

practice would also have been enhanced with more discussion of tools for making decisions. Place-based planning tools (e.g., Marxan, InVEST, MarineMap, EcoSpace, NatureServe Vista) provide enormous opportunities for EBM education and implementation. Interested readers can find descriptions of these tools and illustrations of their use at the EBM Tools Network (www.ebmtools.org).

The volume's integrative, conceptual style makes it relevant to diverse jurisdictions and ecosystems around the world, although the U.S. focus of many chapters means they offer

less insight for developing countries. Modifications will be required in areas with limited rule of law or abject poverty. In addition, the data-intensive nature of EBM in developed countries suggests that sustainable ocean management in countries deficient in social and ecological data will require different strategies.

Several chapters allude to the crucial context and opportunity provided by historical studies of socio-ecological systems, but the topic merits a chapter of its own. Without deeper discussion, one is left with the impres-

sion that historic reconstruction is simple or self-evident. In practice, it is every bit as complex as ecosystem-service valuation and trade-off assessment.

Ecosystem-Based Management for the Oceans heralds a timely call for action. Ocean scientists, resource managers, and policymakers should take careful note of the volume and connected developments. They chart a critical new course for marine management—steering us away from destruction and toward a bountiful future for Earth's oceans.

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HIGHER EDUCATION

Addressing the Graduation Gap

Richard C. Atkinson¹ and Saul Geiser²

Since retiring as president of Princeton and assuming leadership of the Mellon Foundation, William G. Bowen has been lead author of an extraordinary series of books on topics in American higher education such as affirmative action (1), the role of intercollegiate athletics (2), and access for low-income students (3). Bowen's hallmark has been "building large, linked databases and seeing what lessons can be learned from them." *Crossing the Finish Line*, written with Matthew M. Chingos, a Mellon associate, and Michael S. McPherson, president of the Spencer Foundation, continues in this tradition but on an even grander scale.

The book is concerned with the alarming slowdown of improvement on most measures of educational attainment, particularly college completion rates, since the 1970s. During the first three-quarters of the 20th century, the United States made substantial progress in improving both access to higher education and completion of baccalaureate degrees. That progress slowed dramatically in the mid-1970s and has since remained almost flat. With its current college-completion rate of 56%, the United States now ranks near the bottom of the 30 Organisation for Economic Co-operation and Development countries. And among its college-age population, disparities in college graduation by

Crossing the Finish Line
Completing College at
America's Public Universities

by William G. Bowen, Matthew M. Chingos, and Michael S. McPherson

Princeton University Press,
Princeton, NJ, 2009. 413 pp. \$27.95,
£19.95. ISBN 9780691137483.

race, ethnicity, and socioeconomic status have continued and in some cases worsened.

Whereas Bowen's earlier books focused on elite, private institutions, public institutions account for over three-fourths

of college enrollments in the United States. For *Crossing the Finish Line*, he and his colleagues constructed a massive, longitudinal database of students at 21 public "flagship" universities and four state university systems. Students were tracked for six years following their matriculation in 1999. The unprecedented scale of the database and its linkage to student-level, standardized-test data permit the most comprehensive look yet possible at the determinants of graduation rates—and what might be done to improve them.

Bowen and McPherson are economists and bring economists' sensibilities and methods to their subject. Much of the book uses regression analysis to assess the impact of various factors on college completion (e.g., socioeconomic status, financial aid, and institutional selectivity) after adjusting for other factors such as students' high-school grades and test scores. Individual chapters deftly summarize what is known about each topic and then often extend that knowledge substantially.

One finding likely to draw wide attention

is that, of the criteria commonly employed in college admission decisions, high-school grades are by far the best predictor of college completion. Once those grades are known, scores from the SAT and the ACT add little to the prediction. This pattern holds irrespective of the quality or type of high schools that students attend and across colleges and universities at all levels of selectivity. The authors also find that grades are less closely associated with socioeconomic status than are SAT or ACT scores. Together these findings suggest that selective institutions could admit students from a broader range of socioeconomic backgrounds, with no deterioration in graduation rates, by giving greater weight to high-school grades.

Yet the authors by no means close the door on standardized admissions tests. They find that achievement tests (such as the SAT Subject Tests and Advanced Placement exams) that measure students' knowledge of spe-



cific college preparatory subjects are better predictors of college completion than the generic SAT or ACT exams. Subject-based admissions tests also have important "signaling" effects for high schools, encouraging teaching and learning of a more rigorous academic curriculum. *Crossing the Finish Line* will surely enliven and deepen the national dialogue about the role of standardized tests in college admissions.

Another provocative finding concerns

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“undermatching”: students enrolling in colleges that are less demanding than they are qualified to attend. Using a conservative standard—grades and test scores that would qualify students in the top 10% of admits at highly selective public institutions—the authors find that a substantial proportion of well-qualified students enroll instead at two-year or less-selective four-year institutions. The pattern is most pronounced among low-income and minority students. Counterintuitively, however, undermatching has a negative effect on graduation rates. College completion varies sharply with institutional selectivity, even after controlling for student characteristics. As a result, well-qualified students who attend less-selective colleges graduate at lower rates than those with comparable qualifications at highly selective institutions. As the authors conclude, “The scale of the undermatch phenomenon among students from modest backgrounds suggests that addressing this problem offers a real opportunity to increase social mobility and simultaneously to increase overall levels of educational attainment.”

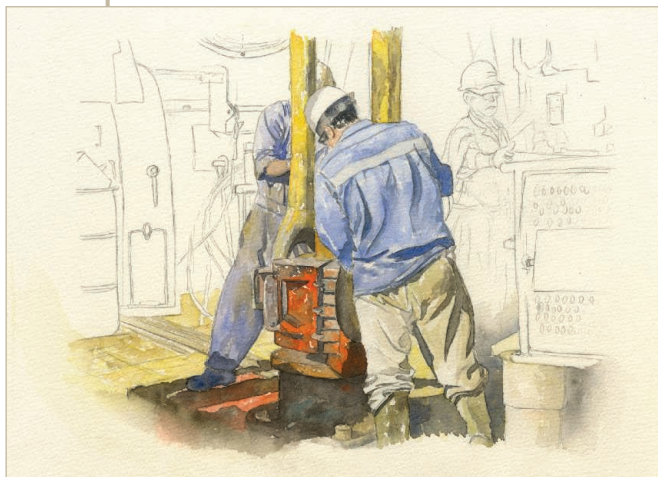
Recently there has been a revival of interest in expanding transfer from two-year to four-year institutions as a means of raising college completion rates, and Bowen, Chingos, and McPherson bring their massive database to bear on that issue as well. On one hand, they find that at many four-year institutions, students who transfer from a community college are more likely to earn a bachelor's degree than students who begin as freshmen, suggesting that those institutions might improve completion rates by admitting more transfers. On the other hand, given the considerable attrition within two-year institutions, enrolling there can negatively affect a student's chances of earning a four-year degree. The authors find that high-school seniors who enter two-year colleges seeking a bachelor's degree are much less likely to complete their degrees than comparably qualified students who move directly from high school into a four-year program. One of the book's strengths is the authors' willingness to follow wherever the evidence leads, even where, as in this instance, the findings may seem to conflict.

The book provides new and often surprising insights on other major determinants of college completion. The chapters on financial aid, in particular, are masterful. The authors argue that, for public universities, offering

BROWSINGS

Drill Me a Painting: A Scientist's Impressions Aboard an Ocean-Drilling Research Vessel. Christine Laverne. Atlantica, Biarritz, France, 2008. Paper, 120 pp. €25. ISBN 9782758801696.

Between 1979 and 2005, petrologist Laverne participated in seven deep-sea drilling cruises in the eastern Pacific Ocean. This logbook of words and watercolors records adventures and routines from her 14 months at sea. The narrative describes many tasks carried out by the international



teams of researchers and crew—as well as their occasional diversions (left, workers on the rig floor of *Joides Resolution*). Sidebars introduce technical and scientific topics, especially the composition and evolution of ocean crust. The author's very personal account reveals the considerable changes in working conditions and technologies over the quarter century. It also conveys the frustrations and triumphs of the drilling itself, which culminate in the successful recovery of a 1400-m section through lavas and sheeted dikes into gabbros formed by a fast-spreading ridge.

more need-based student aid “is demonstrably less expensive than keeping the net price low by reducing tuition across the board—a policy that provides further subsidies to well-off families without improving their graduation rates.”

Crossing the Finish Line also breaks new ground in its manner of presentation. The thread of the analysis can be read directly from the figures interspersed liberally throughout the text. Complex regression analyses are reduced to a graphic language that helps propel the reader through the argument. And in another innovation one hopes others will emulate, the book features an online appendix, maintained by Princeton University Press, where readers can explore a vast array of supporting data for each chapter to judge for themselves whether its conclusions are warranted.

Why have college completion rates in the United States stagnated since the 1970s? Databases of the kind Bowen and his colleagues have built do not necessarily lend themselves to historical analysis, and the authors do not attempt a complete answer to this question. Yet a clue may be found in an essay by another Mellon associate, Eugene M. Tobin, presented as an appendix to the book. Tobin traces the modern history of state public university systems after World War II. Many state systems, he finds, were influenced by the California model and its tri-

partite structure of highly selective research universities, comprehensive four-year institutions, and open-access community colleges. But as that model evolved during the latter part of the 20th century, most of the growth in student enrollment has been absorbed by the community colleges and four-year comprehensives. Undergraduate enrollments at the flagship campuses generally have not kept pace. Given the strong association between institutional selectivity and college completion, the changing structure of state higher education systems may be an important piece of the puzzle.

Crossing the Finish Line exemplifies the best that social science research has to offer: rigorous empirical analysis brought to bear on a major public policy issue. Bowen, Chingos, and McPherson have provided an essential resource that both researchers and policymakers will consult for years to come.

References

1. W. G. Bowen, D. Bok, *The Shape of the River: Long-Term Consequences of Considering Race in College and University Admissions* (Princeton Univ. Press, Princeton, NJ, 1998); reviewed in (4).
2. W. G. Bowen, S. A. Levin, *Reclaiming the Game: College Sports and Educational Values* (Princeton Univ. Press, Princeton, NJ, 2003).
3. W. G. Bowen, M. A. Kurzwel, E. M. Tobin, *Equity and Excellence in American Higher Education* (Princeton Univ. Press, Princeton, NJ, 2005).
4. R. E. Thach, *Science* **284**, 1473 (1999).

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