed in a following section. Yet it is clear that the financial burden of attendance, even at public institutions, is an impediment for students from low-income families. Accordingly, it has been the practice for many institutions as well as governments to subsidize such students. For students attending public institutions, this assistance is largely in the form of cross-subsidies made possible by tapping other sources of funding. Chief among the subsidies from government are the appropriations that public colleges and universities receive from state and local government. In 2012, these amounted to $72 billion (Palmer 2015). In 2011 public institutions received on average 23 percent of their revenue from state and local governments and 19 percent from tuition. Private institutions, by contrast, received about 29 percent from tuition and another 26 percent from investment returns (NCES 2012, tables 402, 405).[9] Two-thirds of all college students receive some form of financial aid; roughly half receive aid in the form of a grant and about 40 percent receive it in the form of loans (NCES 2010, table 386).

Is the Current Structure Sustainable?

Perhaps the most vexing trend related to the accessibility of U.S. higher education has been the stagnation in financial support from state governments, especially so since it came at a time of rising enrollments. Between 1991 and 2008, total state appropriations for higher education increased by 13 percent, and total public enrollments grew by 23 percent. In the two years after 2008, appropriations actually declined, falling by 7 percent in inflation-adjusted terms, while enrollment increased by another eight percent (NCES 2012, table 404; 2013, table 303.25).

Private, nonprofit colleges face a different set of financial challenges. These institutions

9. Total revenues include income from auxiliaries, hospitals, and independent operations.

feel the pressure to keep tuition levels high as a signal of the high quality of the education they offer, including small classes and a community-like environment. But to attract enough students to make their enrollment targets, they typically resort to discounting tuition for many students by way of "merit" scholarships. There are simply not enough students who prefer small liberal arts colleges to charge the "sticker price" to all but the neediest students. Many liberal arts colleges now offer tuition discounts to up to 80 percent of their students. The resulting negative impact on net revenues has led to operating budgets that are very tight in many cases (NACUBO 2014).

In apparent response to these and other pressures, colleges and universities have increased their reliance on part-time and nontenure-track faculty (Ehrenberg 2012, 199). Nationwide, the percentage of faculty that is full time fell from almost four-fifths in 1970 to half in 2007 (Ehrenberg 2012, 194, citing Snyder and Dillow 2010, tables 249 and 253). The percentage of faculty not on the tenure track increased from 19 percent to 37 percent in 2007 (Ehrenberg 2012, 194). Perhaps reflecting these shifts, expenditures on instruction have grown more slowly over the past two decades than those on student services, research, and other support services. Between 1987 and 2008, the real annual rate of growth in public and private two- and four-year institutions was 1.1 percent, versus 1.6 percent for academic support and institutional support, 2.2 percent for student services, and 2.6 percent for research (Ehrenberg 2012, 204).

Even with declining relative costs for instruction, prices have continued to increase. Over the last three decades, average sticker price at private nonprofit colleges and universities has increased at a rate 3.5 percentage points faster than inflation, and the same rate has applied to community colleges as well. For four-year public institutions, tuition increases have exceeded inflation by an average of 5.1 percentage points (Ehrenberg 2012, 193; see also Baum and Ma 2014). To be sure, these increases in sticker price tuition, featured so prominently in news coverage, exaggerate the increase in the actual cost to students and their families net of financial aid. Not only can students defray the cost with grants and loans, they often enjoy an additional cost reduction when colleges provide additional relief in the form of financial aid provided by institutions themselves. In an effort to attract desirable students, most private colleges and some public institutions have increasingly offered institutional aid, often packaged as named scholarships. Such assistance ends up being equivalent to a price discount. To return some tuition dollars to enroll students from the bottom half of the income distribution, higher charges were required for those families who campus financial aid officers determined could afford them (Clotfelter 1996; Ehrenberg 2000).

One principal culprit for price increases has been the rising real cost of inputs, especially faculty salaries. To remain competitive, the leading private colleges and universities, in particular, have had to pay premium salaries to professors who are in high demand. These increases have trickled down to those public universities attempting to keep pace. Real faculty salaries have increased in recent years, after a period of decline during the 1970s, though the rate of increase has not been equal in private and public institutions. Start-up costs for newly hired faculty in the natural sciences also increased markedly. A second reason costs increased in many institutions was growth in the size of faculties at many institutions. This growth was accompanied by a reduction in teaching loads and the hiring of more nonregular faculty (Clotfelter 1996). Third, administrative costs were also a contributing factor. Part of this increase could be attributed to expanding requirements for reporting and recordkeeping, and part was due to the costs associated with the purchase of computer equipment. Consumer demand for services also encouraged staff growth. Student affairs budgets grew markedly; these budgets supported student clubs, campus arts and entertainment events, fitness centers, health and counseling centers, dorm renovations, food courts, and the rest of the amenities residential college students expected to balance the time they spent on study. Campuses also continuously added staff to a range of offices required to maintain donor

and constituency relations, regulatory compliance, and economic development opportunities (Ehrenberg 2012). No doubt empire building among administrators has also contributed at least a small amount to the growth of the managerial stratum.

Why these salary increases could not be mitigated through labor-saving measures, as in some business services, may be due to a deeper problem faced by colleges and universities, the so-called cost disease (Baumol and Bowen 1966). To the extent that the operation of these institutions is like that of an orchestra, wholly wedded to a technology of operation devoid of opportunities to achieve labor-saving efficiencies, the argument goes, costs are forced to rise as long as the cost of workers rises. If these institutions are actually motivated to expand their budgets, then it is natural they would seek any and all opportunities to raise tuition. This viewpoint could be seen as the tuition corollary of Howard Bowen's dictum (1980), to the effect that universities attempt to raise all the money they can and they spend everything they raise. Such an instinct might be driven simply by mission-related ambition, a virtually unbounded desire on the part of top administrators to improve the quality of their institutions—by offering new programs, by hiring more famous professors, and by attracting more talented students—combined with their inability or unwillingness to eliminate anything.[10]

Higher tuition brought more borrowing to pay for college. Student loans were a backbone of the postwar expansion, but the average student owed relatively little. At the end of the 1970s, no public college in the country charged more than $2,500 in annual tuition for in-state tuition. By the mid-2010s, with tuition and residence halls approaching $30,000 per year in public universities and double that in the leading privates, the average private college student could expect to leave with a degree and a $30,000 student debt. Those who attended public universities were on average only a little better off. This was a tough way to begin adult life, and opinion polls showed that most Americans doubted the need for such increases. Muckraking books like *Generation Debt* (Kamenetz 2006) and *The Student Loan Scam* (Collinge 2009) stirred debate about whether college was worth the cost and how it could be made more affordable. In 2010, student debt, then approaching one trillion dollars, exceeded credit card debt as the second largest category of debt in the country (behind mortgages). Nevertheless, most students appear to accept debt as the inevitable price of a degree that remains a very good investment over the course of a lifetime, particularly given the virtual disappearance of good jobs open to those with only a high school degree (see, for example, Rotondi 2015).

We now turn to a discussion of the primary systems-level expectations of U.S higher education, as identified by postwar policymakers, and the evidence of the effectiveness of U.S. colleges and universities in relation to these expectations.

HUMAN CAPITAL DEVELOPMENT AND LINKS TO THE LABOR MARKET

A primary goal of postwar policymakers was to expand higher education to ensure human capital development to meet the changing occupational needs of an increasingly knowledge-based society. We therefore first take up the issue of human capital development and the connection of higher education institutions to desirable positions in the labor market.

The College Earnings Advantage

Few facts speak more persuasively to the importance of postsecondary education than the substantially higher incomes enjoyed by college graduates than by those with less education. In 2012, for example, among men with full-time year round employment, those with

10. Some observers have taken a decidedly skeptical view of cost increases as a natural outgrowth of the objectives of colleges and universities. More nefariously, such a tendency could lead administrators to take advantage of increases in government supported student aid, for example, to raise tuition, as argued by William Bennett (1987). Stephanie Cellini and Claudia Goldin (2012) provide evidence that for-profit colleges act this way, finding that those whose students are eligible for federal financial aid charge 78 percent more in tuition than those not eligible to provide federal aid, an amount close to the value of that aid.

at least four years of college earned an average of nearly $35,000 more than those who had just a high school diploma. For women, the comparable earnings advantage was over $23,000 (Autor 2014, 844). Economists invoke supply and demand to explain this college earnings advantage. College-educated workers earn more than high school graduates, the model posits, because employers' demand for these college graduates is strong, relative to the number of such workers available to be hired. Demand is strong because employers value skilled workers and because such workers are relatively scarce.

Over the last three decades, the earnings advantage for college graduates has grown. The reasons for this growth are the subject of ongoing debate, but many economists would place considerable emphasis on changes that have occurred in the American economy. Knowledge-intensive industries, such as business services and education, have grown at the expense of manufacturing, and all industries have seen increases in the need for educated workers able to use computers and adapt to a wider range of job demands (see, for example, Clotfelter et al. 1991, 64–69; Freeman 1976). As the unionized manufacturing sector has declined, the labor market for less educated workers has virtually collapsed, with low-income jobs replacing the bulk of middle-income jobs that did not at one time require postsecondary credentials (see, for example, Bernhardt et al. 2001). Thus, despite an increasing supply of college graduates, the demand for them has grown even faster. The consequence of these changes has been a doubling of the college earnings advantage for men, which increased in constant 2012 dollars from approximately $17,500 in 1979 to nearly $35,000 in 2012 (Autor 2014, 844).

To find out what portion of the college earnings advantage can be attributed to attending college, rather than unmeasured personal characteristics, researchers must somehow remove the influence of unmeasured personal characteristics that might cause college-goers to differ systematically from those who do not go. Such selection bias would imply that differences in average earnings overstate the true effect of going to college, and overcoming this bias has proven to be a formidable challenge for researchers.[11]

Human Capital Development or Signaling?

Granted that at least some of the observed differences in earnings associated with postsecondary training are related to attending college, what explains it? Economic doctrine says that wages reflect differences in workers' productive value, a proposition accepted by many scholars in addition to most economists. But the question remains, what explains the statistical association between productive value and postsecondary training? Social scientists offer two principal answers: human capital and signaling. A third explanation—that those with higher education degrees form a status group whose members choose one another without serious regard to productivity—is less well known, but worth noting.

Human Capital

Perhaps the most common explanation to the question is that colleges and universities carry out the same basic function as K–12 schools: they arm students with skills that will make them productive workers, allowing them to benefit personally from the result. Society at large benefits as well, in the form of a tangibly higher standard of living. Job-relevant knowledge may be quite specific, such as accounting

11. One noteworthy study to produce estimates arguably free of selection bias compared the earnings of white men who barely qualified to attend their state's flagship university with those who barely fell short. All of these applicants, those just above the cutoff and those just below, arguably were very similar, except for which side of the line they fell on. But the side they landed on turned out to be highly important. As it turned out, those who got in later earned 20 percent more than those who had to settle for a lesser university (Hoekstra 2009). Another type of evidence that where one goes to college makes a difference in the labor market comes from an audit study comparing employers' willingness to interview fictional job applicants. For jobs in business, for example, purported graduates of an online college were 22 percent less likely to get a call back than those whose resumes listed a degree from a nonselective brick and mortar college (Deming, Goldin, and Katz 2013).

practices, or it could be more general cognitive skills that make educated workers more productive, such as skills in understanding data or written expression (Becker 1964). For some, human capital also denotes socioemotional skills that students learn in college, such as how to interact with people from different backgrounds or how to participate in problem-solving groups. The cognitive skill development is very important in some disciplines, but for most students it seems likely that academic development is less important as a source of human capital than persistence and the willingness to delay gratification, traits that reveal themselves as students do or do not listen to lectures, take notes, work on assignments, and pass tests. The characteristics of study, work discipline, and deference to authority that these repeated behaviors foster may, for most students, be the primary productivity advantages associated with a college education.

Human capital is a broad concept, and it is not surprising that most economists have not attempted to measure it directly and have instead taken educational attainment as an acceptable proxy measure. However, this identification introduces a proven-by-fiat quality to the argument by equating the accumulation of skills gained during college with educational attainment, rather than with the qualities developed themselves. Over the last decade social scientists have measured the cognitive component of human capital more precisely by looking at students' scores on tests of cognitive skills (Hanushek and Woessmann 2011, 160–90). However, better measurement does not solve a fundamental objection to human capital theory: if those who go to college were already more skilled before they enrolled in college than those who did not, at least a portion of the earnings advantage they enjoy cannot rightly be attributed to college. This leads to a second explanation: signaling.

Signaling

An alternative to the human capital explanation for the higher earnings enjoyed by college graduates focuses on the informational content that simply possessing a college degree carries. Like the human capital view, this explanation accepts the essential accuracy of the neoclassical economics model of competitive labor markets and its implication that more productive workers will be more valuable to employers, holding constant their supply. Where the signaling explanation diverges from the human capital view comes down to what, exactly, the contribution of college is. In the signaling view of the labor market, most of the skills or attributes that will be valuable to employers are already instilled by the time students have finished high school. All that is necessary is to identify those most richly endowed with those abilities. In the signaling explanation, that is the primary function of college—to identify and certify talent (Spence 1973). Those who have prestigious educational credentials can advance to the head of labor queues, even if they have not developed human capital during their college years, provided that the reputational strength of the degree is stronger than the reputational strength of alternative degrees. Moreover, the signal may be more about adaptability and trainability than about job-relevant skills per se (Thurow 1972). In this explanation, any learning that occurs is incidental to, not the result of, college. The essential function of college is to certify, not to instill. Studies suggesting that not much learning is occurring in college lend weight to the signaling model (see, for example, Arum and Roksa 2011; OECD 2013).

It is likely that one of these explanations may be more relevant for particular students—or that both are relevant in different measures. A student may learn to interact well with people from a wide variety of backgrounds by attending college (a noncognitive form of human capital development) and to improve writing skills while gaining benefits from the signaling quality of the college attended. The two viewpoints of human capital and signaling can be combined in whatever proportions the facts appear to support, allocating to each some portion of the observed college earnings advantage (Bills 2003).

Status Group Preferences

Some who write about the rise of job allocation by educational credentials are skeptical of the association assumed by economists between

educational credentials and productivity. For these skeptics, hiring based on educational credentials is a way to ration opportunity and simplify employers' choice in a market in which many people (including many people without degrees) could do jobs if they were given proper training. Credentials are treated as valid because they are a convenient and relatively efficient way for employers to limit applicant pools, not because they develop or certify skills (Berg 1971; Collins 1979).

Taking this view one step further, some sociologists have argued that higher education credentials signal kinship with the culture of employers more than anything else. In this view, employers choose the highly educated over the less educated because they remind them of themselves. Thus, the highly educated form a kind of "pseudo-ethnic group" whose members, like those of any other status group, recognize one another based on a common social evaluation of honor and a common lifestyle (Collins 1977, chapter 3). The highly educated are thought to speak, present themselves, and dress in ways similar to their employers. For example, they do not have visible tattoos, use profane language in public, or record loud music on their answering machines. They tend to be deferential to authority and able to interact well in management-led work groups. For those who focus on status group preferences, the economic benefit, if there is one, comes from the greater ease of understanding and the lesser friction created by those who share this culture. Pay is based on admittance to the authority structure rather than skills that boost the productivity of the firm.[12]

Some obvious problems exist in relation to this more critical perspective on the college wage premium. It is not clear why many employers would want to pay a hefty premium simply for being able to associate with people who are similar to themselves, if someone less expensive could perform the job just as well—or how employers willing to do so could stay in business. At the same time, the number of shared qualities and outlooks found among highly educated people is indeed impressive. They include high correlations between educational attainment and behaviors such as healthy diet and exercise practices, higher levels of book reading, lower levels of television watching, comparatively liberal attitudes on social issues, and less frequent church attendance (see Brint and Proctor 2011). Employers' presumption of competence based on the "cultural kinship" of the highly educated cannot be ruled out as one advantage that college graduates bring to the labor market. Indeed, studies examining race, gender, and college quality have shown that co-membership preferences are common in hiring decisions (see, for example, Deming, Goldin, and Katz 2013; Rivera 2012).

Is Human Capital Development Lagging?

Compared with the rest of the developed world, the United States is behind in producing young adults who hold postsecondary degrees. A generation ago, the share of Americans with college degrees was one of the highest in the developed world. Since then, many countries have surpassed the United States. Whereas the United States has the highest rate of attainment of postsecondary degrees for fifty-five- to sixty-four-year-olds among thirty OECD countries, its twenty-five- to thirty-four-year-olds ranked only tenth (OECD 2014, table A1.4a). Additional slippage is evident when we look at the most recent generation.[13]

Findings on more direct measures of human capital development during the college

12. From status group closure it is a short step to the more politically loaded idea of social reproduction (Bourdieu and Passeron 1977; Bowles and Gintis 1976). According to those who hold this view, by choosing one another for high positions, members of the same social class maintain control over those who lack credentials while legitimizing their power on the basis of the presumed economic value of higher education credentials and the presumed openness of the competition for them.

13. In recent comparisons looking at first-time degree completion across the OECD, the United States ranked twelfth at the tertiary B (or associate's degree) level and was tied for seventeenth at the tertiary A (or baccalaureate degree) level.

years are arguably even more discouraging.[14] In 2003, the National Assessment of Adult Literacy found that only about one in three college graduates could draw accurate inferences from two editorials with contrasting content or could accurately read a three-variable graph relating age, exercise, and blood pressure (Kutner et al. 2007). A 2011 study found that the average college student attended class and hit the books for more than forty hours per week in the 1960s but just twenty-seven in 2003 (Babcock and Marks 2011). Some have suggested that better tools for information retrieval permitted students to study less, but an obvious implication is that college faculty may have adjusted to lower student interest in study by reducing requirements. Richard Arum and Josipa Roksa (2011) find that only about half of students made significant gains on a test of critical thinking between the beginning of freshman and the middle of sophomore year. A year later, with senior data in hand, they concluded that more than a third of college students failed to make significant gains on critical thinking between freshman and senior years (Arum, Roksa, and Cho 2011). Those students who failed to make significant gains on the critical thinking test had shorter reading and writing assignments in their courses. These students were most likely to be found in less selective institutions and occupationally oriented majors (Arum and Roksa 2011).

Regardless of field, cognitive skill level matters in the labor market (Hanushek and Woessmann 2011, 160-8). In addition, labor market returns vary greatly depending on the field of study. By mid-career, students who graduate in some engineering specializations, such as petroleum engineering, are earning on average two to three times as much as those who graduate in many of the human services fields, such as teaching and child welfare services (Carnevale, Rose, and Cheah 2011; PayScale 2014). In statistical studies that control for input characteristics, such as students' grades and test scores and their socioeconomic backgrounds, differences in returns to fields of study show much stronger net relationships to earnings than the selectivity of the institution attended or students' grade point averages (see, for example, Arcidicano 2004; Brewer, Eide, and Ehrenberg 1999; James et al. 1989). These findings raise the question of whether comparisons by educational attainment are the right ones to make for analyses of human capital development or whether fields of study are the more appropriate bases for comparison, at least for adults who complete postsecondary programs.

Given the labor market advantages held by graduates in many science, technology, engineering, and mathematics (STEM) fields, it is not surprising that a final source of concern over human capital development is the unchanging share of American college students who complete degrees in these fields. STEM fields are a national priority area because of their contribution to economic growth (see, for example, National Academies 2007, 1). The stagnation in STEM degrees is associated with high rates of attrition among college students who start out majoring in a STEM field, only to switch majors, often because of difficulty passing introductory mathematics and science courses (327). Weaknesses in science literacy start early. The recent Program for International Student Assessment (PISA) international test of science knowledge indicated that average scores for American fifteen-year-olds were lower than those of students in all but four of twenty-four participating countries. American students also showed great variability in their scores around this average, producing a higher standard deviation than all but three of the participating countries (see Han and Buchmann, this volume).

14. To be sure, complaints about partying and insufficient seriousness on the part of college students are nothing new. In the 1925 film *The Freshman*, comic star Harold Lloyd poked fun at the subservience of studiousness to the frenzy over football. In his 1928 book, Robert Angell describes students' academic orientation this way: "A small minority are sincerely interested in all their academic work; a larger minority do not put their hearts into any of it; while the great mass are genuinely intent upon only a few of their subjects, commonly the more practical ones, and apathetic toward the rest" (2).

ACCESS, COMPLETION, AND EQUITY

We now turn to a second major interest of national higher education policymakers, the provision of opportunities for upward social mobility. Although the quality of higher education can no longer be assumed and fields of study matter greatly for outcomes in the labor market, college degrees nevertheless remain a key foundation for labor market success, as evidence on the college degree premium attests. For this reason, the distribution of opportunity to attend and graduate from college is a key issue for policymakers and scholars alike.

Disproportional representation of affluent students has been a characteristic of American colleges beginning in the colonial period. Despite the rise of public higher education, this bias in favor of the moneyed and professional classes continued to exist for a century after the first Morrill Act (see, for example, Angell 1928), and it continues today in an only slightly attenuated form. Consequently, American higher education has been regularly criticized for its contributions to the perpetuation of inequality. In so far as greater equality of access and completion are system-level measures of effectiveness, these criticisms amount to a fundamental challenge to the U.S. system's promise of equal opportunity for all.

Rates of college enrollment have been rising over time, but rates for those from low-income families have lagged well behind those for children of the affluent. Moreover, gaps in entry by family income quartiles have grown over time. For a sample drawn from 1961 to 1964 birth cohorts, postsecondary entry rates were 58 percent in the top quartile, 38 percent in the second quartile, 32 percent in the third, and 19 percent in the bottom quartile (Bailey and Dynarski 2011, figure 6.2). But for a sample drawn from the 1979 to 1982 birth cohorts, postsecondary entry rates were 80 percent in the top quartile, 60 percent in the third quartile, 47 percent in the second, and only 29 percent in the lowest income quartile. This is a top-to-bottom gap of more than 50 percent for the later birth cohorts compared with the 40 percent gap for the earlier birth cohorts.

Gaps in college completion by family income are greater than gaps in college entry. Among students in the 1979 to 1982 birth cohorts, for example, the share from the lowest income quartile who had completed four years of college was just 9 percent, representing a third of those who had ever enrolled. For those from the top income group, the corresponding rate of completion was 54 percent, representing two-thirds of those who had ever enrolled (Bailey and Dynarski 2011, tables 6.2 and 6.3). Comparing cohorts born in the early 1960s and the early 1980s, Martha Bailey and Susan Dynarski (2011) show increases in college completion in all income quartiles for those born later, but also an increasing gap in the rate of increase in the bottom two as compared to the top two quartiles of family income.

By contrast, gaps in access by race-ethnicity have narrowed over time, although gaps in graduation remain large. Between 1995 and 2009, for example, freshman college enrollment more than doubled for Hispanics, and increased by 73 percent for African Americans but only 15 percent for whites (Carnevale and Strohl 2013). Among 2004 high school graduates who enrolled in postsecondary institutions immediately following high school graduation, racial-ethnic gaps were not large: 73 percent of Hispanic high school graduates enrolled in college, 76 percent of blacks, 82 percent of whites, and 90 percent of Asians (Ross et al. 2012, 170). However, minorities enrolled mainly in open-access two- and four-year colleges (particularly community colleges and for-profits), and whites and Asians enrolled disproportionately in colleges and universities that select among applicants (Carnevale and Strohl 2013). Even for those who initially entered a four-year college graduation rates have varied sharply by racial-ethnic identity. Nearly 70 percent of Asian American and Pacific Islander students who entered a four-year college in 2007 completed within six years, compared with 58 percent of white students, 46 percent of Hispanic, and 39 percent of African American (NCES 2014, table 326.10)

Notably, the long-standing gender inequalities within higher education have reversed, favoring women rather than men outside of a few fields largely found in the physical sciences

and engineering disciplines but including also philosophy and economics. Women are more numerous than men at every degree level in higher education. They are more likely to complete degrees. Their grades are higher, and they are more likely to win academic honors. Graduate education, even in prestigious fields such as business, law and medicine, has become more gender balanced and in nonquantitative fields women are more numerous (NCES 2014, table 303.60). To explain women's better performance on average than men's, researchers have emphasized the greater propensity of women to focus conscientiously on their studies and particularly their greater dependence on educational credentials to compete in labor markets dominated by men (see DiPrete and Buchmann 2013).

Why is the dropout rate so much higher for low-income and underrepresented minority students? One set of explanations focuses on the students and examines the factors such as inadequate academic readiness or financial resources that may slow or derail their academic progress. Undoubtedly, academic preparation is on average lower among students from the bottom quartiles of the income distribution. Social scientists have documented the advantages of social class for students from affluent families relative to their counterparts. Children of college graduates hear on average two to three times as many different words per day than the children of high school graduates. They are read to at night and are encouraged to begin reading and counting for themselves earlier than children from low-income families. They watch less television. They tend more often to live in stable and well-ordered households and communities, allowing them to fit more easily into orderly, rule-bound settings such as schools. Their families are also much more likely to place them in activities that are educationally and socially enriching, such as attending museums and concerts, traveling abroad, and participation in afterschool developmental activities supervised by adults, such as music or tennis lessons. By contrast, children from lower-income families are more likely to spend time with friends in activities that are not educationally advantageous. (For an overview of these educational attainment based differences on groups of otherwise similar students, see Attewell and Lavin 2007, chapter 6.) Annette Lareau (2002) calls this pattern of middle- and upper-middle class parenting "concerted cultivation." In later grades, children from affluent backgrounds often have access to tutors when they are struggling in a class and to test prep options prior to taking college admissions tests.

Despite extensive efforts to provide financial assistance to needy students, the financial resources available to low-income students do not always meet their full financial need, placing greater stress on their families to identify resources for college completion. Many low-income families are loan-averse and encourage their children to work to put themselves through college, a choice that can greatly lengthen time to degree and may lead to non-completion if work interferes too much with study. The research evidence suggests that when students work more than fifteen to twenty hours per week, it tends to be very difficult for them to keep their grades up (Pascarella and Terenzini 2005, 399–402; King and Bannon 2002).

A second set of explanations looks at the types of institutions in which lower-income and underrepresented minority students are disproportionately represented. Completion rates in public community colleges and historically black colleges and universities, where most minority students enroll, are very low. These are typically colleges and universities with limited resources, meaning low-paid instructors and modest counseling and other student services. Only one-fifth who enter these institutions leave with a degree in three years (NCES 2014, table 326.20), and minorities are less likely to graduate than others (Dougherty and Kienzl 2006). Transfer rates from two-year to four-year colleges are also low. Fewer than 25 percent of entering community college students transfer to a four-year college (Dougherty and Kienzl 2006). Most of those who enter community colleges and become stuck in remedial programs are from minority racial-ethnic backgrounds (Attewell et al. 2006; Bahr 2010).

In a study seeking to explain the decline in college completion rates, John Bound, Michael Lovenheim, and Sarah Turner (2010) compared two cohorts of high school graduates, from the high school graduating classes of 1972 and 1988. The percentage of these students who completed four years of college within eight years declined from 50.5 percent to 45.9 percent (135). These declines were concentrated in two sectors enrolling a large portion of all students: two-year colleges and less selective four-year public institutions. Declines in academic preparation were a major part of the explanation for declining graduation rates in community colleges. But in the case of four-year institutions, the authors blame characteristics of the institutions themselves—and in particular overcrowded classrooms and too few course offerings—for most of the overall decline in graduation rates.

Because of the close connection between educational attainment and lifetime earnings, such disparities in college completion portend limited economic opportunities for those already at the bottom of the economic ladder and continued economic stratification in the country as a whole. Contributing to these long-standing gaps in educational attainment, budget cuts and tuition increases in the last decade have increased at a particularly high rate in public institutions, the institutions that serve most students of modest means. Efforts by donors and colleges themselves to raise completion rates for disadvantaged groups have had more than a modicum of success in some notable cases. However, they have not yet found ways to match the impact of these deeply rooted systemic obstacles to equity in access and completion.

PRODUCTION OF RESEARCH AND NEW DOCTORATES

We now turn to the third major function of higher education in the United States: universities are centrally involved in the production of new knowledge and prepare the next generation of scientists and scholars. The new knowledge they produce enriches culture, contributes to new technologies and economic growth, and changes the way organizations work (Baker 2014).

By most measures, the research quality of American higher education is very high in comparison with that offered in other countries. U.S. research universities dominate the top rungs in global rankings. In Shanghai Jiao Tong University's ranking of the world's top research universities, American universities occupy sixteen of the top twenty spots (CWCU 2014). In *The Times* of London's ranking, they account for fifteen of the top twenty (Times Higher Education 2015). Moreover, the United States continues to be the destination of choice for international students, hosting nearly nine hundred thousand international students in the 2013–2014 school year, double the number of international students studying in the United Kingdom, the second leading host country (International Institute of Education 2014).

One way to measure the growth in knowledge production is to examine how many papers are published in scientific journals over time. This growth has been nothing short of spectacular. Many think of the immediate post–World War II period as a golden age of the American research university, but calculations indicate that more recent decades better deserve the appellation "golden age." Whereas some 140,000 papers appeared in the Web of Science between 1951 and 1970, the number jumped to just over five million between 1971 and 1990, and then nearly doubled again to more than nine million between 1991 and 2010 (personal correspondence, Cynthia Carr). This phenomenal record of growth can be explained by an ever-increasing number of researchers, greater research intensity in universities, the rise of new specialty areas, and perhaps especially by the development of new journals.

Within this rapidly expanding universe of scientific papers, the U.S. global share has been declining over the last three decades as other countries and regions have developed the academic work force and infrastructure to support expanded research activity. The U.S. share dropped from 38 percent in 1973 to 28 percent in 2003, according to National Science Foundation researchers (Javits et al. 2010). Us-

ing slightly different measures, British Royal Society researchers found a further decline to 21 percent between 2004 and 2008 (The Royal Society 2011). Concurrently, the share of papers from European and East Asian universities rose, China making the largest gains (The Royal Society 2011). However, the United States remains, by one measure, the leader in the top 1 percent of most-cited papers, producing half of the world's share in 2012; no other country has yet reached 20 percent (United Kingdom Department of Business Innovation and Skills 2014).

In spite of the growth of research and researchers, the idea of a postindustrial society dominated by highly educated "knowledge workers" (Bell 1973) has not yet come to pass; many industries outside the "knowledge sector" remain important as employers and generators of national income (Brint 2001, 2015). Yet it is clear that industries populated disproportionately by people with advanced degrees are among the fastest-growing contributors to GDP. If we use the criterion of 5 percent of employees holding master's level or higher degrees for identifying the knowledge sector, the sector is vast, including such industries as agricultural services, mass-media industries, chemicals, plastics, pharmaceuticals, computers and electronic equipment, scientific instruments, banking, accounting, consulting and other business services, medical services and hospitals, educational services (obviously including colleges and universities), legal services, and nearly all of government (Brint 2001; see also Powell and Snellman 2004). The knowledge sector, so defined, accounted for 43 percent of GDP by 2010 (Brint 2015). Economic geographers have shown that regions of robust economic growth are those with high proportions of educated workers, regions such as Silicon Valley, Hollywood, and Wall Street. These regions show strong spillover effects on the salaries and wages of workers outside the knowledge sector because higher incomes there drive higher incomes for services in their regions (Moretti 2013).

The production of knowledge workers has altered the landscape of innovation by amplifying the level of scientific talent working outside of universities. Research universities are responsible for just half of basic research and only a fraction of applied research (National Science Board 2014, chapter 4). Many of the most important inventions of the period, from the Internet and GPS to the birth control pill and the pacemaker, were developed in government laboratories and private corporations by university-trained Ph.D.'s, sometimes but not always building on basic research conducted in universities (see, for example, Issacson 2014). Universities retain an important role in basic research, and they are almost certainly the most potent creators of conceptual structures that become influential in organizational practice and public discourse. Yet institutions outside universities are also producing sophisticated conceptual knowledge structures that have a life independent of universities or are brought into universities to test and refine (Collins, Evans, and Gorman 2007; Powell and Snellman 2004). Rather than university domination, the United States is moving toward a society in which knowledge production becomes characteristic of many institutional domains.

The university retains a monopoly on the production of future scientists and scholars through its authority to grant the doctorate degree. Doctorate degree production increased by 150 percent between 1970–1971 and 2011–2012. Today, U.S. universities produce nearly three times as many doctorates a year (170,000) than they did in 1970–1971 (65,000) (NCES 2014, table 318.20). The United States retains a global educational influence through the strength of its graduate programs. In recent years, nearly 30 percent of all doctorates awarded by American universities have gone to students holding temporary student visas (Bound et al. 2014, 18).

This does not mean that the U.S. system for producing doctoral-level scientists and scholars is without significant problems. Graduate students in the humanities and social sciences average seven to eight years from admission to doctorate. About half of doctorates in these fields do not complete and of those who do complete about half do not obtain academic jobs (Ehrenberg et al. 2009, chapter 11). Most

who do not complete obtain professional or managerial jobs, but quite a few are in lower-paid capacities (Ehrenberg et al. 2009). Doctorate production in the natural sciences and engineering does not take quite as long, but for those pursuing academic careers the doctorate is often merely the preliminary to a lengthy apprenticeship (for as many as five or more years) as a postdoctoral scholar before a faculty position becomes a feasible objective (Powell 2015). Postdoctoral scholars accumulate coauthored papers but less frequently gain the autonomy to launch their own independent research careers. Their salaries are low and rarely include robust benefit packages (National Academy of Sciences 2014). The rise of nontenure track faculty has made securing a tenure-track position far more competitive than before (Schuster and Finkelstein 2006). Fortunately, many more positions exist for doctoral-level natural scientists and engineers outside of academe, and the majority of doctoral degree holders in these fields make careers in industry or government agencies rather than academe (National Science Foundation 2013, table 46). Two large and unresolved problems are the adequacy of funding for doctoral students and the quality of professional development opportunities for doctoral students who will not succeed in obtaining academic jobs or are not interested in obtaining them (Bok 2013, chap. 11).

POLICIES TO IMPROVE SYSTEM-LEVEL EFFECTIVENESS

This section examines the role of the federal government and the major philanthropic foundations in maintaining and improving system-level effectiveness. Federal higher education policy has been fundamental in two areas: financial aid and research funding. In recent years, major private foundations have also been centrally involved in the development of accountability mechanisms and in the promulgation of a college completion agenda.[15]

Financial Aid Policy

Scholars and policymakers have long recognized that financial constraints discourage many would-be college graduates from even enrolling in college, let alone finishing. These constraints limit the effectiveness of the higher education system. In addition to financial constraints, low-income students may also be handicapped in college-going by ignorance regarding the application process, sources of aid, and the steps needed to take advantage of such aid.

A primary role for national and state governments therefore has been to provide financial aid to support students whose lack of financial resources would otherwise prevent them from attending college. The programs explicitly aim to alleviate the financial burden of attending college include federal grants to low-income students, commonly referred to as Pell Grants, (amounting to $34 billion in 2014), state-funded scholarships including both need-based and merit scholarships, ($9 billion), federal student loans ($96 billion), federal work-study ($1 billion), and other federal programs such as those supporting veterans, military academies, and minority-serving institutions ($15 billion) (College Board 2014). In addition to these programs are a number of tax provisions that reduce the cost of making donations or specifically subsidize the cost of college attendance. Provisions in the federal personal income tax to subsidize college attendance include two tax credits, a deduction for college tuition, and a provision by which parents can claim their college-going children as dependents up to age twenty-four. The tax code also provides for tax-subsidized college savings accounts. All together, these provisions have a budgetary cost equal to about a third of the Pell Grant program, or about $11 billion (Deming and Dynarski 2009, 2–3).

There are reasons to believe that financial aid expenditures at this level are not keeping up with increases in unmet need. Unmet need can be defined as the gap between college costs

15. Foundations have played an important institution-building role from the earliest years of the twentieth century. In particular, the Ford, Pew, Lumina and Gates Foundations developed standard curricular units (the so-called Carnegie unit), encouraged higher levels of quality in medical education and other professions, made college teaching a more secure occupation by funding the original retirement plans, greatly aided the development of community colleges, led internationalization efforts, and fostered the diversification of the student body.

and what students have to pay after accounting for the students' expected family contribution, grants and scholarships, and any other aid that does not need to be repaid (Saunders 2015). Bridget Long and Erin Riley (2007) found substantial increases in unmet need from the 1995–1996 school year to the 2003–2004 school year for all full-time, full-year undergraduates. Moreover, these increases in unmet need affected low-income students more than other students. For example, they found that low-income students attending a public four-year college experienced a 59 percent increase in unmet need. High levels of unmet need persisted through the early 2010s (Saunders 2015). It is difficult to disentangle the effects of unmet need from other factors that affect retention and completion, such as academic preparation. However, unmet need is certainly one cause of the lower retention and completion rates of lower-income and underrepresented minority students. Serge Herzog (2005), for example, found that students in four-year public university with $1,000 in unmet need had drop-out and transfer-out odds of 7 to 10 percent above those of student with no unmet need. Students with unmet need work longer hours to pay for college and are more likely to attend part time. Longer work hours, in turn, lead to higher dropout rates among otherwise similar students, and part-time status is also correlated with lower rates of college completion (see, for example, Attewell, Heil, and Reisel 2012).

A recent review of statistical studies of the effect of financial aid policies observed that the availability of the two largest federal programs, Pell Grants and Stafford Loans, do not affect the probability that low-income students will enroll in college. In contrast, the merit aid programs that have been established in more than a dozen states do exhibit measurable positive effects on enrollments (Deming and Dynarski 2009). The explanation for this difference in effectiveness is that the paperwork required to apply for federal aid is daunting, especially for applicants whose parents have limited education. By contrast, state merit aid programs have simple requirements, and state education systems typically assume the burden of getting necessary information to colleges automatically. A policy option at the federal level would be to simplify the application process for aid. In one experiment, a national tax assistance company assisted customers with their children's financial aid applications, resulting in an increase in college enrollment rates (Deming and Dynarski 2009).[16]

Accountability and Quality Assurance

By the 1980s, international competition and the increasing number of students entering higher education with lower levels of academic preparation heightened worries about the quality of academic programs (National Governors Association 1986). The Pew and Ford Foundations were notable among the many philanthropies funding the regional accrediting agencies to develop approaches to assessment of student learning outcomes. In 1989, federal regulations first required accrediting organizations to examine student learning outcomes as a condition of recognition. By 2001, ten states, concentrated in the Midwest and the South, had experimented with or adopted standardized testing at the college level to assess student learning, but most of the regional accreditation agencies decided to allow colleges and universities themselves to determine how best to assess student learning outcomes. In 2006, a national commission formed by then-Secretary of Education Margaret Spellings issued a report calling for "a robust culture of accountability and transparency" and urging institutions to develop "new performance benchmarks designed to measure and improve productivity and efficiency" (Commission on the Future of Higher Education 2006, 14, 19, 20).

Assessment of student learning outcomes has had a mixed record, one that has not fully satisfied federal higher education officials. A

16. In these and other studies of the effectiveness of various financial aid policies, it is necessary for researchers to overcome selection effects, the tendency of those applying for aid to be systematically different from those who do not apply for aid. One study that explicitly deals with that source of bias relies on the results of a random control experiment in Nebraska (Angrist et al. 2014). The authors find that increased financial aid boosted both enrollment and completion.

report on accountability in higher education released in 2009 (Kuh and Ikenberry) revealed that more than 90 percent of respondents from two- and four-year institutions said they were engaged in institution-level assessments of student learning. Most were using survey instruments, such as the National Survey of Student Engagement, for this purpose, though nearly two in five respondents were using standardized tests of general knowledge and skill, such as the Collegiate Learning Assessment. Most confirmed that accreditation was the primary driver of their interest in assessment.[17] However, on campuses assessment of student learning outcomes often remained surface-level, treated as a matter of compliance rather than as a deeper commitment. Many departments went through the motions of assessing student learning outcomes without using results to improve program performance (Kuh and Ikenberry 2009).

Engineering was an exception to this mixed record. Its professional accrediting organization issued a report in 2000 requiring schools to publish detailed educational objectives, to design a curriculum that ensured achievement of these objectives, and to put in place a system for using results of assessments to improve the effectiveness of the program. In addition, it established specific outcome criteria that all engineering graduates were, in theory, required to demonstrate (Accreditation Board for Engineering and Technology 2000). A follow-up report showed that these recommendations produced real change in how courses were taught. More than half of faculty surveyed reported that they had increased their use of active learning methods, such as group work, design projects, case studies, and application exercises, due to the new requirements for accreditation. A comparison of 1994 and 2004 engineering graduates showed small but significant self-reported gains in technical abilities, such as the application of mathematics and science to engineering problems. Students also self-reported sizable increases in their ability to work in teams, to understand professional ethics, to understand contemporary issues and to demonstrate global cultural awareness (Lattuca, Terenzini, and Volkwein 2006).

College Completion

The postwar federal policy emphasis on increasing access for less advantaged groups assumed the opportunity to attend college would lead to improvement in outcomes. However, rates of baccalaureate attainment declined, leading foundations of the early twenty-first century to focus on college completion as a necessary complement to improved access. The Lumina Foundation set the goal of 60 percent of all Americans with credentials, associate degrees, and baccalaureate degrees by 2025. To promote wider access and faster completion at lower cost, the Gates Foundation invested heavily in experiments in which online modules replaced courses and students demonstrated competency by achieving a passing grade on an online exam. It also invested in the development of Massive Open Online Courses (MOOCs) and new adaptive learning technologies. This Lumina-Gates completion push was embraced by President Obama, who, in a 2010 speech, proclaimed the goal of regaining by the year 2020 the world lead in the production of higher level credentials.

The results of this effort have as yet not yielded changes in graduation rates as large as advocates had hoped. Nationally, the proportion of students who entered college and graduated within four and six years increased in both cases by more than 5 percent for the cohorts entering in 1996 and those entering in 2007. Yet four-year graduation remains under 40 percent and six-year graduation remains under 60 percent (NCES 2014, table 326.10). Constraints on seats and courses, financial aid availability, and student academic preparation

17. At the program level, four of five respondents said they were assessing student learning outcomes in at least one program, and here portfolios dominated. Extending the reach of assessment, the American Association of Colleges & Universities, also supported by the major philanthropies, successfully lobbied for the inclusion of the "core competencies" of analytical and critical thinking, information literacy, quantitative reasoning, oral communication, and written expression as campus-wide assessment components in the Western region (Western Association of Schools and Colleges 2013).

have conspired to keep the college completion movement from achieving its goals.

Research Policy

Research policy is perhaps a misnomer for the decentralized advocacy and negotiation that occurs between scientists, funding agencies, Congress, the president, and the various advisory and advocacy groups whose efforts eventually result in apppropriations and national science and engineering initiatives. This network of contending parties eventually produces federal budget appropriations that provide nearly two-thirds of nondefense spending on university research. Colleges and universities' self-financing of research has played a larger role over time and is now up to nearly 20 percent of the total (National Science Foundation 2013).[18]

International competition has been a major driver of research policy since the days of Sputnik in the 1950s. In the 1970s, the rise of Japan and the decline of American manufacturing triggered new competitiveness policies. One of these was the Bayh-Dole Act of 1980, which allowed universities greater leeway in patenting and licensing of commercially viable products, therapies, and technologies. Bayh-Dole accelerated trends in university patenting and licensing that were already developing in the 1970s (Mowery et al. 2001; Stephan 2012) by allowing all universities to profit from the patenting and licensing of discoveries made by their researchers. The Act achieved its aim of contributing to the rapid increase of university-based patents and licenses yielding income. The income earned by universities increased by approximately 2.5 times in constant dollars between 1981 and 2008 (calculated from Loise and Stevens 2010). However, earnings data are highly skewed by a few "big hits," and a majority of university technology transfer offices run in the red (Loise and Stevens 2010)

Concerns about American competitiveness also stimulated the influential National Academy of Sciences report of the mid-2000s, *Rising Above the Gathering Storm* (National Academies 2007). The report noted a shortage of high school math and science teachers, the need for pipeline programs to increase STEM enrollments in college, and a restrictive immigration system that prevented researchers trained outside the United States from seeking employment in the United States. It also advocated a reinvestment in basic research to reverse trends toward larger shares going to applied research and urged a stronger research and development tax credit to encourage private investment in innovation. Several of the recommendations of the report were incorporated into the America COMPETES Act of 2007, reauthorized by Congress in 2010.[19] Nevertheless, the educational infrastructure for producing the STEM workforce remains underdeveloped, and immigration policy has not been overhauled. A recent study by the Information Technology and Innovation Foundation found that the United States ranked twenty-seventh in the world in the size of its R&D tax incentives (Stewart, Warda, and Atkinson 2012).

ORGANIZATIONAL EFFECTIVENESS

We now turn to campus-level initiatives to improve higher education effectiveness. We focus on three developments that are prevalent on campuses across the country: importing corporate business models into university administration; a trend toward interdisciplinary organization; and increased interest in "student success," defined as undergraduate retention and graduation.

Imported Business Practices

For more than a century, university trustees and administrators have looked to the corporate sector for practices that can improve the efficiency and effectiveness of their operations.

18. The United States spends at 2.8 percent a comparatively high proportion of GDP on R&D. A 2013 study by the World Bank showed that only six of seventy-seven countries reporting in 2011 or 2012 spent a higher proportion of GDP on R&D (World Bank 2013).

19. The 2015 reauthorization ran into opposition from the scientific community and the Democratic Party for its efforts to roll back funding on climate change, to reduce funding for several scientific directorates, and to increase the administrative burden on researchers (National Science Foundation 2015; White House 2015).

At the turn of the twentieth century, the maverick economist Thorstein Veblen disparaged such efforts as inimical to scholarship. The Veblenian tradition of suspicion has lived on, with critics warning against excessive business influence in universities. In recent decades, this influence has been described as "academic capitalism" (Slaughter and Leslie 1997), the "corporatization" of academic life (Tuchman 2009; Washburn 2005), and the rise of the "market-model" university (Engel and Dangerfield 1998; Kirp 2003).

Functions with revenue-generating potential receive special attention because of their centrality to institutional stability. Support staffs for admissions, fund-raising, government and community relations, and research are typically among the largest on campus and the most carefully administered. These units frequently rely on consultants to help managers to improve performance (Coopers & Lybrand 1995). Campuses have engaged in efforts to "brand" themselves in the marketplace to improve their competitive position (Kirp 2003) and commercialized intercollegiate sports play an important role in these branding efforts, often across a national audience (Clotfelter 2011).

One controversial strategy to audit professorial productivity was briefly adopted and then abandoned in Texas. This audit rated professors' productivity using metrics such as number of students taught and external research funding (Berrett 2011). The pushback from university supporters led to abandonment of this effort, and other states have been reluctant to impose such audits. However, many campuses have adopted other ostensibly more efficient management policies pioneered by business corporations. These strategies include "lean" staffing with greater centralization of control and greater reliance on computerized systems and metrics to guide work processes (see, for example, Womack and Jones 2003). They also include responsibility-centered management (RCM), also known as Incentive-Based Budgetting Systems (IBBS), a popular budget model in which colleges and departments are rewarded for increasing student credit hours, majors, and sometimes also graduation rates, while central administration retains funds for common core functions, such as the library, as a kind of tax on "revenue-generating" units (Whalen 1991; Lang 1999).

Clearly quite a bit of faddism is evident in university administrators' efforts to mimic trends in corporate management, leading to short life spans for many new management practices (Birnbaum 2001). Some with longer-lasting support have checkered histories. Although lean management models can improve efficiency, notably in administratively bloated units, studies of corporations indicate that the substitution of technology for staff and the centralization and clustering of functions can also reduce the effectiveness of operations when staff numbers decline below a critical threshold or when staff motivation declines due to overwork (Amabile and Conti 1999; Cameron 1994; Cascio 1993). Responsibility-centered management has the potential to improve the efficiency of budgeting "by clarifying and making more visible institutions, investment patterns, budgets, cross-subsidies, management stregnths and weaknesses, and operational values" (Hearn et al. 2006, 312). It also has well-known unintended consequences, including the stimulation of inefficient competition across schools and departments for student credit hours and pressures for reducing mission-critical central functions such as libraries and community activities, which are supported by taxing the "revenue-generating" units (Adams 1997; Meisinger 1994).

Certain legal and economic features of colleges and universities make the analogy with private firms one that can be easily pushed too far. Unlike the specialized research institutions in Europe, American state universities serve several major objectives: broad-based undergraduate education, pragmatically oriented professional training, basic research in arts and sciences, and applied research and outreach to industry and farm (Goldin and Katz 1999, 45). The contribution of positive externalities to economy and society, as well as the public service activities of higher education institutions, justify their nonprofit status.[20] Because no single metric of performance exists

20. Because of these activities, colleges and universities, like all non-profit organizations, enjoy exemptions from

in colleges and universities comparable to market share or profitability, higher education management is more about balancing many important goals than about maximizing one or two key indicators. The use of bottom-line measures can consequently be a poor fit for the university environment.

Moreover, certain features of the employment situation of the professional staff also mark universities as distinctive from business firms. As James Coleman (1973) notes, one of the distinguishing marks of universities is that their central group of employees are not really employees in the usual sense, but are rather semiautonomous professionals, some of whom may feel only a minimal attachment to their employer. The market for faculty, particularly those at the top of their respective disciplines, is very much a national market. Probably the single most distinctive characteristic of these faculty positions, however, is the institution of tenure, a virtually iron-clad guarantee of permanent employment to those faculty who survive what can be a most demanding probationary period.[21] These features of the employment situation support a governance structure that is in most cases still better described as a "dual structure," involving spheres of faculty authority and influence, than as "managerial control" (Apkarian et al. 2014).

Interdisciplinary Designs

Departmental organization has been the backbone of the American colleges and organizations since the early twentieth century (Abbott 2002). But the rise of interdisciplinary forms of academic organization threatens this dominance.[22] Since the 1980s, many requests for proposals from research funding agencies have required submission by interdisciplinary rather than discipline-only teams. Institutions too have perceived the benefit of fostering cross-disciplinary collaborations. Some of the leading justifications for interdisciplinary organization, such as the alleged "siloed" quality of the disciplines, are suspect, given the permeability of disciplines to new methods and concepts (Jacobs 2013). Nevertheless, interdisciplinary curricula (Brint et al. 2009), interdisciplinary cluster hiring (Sa 2008; Urban Universities 2015), and campus-wide interdisciplinary initiatives (Brint 2005; Sa 2008) have all been on the rise in American colleges and universities since the 1980s.

In spite of their decidedly mixed record of success (see, for example, Geiger and Sa 2008, 167; Rhoten 2003, 2004; Hollingsworth and Hollingsworth 2000), interdisciplinary initiatives have retained a reputation for superiority in problem solving and breakthrough research, and these objectives have great appeal to the people who provide financial contributions and political support for universities. Moreover, the introduction of project-based collaborative learning environments has been identified by some sociologists as a way to reproduce the work environments found in the more dynamic and innovative sectors of the economy, such as Internet services and biotechnology firms (see, for example, Vallas and Kleinman 2007), with the hope that they may lead to similar levels of creativity in the academic setting.

Quite apart from their capacity to raise the profile of universities by leveraging existing strengths across fields, interdisciplinary initiatives play to the skills of administrators in pull-

the federal income tax. Most donations to universities are deductible in calculating the personal income tax, the corporate income tax, and the estate tax. Private foundations, a noteworthy beneficiary of the tax laws, also provided support to universities. At the local level, universities both public and private are exempted from paying most property taxes.

21. The practical implications of tenure for academic governance deepened in 1994, when mandatory retirement for faculty was outlawed (Hammond and Morgan 1991, xi).

22. Concerted federal commitments to interdisciplinary date from the arrival of Ernest Bloch at the National Science Foundation in the mid-1980s. Coming from an industrial research background, Bloch emphasized that pathbreaking research and development typically requires the collaborative work of many types of disciplinary specialists. Insurgent ethnic, gender, and non-Western cultural studies movements of the 1970s and 1980s had their own reasons for favoring interdisciplinarity as a way of linking advocates to like-minded colleagues in neighboring disciplines, thereby escaping the traditional reproductive tendencies of departmental structures.

ing together resources to pursue large-scale initiatives, placing them in a more central position in academic decision-making (Brint 2005). They also have natural constituencies among those in the sciences who are responsive to the priorities of granting agencies and those in the humanities and social sciences who see interdisciplinarity as a way to foster faculty diversity (Brint 2005; Urban Universities 2015). If only for these reasons, interdisciplinary designs that deemphasize departmental organization are unlikely to recede in importance soon.

Student Success Programs

It has been clear at least since the 1980s that aspects of the campus environment can make a difference for the retention and graduation of "at-risk" college students. For example, students who live and work on campus tend to be better integrated into campus life than otherwise similar students who live and work off campus, and they are therefore more likely to persist to graduation (Astin 1984). Prodded by the major philanthropic foundations and the federal government, campuses have over the last decade taken a more systematic approach to improving their retention and graduation rates. Because first-generation and low-income students often come to college less prepared academically, these interventions often focus on such students. Efforts to increase retention and graduation rates are now frequently referred to as "student success programs."

Unfortunately, evaluations of programs to increase retention and graduation rates often fail to take into account unmeasured motivational differences between students who do and do not sign up for programs, thus preventing robust program evaluation that controls for student motivation. The outcomes of interventions are also influenced by variation in the commitment, competence, and resources of staff, as well as by differences in program design and implementation. In one of the few strong studies of student success programs, Eric Bettinger and Rachel Baker (2014) used experimental methods to assess the impact of an intensive series of coaching and counseling interventions with high-need college students. They found a statistically significant increase in persistence and degree completion for students in the treatment group, supporting survey results indicating that high-need students benefit disproportionately from more regular contact with advisers (see Klepfer and Hull 2012). Until findings relevant to other promising academic support programs can be corroborated in multiple sites using rigorous methods, campuses will lack convincing evidence to guide design and implementation of these programs.[23]

CLASSROOM EFFECTIVENESS

We now examine the final level in our analysis of higher education effectiveness, the classroom. Educators have long recognized that traditional lecture halls are not conducive environments for learning (see, for example, Barzun 1968). This is true because many instructors are not compelling lecturers and because the traditional lecture format invites student passivity. Student attention frequently wavers in most large lecture classes (Bunce, Flens, and Neiles 2010). Nevertheless, economic realities require that many introductory courses and even advanced courses in some majors be taught in lecture halls. Fortunately, some new instructional techniques show promise in creating more effective learning environments.

Active and Experiential Learning

Active learning techniques seek to increase student participation in order to improve learning outcomes. In addition to such staples as presentations, demonstrations, debates, and project reports, active learning advocates have called for breaking large classes into smaller groups to work on questions collectively and

23. Persuasive multisite studies using random assignment techniques do not exist in support of most interventions often judged by higher education scholars to be effective in improving retention and graduation rates. These interventions include learning communities; pre-matriculation summer programs; athletic advising models applied to at-risk students; and timely data updates to advisers about students who are failing to achieve critical grades or take gateway courses on schedule for graduation.

then to report out results to the entire class (Mazur 1997). Some reformers adopted electronic "clicker" technology to take instantaneous polls among students to test for understanding and to solicit opinion on discussion questions posed by the instructor. Mini-lectures combined with problem-based small group breakouts have been carefully studied. Based on results of pre- and post-semester concept inventory tests, the studies show a pattern of significantly improved learning relative to prior term traditional lecture courses (see, for example, Hake 1998; Prince 2004).

As opposed to active learning, experiential learning involves "hands-on" activities undertaken in nonclassroom environments, including field work, observations, interviews, internships, and "service learning" opportunities in community organizations (DeAngelo et al. 2007). Although researchers have often found higher levels of student engagement due to experiential learning activities (Kuh et al. 2008), some studies have found that engagement scores are not strongly correlated with improved performance on tests of analytical and critical thinking (Carini, Kuh, and Klein 2006). The upshot of this research is that efforts to increase engagement are not as closely connected to learning outcomes as many believe.

One reason is that student-centered approaches alone cannot make up for the declines in study time and reading completion that have been observed in every discipline, among every demographic group, and at every type of institution since the 1960s (Babcock and Marks 2011). Improved in-class accountability mechanisms are consequently a valuable complement to student-centered teaching, if the goal is increased student learning. A notable experimental study showed that daily online reading quizzes significantly improved student performance on final exams, while reducing achievement gaps between students from high- and low-income backgrounds (Pennebaker, Gosling, and Ferrell 2013). Similarly, longer reading and writing assignments have been associated with gains in analytical and critical thinking among otherwise similar students (Arum and Roksa 2011).

Instructional Technologies

Online instruction has grown steadily. By 2012, nearly seven million students had taken at least one course online, representing one-third of college students overall (Allen and Seaman 2013). Online courses have many advantages. They can educate larger numbers of students, using engaging multimedia content, and potentially at a fraction of the cost of face-to-face instruction. They are convenient because students are not required to attend class at specified days and times. It is no wonder that lectures are seen by many technology enthusiasts as emblematic of an industry hanging onto an outmoded nineteenth-century technology, and consequently missing opportunities to increase students' learning while cutting costs.

Online courses suffer from extremely high dropout rates compared with face-to-face courses. Moreover, the prevailing wisdom, based on meta-analysis of hundreds of studies, is that hybrid instruction is preferable in so far as it can provide both the convenience of learning basic materials online and time for in-depth questioning and feedback in face-to-face sessions (Means et al. 2009). This evidence has led to an increase in "flipped classrooms," in which lectures are viewed prior to class and class time is used for solving problems or discussing texts.

Online courses appear to work best for mature professionals who are pursuing higher level degrees or advanced certification. Regardless of age, academically well-prepared students can fare well in a fully online environment. However, several studies have suggested that younger students, male students, and particularly those who are less prepared for academic work do not tend to fare as well in fully online environments (see, for example, Xu and Jaggars 2011). Less experienced students may need the reinforcement that comes from seeing others attending and participating in learning, much as those who go to gyms may need to see others sweating to want to do the same.

Serious questions have also been raised about the distributional consequences of online higher education. A widely circulated open letter by a San Jose State philosophy professors responding to the introduction of MOOCs in

their department questioned whether lectures geared to the cultural reference sets of elite students were appropriate to the predominantly first-generation students they taught. They also questioned whether online courses were more suitable for the production of technicians working alone or under the direction of others than higher-level professionals and managers whose work requires well-developed interpersonal skills and the capacity to build social networks (San Jose State University 2013).

Adaptive learning technologies (also known as courseware and intelligent tutoring systems) are another technological approach to improve learning. These technologies are used to assess difficulties that learners are having in mastering ideas and, based on these assessments, to provide individualized tutorials to help students bridge their learning gaps.[24] Adaptive learning software has the clear advantage over human instructors of being infinitely patient. When a student fails to understand a particular concept, the software begins teaching the concept again and can continue indefinitely until the concept is learned. In more sophisticated software programs, students are exposed to multiple ways of thinking about a concept or problem, an approach that is clearly advantageous when the first explanation does not work. In well-controlled experiments, researchers have shown significant improvements in students' classroom engagement and course grades following the adoption of adaptive learning technologies (Dori and Belcher 2005; Lovett, Meyer, and Thille 2008; Twigg 2003).[25] Of the technological approaches to improve higher education effectiveness, adaptive learning technologies are clearly one of the more promising.

CONCLUSION

Higher education is a central sector in American society. The effectiveness of colleges and universities is consequently a national priority concern. We have argued that higher education effectiveness can be evaluated at four levels of analysis: systems, state, campus, and classroom. We have focused on three of those levels here for the most part, leaving aside variation in state policies.

Our overview yields a mixed scorecard on efforts to improve higher education effectiveness. The system looks very good when labor market and research outcomes are assessed, but labor market outcomes appear to have as much or more to do with the interpretation of degrees as signals of talent and trainability as with any measurable human capital contributions they reflect. In disciplines and institutions where it is lacking, a renewed focus on transmitting subject matter knowledge and core cognitive competencies is warrented. When equity issues are in the foreground, research indicates that U.S. progress has stalled, particularly for lower-income students. State subsidies to public institutions have been declining in recent decades and financial aid has not kept pace with need. A high priority in national policy must therefore be to reverse these declines. We also observe persistent difficulties in the financing and professional development of doctoral students, in the latter case particularly for those who are unlikely to obtain academic jobs.

The most popular campus-level innovations are imported business practices, interdisciplinary designs, and programs to boost graduation rates. Each of these has created bandwagon effects among university administrators, but so far none has as yet shown a consistent

24. One example is Virginia Tech's Math Emporium, which was an early and influential model of adaptive learning software tailored to address the individual student's learning gaps. In the Math Emporium, students learn course concepts, complete practice problems, and take assigned tests at a self-paced rate. Built-in assessment programs allow faculty members to monitor each student's progress and to intervene as problems arose (Truelove 1999).

25. Adaptive learning software represents just one approach to the use of technology to enhance student learning. Other approaches include, for example, online simulations, online video demonstrations, and calibrated peer review of writing assignments. More than a hundred interactive simulations are now available in open source from the University of Colorado's PhET Interactive Simulations (Weiman, Adams, and Perkins 2008).

or replicable record of improving effectiveness in the areas they address. By contrast, many classroom-level innovations in instructional practices and technologies show promising results, with the proviso that student-centered teaching has proven to be no panacea without an equal level of student accountability for learning.

Although the scorecard is mixed, the attention to effectiveness is welcome. Perhaps the most important consequence of higher education's growing concern with effectiveness is that it can lead in the direction of policies that contribute to better system-level outcomes—and toward institutions that will eventually be capable of using well-researched and scalable practices for the benefit of their students, their faculties, and their communities.

REFERENCES

Abbott, Andrew. 2002. *The Chaos of Disciplines*. Chicago: University of Chicago Press.

Accreditation Board for Engineering and Technology. 2000. *Criteria for Accrediting Engineering.* Baltimore, Md.: ABET.

Adams, E. M. 1997. "Rationality in the Academy: Why Responsibility Center Budgeting Is a Wrong Step Down a Wrong Road." *Change* 29(5): 58–61.

Allen, I. Elaine, and Jeff Seaman. 2013. "Changing Course: Ten Years of Tracking Online Education in the United States." Babson Park, Mass.: Babson Survey Research Group and Quahog Research Group. Accessed December 17, 2015. http://www.onlinelearningsurvey.com/reports/changingcourse.pdf.

Amabile, Teresa M., and Regina Conti. 1999. "Changes in the Work Environment for Creativity During Downsizing." *Academy of Management Journal* 42(6): 630–40.

Angell, Robert Cooley. 1928. *The Campus: A Study of Contemporary Undergraduate Life in the American University.* New York: Appleton and Co.

Angrist, Joshua, David Autor, Sally Hudson, and Amanda Pallais. 2014. "Leveling Up: Early Results from a Randomized Evaluation of Post-Secondary Aid." *NBER* working paper no. 20800. Cambridge, Mass.: National Bureau of Economic Research.

Apkarian, Jacob, Kerry Mulligan, Matthew B. Rotondi, and Steven Brint. 2014. "Who Governs? Academic Decision-Making in U.S. Four-Year Colleges and Universities, 2000–2012." *Tertiary Education and Management* 20(2): 1–14.

Arcidicano, Peter. 2004. "Ability Sorting and the Returns to the College Major." *Journal of Econometrics* 121(1–2): 343–75.

Arum, Richard, and Josipa Roksa. 2011. *Academically Adrift: Limited Learning on College Campuses.* Chicago: University of Chicago Press.

———. 2014. *Aspiring Adults Adrift.* Chicago: University of Chicago Press.

Arum, Richard, Josipa Roksa, and Esther Cho. 2011. *Improving Undergraduate Learning: Findings and Policy Recommendations from the SSRC-CLA Project.* New York: Social Science Research Council.

Association of American Universities. 2010. "AAU Membership Policy." Accessed December 17, 2015. https://www.aau.edu/WorkArea/DownloadAsset.aspx?id=10972.

———. 2015. "By the Numbers." Accessed December 17, 2015. http://www.aau.edu/uploadedFiles?About_AAU/AAu_Data/AAU_Bythe Numbers_2015._8.5x11_HR.pdf.

Association of Public and Land-Grant Universities. 2015. "Project Degree Completion." Accessed December 17, 2015. http://www.aplu.org/projects-and-initiatives/project-degree-completion/.

Astin, Alexander W. 1984. "Student Involvement: A Developmental Theory." *Journal of Colleges Student Personnel* 25(4): 297–308.

Attewell, Paul, Scott Heil, and Liza Reisel. 2012. "What Is Academic Momentum? And Does It Matter?" *Educational Evaluation and Policy Analysis* 34(1): 27–44.

Attewell, Paul, and David E. Lavin. 2007. *Passing the Torch: Does Higher Education Pay for the Disadvantaged and Pay Off Across the Generations?* New York: Russell Sage Foundation.

Attewell, Paul, David E. Lavin, Thurston Domina, and Tania Levey. 2006. "New Evidence on College Remediation." *Journal of Higher Education* 77(5): 886–924.

Autor, David H. 2014. "Skills, Education and the Rise of Earnings Inequality Among the 'Other 99 Percent.'" *Science* 344(6186): 843–51.

Babcock, Philip, and Mindy Marks. 2011. "The Falling Time Cost of College: Evidence from Half a Century of Time Use Data." *Review of Economics and Statistics* 93(2): 468–78.

Bahr, Peter Riley. 2010. "Preparing the Underprepared: An Analysis of Racial Disparities in Post-

secondary Mathematics Remediation." *Journal of Higher Education* 81(2): 209–37.

Bailey, Martha, and Susan Dynarski. 2011. "Inequality in Postsecondary Attainment." In *Wither Opportunity? Rising Inequality, Schools, and Children's Life Chances*, edited by Greg Duncan and Richard Murnane. New York: Russell Sage Foundation.

Baker, David P. 2014. *The Schooled Society: The Educational Transformation of Global Culture.* Stanford, Calif.: Stanford University Press.

Barzun, Jacques. 1968. *The American University: How It Runs, Where It Is Going.* Chicago: University of Chicago Press.

Baum, Sandy, and Jennifer Ma. 2014. *Trends in College Pricing 2013*. Princeton, N.J.: The College Board.

Baumol, William, and William G. Bowen. 1966. *Performing Arts, The Economic Dilemma: A Study of Problems Common to Theater, Opera, Music, and Dance*. New York: Twentieth Century Fund.

Becher, Tony. 1989. *Academic Tribes and Territories: Intellectual Enquiry and the Cultures of Discipline.* Buckingham, UK: SRHE and Open University Press.

Becker, Gary S. 1964. *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education.* New York: Columbia University Press.

Bell, Daniel. 1973. *The Coming of Post-Industrial Society: An Essay in Social Forecasting.* New York: Basic Books.

Bennett, William J. 1987. "Our Greedy Colleges." *New York Times*, February 8, p. A7.

Berg, Ivar. 1971. *Education and Jobs: The Great Training Robbery.* Boston, Mass.: Beacon Press.

Bernhardt, Annette, Martina Morris, Mark Handcock, and Marc Scott. 2001. *Divergent Paths: Economic Mobility in the New American Labor Market.* New York: Russell Sage Foundation.

Berrett, Dan. 2011. "The Wrong Kind of Accountability?" *Inside Higher Ed*, May 10. Accessed December 17, 2015. https://www.insidehighered.com/news/2011/05/10/texas_faculty_and_president_criticize_regents_measurement_of_professors.

Bettinger, Eric P., and Rachel Baker. 2014. "The Effects of Student Coaching: An Evaluation of a Randomized Experiment in Student Advising." *Educational Evaluation and Policy Analysis* 36(1): 3–19.

Bills, David. 2003. "Credentials, Signals, and Screens: Explaining the Relationship between Schooling and Job Assignment." *Review of Educational Research* 73(4): 441–69.

Birnbaum, Robert. 2001. *Management Fads in Higher Education: Where They Come From, What They Do, Why They Fail.* New York: John Wiley & Sons.

Bok, Derek. 2013. *Higher Education in America*. Princeton, N.J.: Princeton University Press.

Bound, John, Murat Demirci, Gaurav Khanna, and Sarah Turner. 2014. "Finishing Degrees and Finding Jobs: U.S. Higher Education and the Flow of Foreign IT Workers." *NBER* working paper no. 20505. Cambridge, Mass.: National Bureau of Economic Research.

Bound, John, Michael F. Lovenheim, and Sarah Turner. 2010. "Why Have College Completion Rates Declined? An Analysis of Changing Student Preparation and Collegiate Resources." *American Economic Journal: Applied Economics* 2(3): 129–57.

Bourdieu, Pierre, and Jean-Claude Passeron. 1977. *Reproduction in Economy, Society and Culture.* Beverly Hills, Calif.: Sage Publications.

Bowen, Howard E. 1977. *Investment in Learning: The Individual and Social Benefits of American Higher Education.* San Francisco: Jossey-Bass.

———. 1980. *The Costs of Higher Education.* San Francisco: Jossey-Bass.

Bowles, Samuel, and Herbert J. Gintis. 1976. *Schooling in a Capitalist Society.* New York: Basic Books.

Brewer, Dominic J., Eric R. Eide, and Ronald G. Ehrenberg. 1999. "Does It Pay to Attend an Elite Private College? Cross-Cohort Evidence on the Effects of College Type on Earnings." *Journal of Human Resources* 34(1): 104–23.

Brint, Steven. 2001. "Professionals and the 'Knowledge Economy': Rethinking the Theory of Post-Industrial Society." *Current Sociology* 49(1): 101–32.

———. 2005. "Creating the Future: The 'New Directions' at American Research Universities." *Minerva* 43(1): 23–50.

———. 2015. "Professional Responsibility in an Age of Experts and Large Organizations." In *Professional Responsibility*, edited by Douglas E. Mitchell and Robert K. Ream. London: Springer.

Brint, Steven, and Jerome Karabel. 1989. *The Diverted Dream: Community Colleges and the Promise of Educational Opportunity in America, 1900–1985.* New York: Oxford University Press.

Brint, Steven, and Kristopher Proctor. 2011. "Middle-Class Respectability in 21st Century America: Work and Lifestyle in the Professional-Managerial Stratum." In *Thrift and Thriving in America: Capitalism and Moral Order from the Puritans to the Present*, edited by Joshua Y. Yates and James Davison Hunter. New York: Oxford University Press.

Brint, Steven, Mark Riddle, and Robert A. Hanneman. 2006. "Reference Sets, Identities, and Aspirations in a Complex Organizational Field: The Case of American Four-Year Colleges and Universities." *Sociology of Education* 79(3): 126–40.

Brint, Steven, Lori Turk-Bicakci, Kristopher Proctor, and Scott Patrick Murphy. 2009. "Expanding the Social Frame of Knowledge: The Growth and Distribution of Interdisciplinary Degree-Granting Programs in American Colleges and Universities, 1975–2000." *Review of Higher Education* 32(2): 155–83.

Brint, Steven, Lori Turk-Bicakci, Mark Riddle, and Charles S. Levy. 2005. "From the Liberal to the Practical Arts in American Colleges and Universities: Organizational Analysis and Curricular Change." *Journal of Higher Education* 76(2): 151–80.

Bunce, Diane M., Elizabeth A. Flens, and Kelly Y. Neiles. 2010. "How Long Can Students Pay Attention in Class? A Study of Student Attention Decline Using Clickers." *Journal of Chemical Education* 87(12): 1438–43.

Cameron, Kim S. 1994. "Strategies for Successful Organizational Downsizing." *Human Resources Management* 33(2): 189–211.

Carini, Robert M., George D. Kuh, and Stephen P. Klein. 2006. "Student Engagement and Student Learning: Testing the Linkages." *Research in Higher Education* 47(1): 1–32.

Carnevale, Anthony, Stephen J. Rose, and Ben Cheah. 2011. *The College Payoff.* Washington, D.C.: Georgetown University, Center for Education and Work.

Carnevale, Anthony, and Jeff Strohl. 2013. *Separate and Unequal: How Higher Education Reinforces the Intergenerational Reproduction of White Racial Privilege.* Washington, D.C.: Georgetown University, Center for Education and Work.

Cascio, Wayne F. 1993. "Downsizing: What Do We Know? What Have We Learned?" *The Executive* 7(1): 95–104.

Cellini, Stephanie Riegg, and Claudia Goldin. 2012. "Does Federal Student Aid Raise Tuition? New Evidence on For-Profit Colleges." *NBER* working paper no. 17827. Cambridge, Mass.: National Bureau of Economic Research.

Center for World Class Universities (CWCU). 2014. "Academic Rankings of World Universities 2014." Accessed December 17, 2015. http://www.shanghairanking.com/ARWU2014.html.

Christensen, Clayton M., and Henry J. Eyring. 2011. *The Innovative University: Changing the DNA of Higher Education from the Inside Out.* San Francisco: Jossey-Bass.

Clotfelter, Charles T. 1996. *Buying the Best: Cost Escalation in Elite Higher Education*. Princeton, N.J.: Princeton University Press.

———. 2011. *Big-Time Sports in American Universities.* Cambridge: Cambridge University Press.

Clotfelter, Charles T., Ronald G. Ehrenberg, Malcolm Getz, and John J. Siegfried. 1991. *Economic Challenges in Higher Education.* Chicago: University of Chicago Press.

Cole, Jonathan R. 2009. *The Great American University: Its Rise to Preeminence, Its Indispensable National Role, Why It Must be Protected.* New York: Perseus Books.

Coleman, James S. 1973. "The University and Society's New Demands Upon It." In *Content and Context*, edited by Carl Kaysen. New York: McGraw-Hill.

College Board. 2014. "Trends in Student Aid 2014." New York: The College Board. Accessed December 17, 2015. http://trends.collegeboard.org/sites/default/files/2014-trends-student-aid-final-web.pdf.

Collinge, Alan. 2009. *The Student Loan Scam: The Most Oppressive Debt in U.S. History and How We Can Fight It.* Boston, Mass.: Beacon Press.

Collins, Harry, Robert Evans, and Michael E. Gorman. 2007. "Trading Zones and Interactional Expertise." *Studies in History and Philosophy of Science* 38(4): 657–66.

Collins, Randall. 1977. *Conflict Sociology.* New York: Academic Press.

———. 1979. *The Credential Society.* New York: Academic Press.

Commission on the Future of Higher Education. 2006. *A Test of Leadership: Charting the Future of U.S. Higher Education*. Washington: U.S. Department of Education. Accessed December 18,

2015. http://www2.ed.gov/about/bdscomm/list/hiedfuture/reports/final-report.pdf.

Coopers & Lybrand. 1995. *Reinventing the University: Managing and Financing Institutions of Higher Education.* New York: John Wiley & Sons.

Craig, John E. 1985. "The Expansion of Education." *Review of Research in Education* 9: 151–213.

DeAngelo, Linda, Sylvia Hurtado, John H. Prior, Kimberly R. Nelly, Jose Luis Santos, and William S. Korn. 2007. *American College Teacher: National Norms for the 2007–2008 HERI Faculty Survey.* Los Angeles: University of California, Higher Education Research Institute.

Deming, David, and Susan Dynarski. 2009. "Into College, Out of Poverty? Policies to Increase the Postsecondary Attainment of the Poor." *NBER* working paper no. 15387. Cambridge, Mass.: National Bureau of Economic Research.

Deming, David J., Claudia Goldin, and Lawrence F. Katz. 2012. "The For-Profit Postsecondary School Sector: Nimble Critters or Agile Predators?" *Journal of Economic Perspectives* 26(1): 139–64.

———. 2013. "For-Profit Colleges." *The Future of Children* 23(1): 137–63.

DiPrete, Thomas A., and Claudia Buchmann. 2013. *The Rise of Women: The Growing Gender Gap in Education and What It Means for American Schools.* New York: Russell Sage Foundation.

Dori, Yehudit Judy, and John Belcher. 2005. "How Does Technology-Enabled Active Learning Affect Undergraduate Students' Understanding of Electromagnetism Concepts?" *Journal of the Learning Sciences* 14(2): 243–79.

Dougherty, Kevin J., and Gregory S. Kienzl. 2006. "It's Not Enough to Get Through the Open Door: Inequalities in Social Background in Transfer from Community Colleges to Four-Year Colleges." *Teacher's College Record* 108(3): 452–87.

Dunham, Edgar Alden. 1969. *Colleges of the Forgotten Americans: A Profile of State Colleges and Regional Universities.* New York: McGraw-Hill.

Ehrenberg, Ronald G. 2000. *Tuition Rising: Why College Costs So Much*. Cambridge, Mass.: Harvard University Press.

———. 2012. "American Higher Education in Transition." *Journal of Economic Perspectives* 26(1): 193–216.

Ehrenberg, Ronald G., Harriet Zuckerman, Jeffrey A. Groen, and Sharon M. Brucker. 2009. *Educating Scholars: Doctoral Education in the Humanities.* Princeton, N.J.: Princeton University Press.

Engel, James, and Anthony Dangerfield. 1998. "The Market-Model University: Humanities in the Age of Money." *Harvard Magazine*. Accessed December 17, 2015. http://www.harvardmagazine.com/1998/05/forum.html.

Freeman, Richard. 1976.*The OverEducated American*. New York: Academic Press.

Geiger, Roger L. 1993. *Research and Relevant Knowledge: American Universities Since World War II.* New York: Oxford University Press.

———. 2015. The *History of American Higher Education: Learning and Culture from the Founding to World War II.* Princeton, N.J.: Princeton University Press.

Geiger, Roger L., and Creso Sa. 2008. *Tapping the Riches of Science: Universities and the Promise of Economic Growth.* Cambridge, Mass.: Harvard University Press.

Goldin, Claudia, and Lawrence F. Katz. 1999. "The Shaping of Higher Education: The Formative Years in the United States, 1890 to 1940." *Journal of Economic Perspectives* 13(1): 37–62.

———. 2008. *The Race Between Education and Technology.* Cambridge, Mass.: The Belknap Press of Harvard University Press.

Hake, Robert R. 1998. "Interactive-Engagement Versus Traditional Methods: A Six-Thousand Student Survey of Mechanics Test Data for Introductory Physics Courses." *American Journal of Physics* 66(1): 64–74.

Hammond, Brett P., and Harriet P. Morgan. 1991. *Ending Mandatory Retirement for Tenured Faculty: The Consequences for Higher Education.* Washington, D.C.: National Academy Press.

Hanushek, Eric A., and Ludger Woessmann. 2011. "The Economics of International Differences in Educational Achievement." In *The Handbook of the Economics of Education, vol. 3,* edited by Eric A. Hanushek, Stephen Machin, and Ludger Woessmann. London: Elsevier.

Hearn, James C., Darrell R. Lewis, Lincoln Kallsen, Janet M. Holdsworth, and Lisa M. Jones. 2006. "'Incentives for Managed Growth': A Case Study of Incentives-Based Planning and Budgeting in a Large Public University." *Journal of Higher Education* 77(2): 286–316.

Herzog, Serge. 2005. "Measuring Determinants of Student Retention vs. Dropout/Stopout vs.

Transfer: A First-to-Second Year Analysis of New Freshmen." *Research in Higher Education* 46(8): 883–928.

Hoekstra, Mark, 2009. "The Effect of Attending the Flagship State University on Earnings: A Discontinuity-Based Approach." *Review of Economics and Statistics* 91(4): 717–24.

Hollingsworth, J. Rogers, and Ellen J. Hollingsworth. 2000. "Major Discoveries in Biomedical Research Organizations: Perspectives on Interdisciplinarity, Nurturing Leadership, Integrated Structures and Cultures." In *Practicing Interdisciplinarity*, edited by Peter Weingart and Nico Stehr. Toronto: University of Toronto Press.

Horowitz, Helen Lefkowitz. 1987. *Campus Life: Undergraduate Cultures from the Eighteenth Century to Today.* New York: Alfred A. Knopf.

Hout, Michael. 2012. "Social and Economic Returns to College Education in the United States." *American Annual Review of Sociology* 38: 379–400.

Hoxby, Caroline M. 2009. "The Changing Selectivity of American Colleges." *Journal of Economic Perspectives* 23(1): 1–25.

International Institute of Education. 2014. *The 2014 Open Doors Report on International Educational Exchange.* New York: International Institute of Education.

Issacson, Walter. 2014. *The Innovators: How a Group of Hackers, Geniuses and Geeks Created the Digital Revolution.* New York: Simon & Schuster.

Jacobs, Jerry A. 2013. *In Defense of the Disciplines: Interdisciplinarity and Specialization in the Research University.* Chicago: University of Chicago Press.

James, Estelle, Nabeel Alasalam, Joseph C. Conaty, and Duc-Le To. 1989. "College Quality and Future Earnings: Where Should You Send Your Child to College?" *American Economic Review* 79(2): 247–52.

Javits, Harold, Teresa Grimes, Alan Rapoport, Robert Bell, Ron Fecso, and Rolf Lehming. 2010. *U.S. Academic Scientific Publishing.* Working paper SRS 11–201. Arlington, Va.: National Science Foundation, Division of Science Resources Services.

Kamenetz, Anya. 2006. *Generation Debt.* New York: Penguin Group.

Kena, Grace, Lauren Musu-Gillette, Jennifer Robinson, Xiaolei Wang, Amy Rathbun, Jijun Zhang, Sidney Wilkinson-Flicker, Amy Barmer, and Erin Dunlop Velez. 2015. *The Condition of Education.* NCES 2015-144. Washington: U.S. Department of Education. Accessed December 17, 2015. http://nces.ed.gov/pubs2015/2015144.pdf.

King, Tracey, and Ellynne Bannon. 2002. *At What Cost? The Price that Working Students Pay for a College Education*. Washington: U.S. Public Interest Research Group.

Kingston, Paul W. 2015. "Questionable Promises: College for Many More." Unpublished paper. Department of Sociology, University of Virginia.

Kirkham, Chris. 2015. "Corinthian Closing Its Last Schools; 10,000 CA Students Displaced." *Los Angeles Times*, April 27, 2015, p. 1.

Kirp, David L. 2003. *Shakespeare, Einstein, and the Bottom Line: The Marketing of Higher Education.* Cambridge, Mass.: Harvard University Press.

Klepfer, Kasey, and Jim Hull. 2012. 2012. *High School Rigor and Good Advice: Setting Up Students to Succeed*. Washington, D.C.: Center for Public Education.

Kuh, George D., Ty M. Cruce, Rick Shoup, Jillian Kinzie, and Robert M. Gonyea. 2008. "Unmasking the Effects of Student Engagement on First-Year College Grades and Persistence." *Journal of Higher Education* 79(5): 540–63.

Kuh, George D., and Stanley O. Ikenberry. 2009. *More Than You Think, Less Than We Need: Learning Outcomes Assessment in American Higher Education.* Champaign, Ill.: National Institute for Learning Outcomes Assessment.

Kuh, George D., and Ernest T. Pascarella. 2004. "What Does Institutional Selectivity Tell Us About Educational Quality?" *Change* 36(5): 52–58.

Kutner, Mark, Elizabeth Greenberg, Ying Jin, Bridget Boyle, Yung-chen Hsu, and Eric Dunleavy. 2007. *Literacy in Everyday Life: Results for the 2003 National Assessment of Adult Literacy*. NCES 2007-480. Washington: National Center for Education Statistics.

Lang, Daniel W. 1999. "Responsibility Centre Budgeting and Responsibility Centre Management in Theory and Practice." *Higher Education Management* 11(3): 81–111.

Lareau, Annette. 2002. "Invisible Inequality: Social Class and Child Raising in Black Families and White Families." *American Sociological Review* 67(5): 747–76.

Lattuca, Lisa R., Patrick T. Terenzini, and J. Fredericks Volkwein. 2006. *Engineering Change: A Study of the Impact of EC 2000.* Baltimore, Md.: ABET.

Loise, Vicki, and Ashley J. Stevens. 2010. "The Bayh-Dole Act Turns 30." Accessed December 17, 2015. http://www.bu.edu/otd/files/2011/02/The_Bayh-Dole_Act_Turns_30.pdf.

Long, Bridget Terry, and Erin Riley. 2007. "Financial Aid: A Broken Bridge to College Access?" *Harvard Educational Review* 77(1): 39–63.

Lovett, Marsha, Oded Meyer, and Candace Thille. 2008. "The Open Learning Initiative: Measuring the Effectiveness of the OLI Statistics Course in Accelerating Student Learning." *Journal of Interactive Media in Education.* Accessed December 18, 2015. https://oli.cmu.edu/wp-oli/wp-content/uploads/2012/05/Lovett_2008_Statistics_Accelerated_Learning_Study.pdf.

Mazur, Eric. 1997. *Peer Instruction: A User's Manual.* Upper Saddle River, N.J.: Prentice-Hall.

Means, Barbara, Yukie Toyama, Robert Murphy, Marianne Bakia, and Karla Jones. 2009. *Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies.* Washington: U.S. Department of Education.

Meisinger, Richard J., Jr. 1994. *College and University Budgeting: An Introduction for Faculty and Academic Administrators*. Washington, D.C.: National Association of College and University Business Officers.

Moretti, Enric. 2013. *The New Geography of Jobs.* New York: Houghton Mifflin Harcourt.

Mowery, David, Richard R. Nelson, Bhaven N. Sampat, and Arvids A. Ziedonis. 2001. "The Growth of Patenting and Licensing by U.S. Universities: An Assessment of the Effects of the Bayh-Dole Act of 1980." *Research Policy* 30(1): 99–119.

Mullen, Ann L., Kimberly A. Goyette, and Joseph A. Soares. 2003. "Who Goes to Graduate School? Social and Academic Correlates of Educational Continuation After College." *Sociology of Education* 76(2): 143–69.

Murnane, Richard, John Willett, and Frank Levy. 1995. "The Growing Importance of Cognitive Skills in Wage Determination." *Review of Economics and Statistics* 77(2): 251–66.

National Academies Committee on Prospering in the Global Economy of the 21st Century (National Academies). 2007. *Rising Above the Gathering Storm: Energizing and Employing American for a Brighter Economic Future.* Washington, D.C.: National Academies Press.

National Academy of Sciences. 2014. *The Postdoctoral Experience Revisited*. Washington, D.C.: National Academies Press.

National Association of College and University Business Officers (NACUBO). 2014. *NACUBO Tuition Discounting Study.* Washington, D.C.: NACUBO.

National Center for Education Statistics (NCES). 2010. "List of 2010 Digest Tables." Washington: U.S. Department of Education. Accessed December 18, 2015. https://nces.ed.gov/programs/digest/2010menu_tables.asp.

———. 2012. "List of 2012 Digest Tables." Washington: U.S. Department of Education. Accessed December 18, 2015. https://nces.ed.gov/programs/digest/2012menu_tables.asp.

———. 2013. "List of 2013 Digest Tables." Washington: U.S. Department of Education. Accessed December 18, 2015. https://nces.ed.gov/programs/digest/2013menu_tables.asp.

———. 2014. "List of 2014 Digest Tables." Washington: U.S. Department of Education. Accessed December 18, 2015. https://nces.ed.gov/programs/digest/2014menu_tables.asp.

———. 2015a. "List of 2015 Digest Tables." Washington: U.S. Department of Education. Accessed December 18, 2015. https://nces.ed.gov/programs/digest/2015menu_tables.asp.

———. 2015b. "Integrated Post-Secondary Education Data System (IPEDS)." Washington, D.C.: U.S. Department of Education. Accessed December 18, 2015. https://nces.ed.gov/ipeds.

National Governors Association. 1986. *A Time for Results: The Governors' Report on Education.* Washington, D.C.: National Governors Association.

National Science Board. 2014. *Science and Engineering Indicators 2014.* Washington, D.C.: National Science Board.

National Science Foundation. 2013. "Science and Engineering Doctorates: Data Tables." Accessed December 17, 2015. http://www.nsf.gov/statistics/sed/2013/data-tables.cfm.

———. 2015. "America COMPETES Reauthorization Act of 2015 (H.R. 1806): Impact on the National Science Foundation." Accessed December 17, 2015. http://www.nsf.gov/about/congress/114/hr1806_impact.jsp.

Obama, Barack. 2010. "Remarks by the President on

Higher Education and the Economy at the University of Texas Austin." Washington, D.C.: The White House, Office of the Press Secretary. Accessed December 17, 2015. http://www.whitehouse.gov/the-press-office/2010/08/09/remarks-president-higher-education-and-economy-university-texas-austin.

Organization for Economic Cooperation and Development (OECD). 2013. *OECD Skills Outlook 2013: First Results for the Survey of Adult Skills*. Paris: OECD Publishing. Accessed December 18, 2015. http://dx.doi.org/10.1787/9789264204256-en.

———. 2014. *Education at a Glance: OECD Indicators.* Paris: OECD Publishing. Accessed December 17, 2015. http://www.oecd.org/education/eag.htm.

Palmer, James. 2015. "Grapevine Compilation of State Fiscal Support for Higher Education Results for Fiscal Year 2012–2013." Boulder, Colo.: State Higher Education Executive Officers. Accessed December 17, 2015. http://www.sheeo.org/resources/publications/grapevine-compilation-state-fiscal-support-higher-education-results-fiscal.

Pascarella, Earnest T., and Patrick T. Terenzini. 2005. *How College Affects Students: A Third Decade of Research*, vol. 2. San Francisco: Jossey-Bass.

PayScale. 2014. "2013–14 PayScale College Salary Report." Accessed December 18, 2015. http://www.payscale.com/college-salary-report-2014/majors-that-pay-you-back.

Pennebaker, James W., Samuel D. Gosling, and Jason D. Ferrell. 2013. "Daily Online Testing in Large Classes: Boosting College Performance While Reducing Achievement Gaps." *PLoS ONE* 8(11): 1–6. Accessed December 17, 2015. http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0079774.

Powell, Kendall. 2015. "The Future of the Postdoc." *Nature*, April 7. Accessed December 18, 2015. http://www.nature.com/news/the-future-of-the-postdoc-1.17253#/postdoc/.

Powell, Walter W., and Kaisa Snellman. 2004. "The Knowledge Economy." *Annual Review of Sociology* 30: 199–220.

Prince, Michael. 2004. "Does Active Learning Work?" *Journal of Engineering Education* 93(3): 223–31.

Reuf, Martin, and Manish Nag. 2014. "The Classification of Organizational Forms: Theory and Application to the Field of Higher Education." In *Remaking College: The Changing Ecology of Higher Education*, edited by Michael W. Kirst and Mitchell L. Stevens. Stanford, Calif.: Stanford University Press.

Rhoten, Diane. 2003. *A Multi-Methods Analysis of the Social and Technical Conditions for Interdisciplinary Collaboration.* Final Report. BCS-0129573. Washington, D.C.: National Science Foundation.

———. 2004. "Interdisciplinary Research: Trend or Transition." *Items and Issues* (Spring/Summer): 6–11.

Riesman, David, and Reuel Denney. 1951."Football in America: A Study in Cultural Diffusion." *America Quarterly* 3(4): 309–25.

Rivera, Lauren A. 2012. "Hiring as Cultural Matching: The Case of Elite Professional Service Firms." *American Sociological Review* 77(6): 999–1022.

Rosenbaum, James A., Regina Deil-Amen, and Ann Person. 2009. *After Admission: From College Access to College Success*. New York: Russell Sage Foundation.

Ross, Terris, Grace Kena, Amy Rathbun, Angelina KewalRamani, Jijun Zhang, Paul Kristapovich, and Eileen Manning. 2012. *Higher Education: Gaps in Access and Persistence Study.* NCES 2012-046. Washington: U.S. Department of Education. Accessed December 18, 2015. https://nces.ed.gov/pubs2012/2012046.pdf.

Rotondi, Matthew Baron. 2015. *Making Meaning of Student Debt: How Undergraduate Students Make Sense of Their Student Loan and Credit Card Debt.* Ph.D. diss. Department of Sociology, University of California, Riverside.

The Royal Society. 2011. *Knowledge, Networks, and Nations: Global Scientific Collaboration in the 21st Century.* Policy Document no. 03/11. London: The Royal Society. Accessed December 17, 2015. https://royalsociety.org/topics-policy/projects/knowledge-networks-nations/report/.

Ruch, Richard S. 2001. *Higher Ed, Inc.: The Rise of the For-Profit University.* Baltimore, Md.: Johns Hopkins University Press.

Sa, Creso. 2008. "Interdisciplinary Strategies in U.S. Research Universities." *Higher Education* 55(5): 537–52.

San Jose State University. 2013. "An Open Letter to Michael Sandel from the Department of Philosophy, San Jose State University." *Chronicle of Higher Education*, May 2. Accessed December 18,

2015. http://chronicle.com/article/The-Document-Open-Letter-From/138937/.

Saunders, Katherine. 2015. "Barriers to Success: Unmet Financial Need for Low-Income Students of Color at Community Colleges." Washington, D.C.: CLASP. Accessed December 17, 2015. http://www.clasp.org/resources-and-publications/publication-1/Barriers-to-Success-Unmet-Financial-Need-for-Low-Income-Students-of-Color.pdf/.

Schuster, Jack H., and Martin J. Finkelstein. 2006. *The American Faculty: The Restructuring of Academic Work and Careers*. Baltimore, Md.: Johns Hopkins University Press.

Slaughter, Sheila, and Larry L. Leslie. 1997. *Academic Capitalism.* Baltimore, Md.: Johns Hopkins University Press.

Snyder, Thomas D. 1993. *120 Years of American Education: A Statistical Portrait*. Washington: U.S. Department of Education.

Snyder, Thomas D., and Sally A. Dillow. 2010. *Digest of Education Statistics 2010.* Washington: National Center for Education Statistics.

Spence, Michael. 1973. "Job Market Signaling." *Quarterly Journal of Economics* 87(3): 355–74.

Stephan, Paula. 2012. *How Economics Shapes Science.* Cambridge, Mass.: Harvard University Press.

Stewart, Luke A., Jacek Warda, and Robert D. Atkinson. 2012. "We're #27!: The United States Lags Far Behind in R&D Tax Incentive Generosity." Washington, D.C.: Information Technology and Innovation Foundation. Accessed December 17, 2015. http://www2.itif.org/2012-were-27-b-index-tax.pdf.

Thurow, Lester. 1972. "Education and Economic Equality." *The Public Interest* 28 (Summer): 66–81.

Tierney, William G., and Guilbert C. Hentschke. 2007. *New Players, Different Game*: *Understanding the Rise of For-Profit Colleges and Universities.* Baltimore, Md.: Johns Hopkins University Press.

Times Higher Education. 2015. "World University Rankings 2014–15." Accessed December 18, 2015. https://www.timeshighereducation.com/world-university-rankings/2015/world-ranking#!/page/0/length/25.

Trow, Martin. 2007. "Reflections on the Transition from Elite to Mass to Universal Access: Forms and Phases of Higher Education in Modern Societies Since WWII." In *International Handbook of Higher Education*, edited by James J. F. Forrest and Philip Altbach. Dordrecht: Springer. Accessed December 18, 2015. http://escholarship.org/uc/item/96p3s213.

Truelove, Susan. 1999. "Math Emporium Revolutionizes University's Introductory Math Program." *VirginiaTech Math Emporium*. Accessed December 17, 2015. http://www.emporium.vt.edu/emporium/generalinterest/article561999.html.

Tuchman, Gaye. 2009. *Wannabe U: Inside the Corporate University.* Chicago: University of Chicago Press.

Twigg, Carol. 2003. "Improving Quality and Reducing Cost: Designs for Effective Learning." *Change* 35(4): 22–29.

United Kingdom Department of Business Innovation and Skills. 2014. "UK Share of Highly Cited Articles." BIS Performance Indicators. Accessed December 18, 2015. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/310544/bis-performance-indicators-uk-share-highly-cited-academic-articles-april-2014.pdf.

Urban Universities for HEALTH (Urban Universities). 2015. "Cluster Hiring for Diversity and Institutional Climate." Washington, D.C.: Urban Universities for HEALTH. Accessed December 18, 2015. http://urbanuniversitiesforhealth.org/media/documents/Faculty_Cluster_Hiring_Report.pdf.

U.S. Presidents Commission. 1947. *Higher Education for American Democracy*. Washington: Government Printing Office.

Vallas, Steven P. and Daniel L. Kleinman. 2007. "Contradiction, Convergence, and the Knowledge Economy: The Confluence of Academic and Commercial Biotechnology." *Socioeconomic Review* 6(2)*:* 1–29.

Washburn, Jennifer. 2005. *University, Inc.: The Corporate Corruption of Higher Education.* New York: Basic Books.

Weiman, Carl E., Wendy K. Adams, and Katherine K. Perkins. 2008. "PhET: Simulations That Enhance Learning." *Science* 322(5902): 682–83. Accessed December 18, 2015. http://www.sciencemag.org/content/322/5902/682.full.pdf.

Weingart, Peter, and Nico Stehr, eds. 2000. *Practicing Interdisciplinarity*. Toronto: University of Toronto Press.

Western Association of Schools and Colleges (WASC). 2013. *Accreditation Handbook.* Alameda, Calif.: WASC. Accessed December 17, 2015. http://www.wascsenior.org/resources/handbook-accreditation-2013.

Whalen, Edward L. 1991. *Responsibility Center Budgeting: An Approach to Decentralized Management for Higher Education.* Bloomington: Indiana University Press.

The White House. 2015. "Statement of Administration Policy H.R. 1806—America COMPETES Reauthorization Act of 2015." Washington, D.C.: Office of Management and Budget, Executive Office of the President. Accessed December 18, 2015. http://www.whitehouse.gov/sites/default/files/omb/legislative/sap/114/saphr1806r_20150518.pdf.

Winston, Gordon. 1999. "Subsidies, Hierarchies and Peers: The Awkward Economics of Higher Education." *Journal of Economic Perspectives* 13(1): 13–36.

Womack, James, and Daniel T. Jones. 2003. *Lean Thinking: Banish Waste and Create Wealth in Your Corporation.* New York: The Free Press.

World Bank. 2013. "Research and Development Expenditure (% of GDP)." Accessed December 18, 2015. http://data.worldbank.org/indicator/GB.XPD.SSDV.GD.ZS.

Xu, Di, and Shanna Smith Jaggars. 2011. "Online and Hybrid Course Enrollment and Performance in Washington State Community and Technical Colleges." *CCRC* working paper no. 31. New York: Columbia University, Community College Research Center. Accessed December 17, 2015. http://ccrc.tc.columbia.edu/publications/online-hybrid-courses-washington.html.