erty, sexuality, crime, along with theories of institutional elaboration in response to changes affecting individuals and groups. The political confrontations that have taken place in and around schools and colleges have also helped to demolish the belief that education is or can be apolitical and that social institutions and services, however "professionalized," can be neutral or insulated from contested issues of public policy. Finally, congenial to these new concerns, there existed a tradition of educational historiography which, albeit wary of providing only "narrow institutional history," was nonetheless concerned with forms, structures, and the ideology and rhetoric associated with them and which had a continuing propensity to dwell upon such matters at the expense of diligent attention to actual outcomes—especially the outcomes for highly diverse individuals and groups.

However explainable its current popularity, educational history written in terms of organizational elaboration shares historiographic difficulties with other interpretive schemata, especially that the events predicted by the schema sometimes overshadow more elusive data. In his prologue Tyack invites his colleagues to "contest or refine [his book's] explanations, to make its periodization more precise, [and] to describe missing dimensions" (p. 3). The following comments are intended to suggest future efforts along these lines.

Other historians have provided evidence that early school bureaucratization was in good measure a response to a rapid proliferation of students, teachers, schools, and expenditures and to public complaints about costs and inefficiencies; we must know much more about all these pressures for system building. Tyack himself makes clear the importance of a nativist distrust of culturally diverse urban populations and their leaders in the centralizing reforms of the later 19th century; the children of immigrants, as community leaders and teachers, were also acting as sometimes enthusiastic agents of public schools in the service of forced cultural assimilation. The claims of a rational science of educational psychology and measurement entered the picture still later. Closer to our own times (and not dealt with by Tyack), one may observe signs of a greater degree of simple institutional aggrandizement at work. Now these diverse motives do not just manifest themselves in historical succession; "appearances" of them may be found together in any one period. For example, in his study of New York City before 1850, Carl Kaestle found both a strong animus against Catholic immigrants on the part of the Free (Public) School Society which was securing a virtual monopoly over public education and evidence to suggest that schoolmen, failing to erase ethnic difference and to solve the social problems of poverty and crime through education, sometimes turned means into ends, basing their sense of accomplishment on what *could* be achieved: erection of an organizational structure, which later generations might work at perfecting. The point being made here is also that system building, system rationalizing, system elaboration and differentiation, and system protection may differ as much in their motivations and experiential meaning (and therefore in their historical significance) as in their origins and strategies. One still wonders if "bureaucracy" (even "bureaucratization") is as meaningful a handle for the historian of education as it seems to be for today's activists in the movements for school decentralization, community control, alternative schools, and teacher unionization. This cannot be known until historians are even more zealous in acquiring the testimony of a far broader sampling of the range of participants in the educational enterprise. When *The One Best System* is superseded, as it will be, Tyack is well equipped by scholarship, historical sensitivity, and modesty to write the next "one best book."

GERALDINE JONÇICH CLIFFORD
School of Education,
University of California, Berkeley

The Monetary Value of Education

Higher Education and Earnings. College as an Investment and a Screening Device. A Report Prepared for the Carnegie Commission on Higher Education and the National Bureau of Economic Research. PAUL TAUBMAN and TERENCE WALES. McGraw-Hill, New York, 1974. xxxiv, 302 pp. $17.50. General Series 101.

This analysis of the impact of education on the 1969 earnings of males who were born between 1916 and 1926 and who in 1943 had at least a high school diploma reveals some startling facts. An undergraduate degree lifted annual earnings by 31 percent, but for those with some graduate work (but no graduate degree) the increase over high school earnings was only 26 percent. A master's degree yielded a 32 percent increase but a Ph.D. only 27 percent. In law and medicine the differentials were three to four times those accruing to undergraduate and graduate degrees: 84 percent for the L1.B. and 106 percent for the M.D. recipient. Social rates of return to educational investment, deflated by the Consumer Price Index, were not high: from high school to some college, 11 percent; to the B.A. degree, 8 percent; for some graduate work, 5 percent; to a master's degree, 6 percent; to a Ph.D., 2 percent; and to an L1.B., 9 percent. Private rates of return were only slightly higher.

For those who would justify higher education on the basis of its contribution to earnings there is more bad news. Attempting to isolate the effect of education per se on earnings, the authors separate the contributions of mental ability, family background, age, marital status, and health from those of quantity and quality of education. They find that poor health cost a man $7000 in 1969 earnings; being single cost him $3000. The variable for marital status, incidentally (usually interpreted as a proxy for motivation and need for income), is not only significant; its coefficient is larger than the effect of the education or ability variables. As the father's education rose, so did the son's annual earnings, with the latter being $4000 higher if the father had a bachelor's degree than if he had never gone to high school.

Of the abilities included—mathematical, coordination, verbal, and spatial perception—only mathematical ability (primarily numerical fluency and only secondarily problem-solving competence) had a significant influence on earnings. Further, "the pretest variation in quantity and quality of schooling had little effect on test scores or earnings .... Thus the ability coefficients should be closer to measures of the effect on earnings of inherited mathematical ability than anything else." The earnings of the men who ranked in the highest fifth in ability were 15 percent higher than the average high school graduate earnings in 1969; those in the next highest ability group earned 2.9 percent more. Ability had little effect on earnings at the beginning of work life, however, and later appeared to be most effective for those with graduate education and very high levels of ability.

Two other findings are of particular interest. First, the quality of education (judged on the basis of the Gourman academic rating) has a significant effect on earnings. Depending on their college's quality, the earnings of males with three-year graduate degrees varied between 53 and 98 percent above those of the high school graduate. Second, the screening effect of education on earnings is quite high, accounting for perhaps half the returns to

education in 1969. The latter finding bolsters the authors' conclusion that there has been an overinvestment in education; before-tax returns on physical capital are 13 to 15 percent and thus greatly exceed the usual social rate of return to education. Since the rate of return declines with additional years of study (except for the study of law and medicine), the overinvestment is particularly marked in the case of the master's and Ph.D. degrees.

Following F. Thomas Juster's *Education, Income, and Human Behavior*, this second volume from the National Bureau of Economic Research provides a detailed analysis of the determinants of earnings. The data set is unique: a longitudinal sample of 5000 men who, having volunteered for the Army Air Corps, were surveyed in 1943, again in 1955, and a third time in 1969. Having at least a high school diploma and with test scores at the college sophomore level, this cohort of males was more intelligent (and less averse to risk) than the average. The authors are careful to warn that some of the results, drawn from a sample of a special population, may not be generally applicable.

But the more important caveats, as John Meyer points out in a foreword, have to do with what is being measured. Can research identify the nonpecuniary returns to education? The bureau's studies will continue to probe the relationship between education and other, often nonfinancial factors such as health, demographic behavior, and the taste for leisure, and between preschool environment and school performance. Taubman and Wales, too, raise broader questions for research. What types of abilities influence earnings, and how are these abilities to be measured? Can we determine what cognitive or affective skills education improves, and how?

Looking further into the black box called education, as the authors propose, may reassure educators. For the moment, however, we are confronted with some sobering conclusions: personal characteristics and mental abilities contribute as much to earnings as education; the real rate of return on a college degree is only about 8 percent; approximately half of that return is due to the screening effect of education.

JUANITA KREPS
Department of Economics, Duke University, Durham, North Carolina

Aspirations for the Mechanic Arts

Philadelphia's Philosopher Mechanics. A History of the Franklin Institute, 1824–1865. BRUCE SINCLAIR. Johns Hopkins University Press, Baltimore, 1974. xiv, 354 pp. $15. History of Technology.

Studies of institutions are often dull, because the data fit temptingly into chronological or discrete topical patterns. Rarely does such research combine readable, thoughtful analysis with extensive detail and scholarly apparatus. In this history of the Franklin Institute in the mid-19th century Sinclair has produced a volume that is integrative, combining contemporary presuppositions about egalitarianism and the nature of learning into what might otherwise have been a narrow study of a meritorious institution.

The Franklin Institute, founded in 1824, was intended to promote industrial advancement and technological research. Through a careful comparison of it with similar institutions, Sinclair justifies his claim that Philadelphia's mechanics' institute (appropriately named in honor of that city's most illustrious experimentalist) was the prominent technical organization in pre-Civil-War America. Its early leadership proved flexible in adapting ideas from similar British institutions and in trying various schemes—popular lectures, industrial fairs, and educational programs—for promoting the mechanical arts. Experimentalists at heart, the leadership was not inhibited by false starts and continued to test not only mechanical but also institutional alternatives. As the title of this volume indicates, the intention of the Institute was never simply to produce technical (or mechanical) expertise but to offer sufficient background that students acquired a philosophical (or scientific) foundation as well.

Interested in providing national leadership, certain members of the Institute challenged the Patent Office to establish the principle of open access to approved patents and worked for clearer guidelines on procedures. Although the Institute's resolutions were not immediately acted upon, a statute passed in 1836 incorporated several of its proposals. Probably the most famous project of the Institute was an investigation, under grant from Congress, into the cause of steam boiler explosions on riverboats. A tightly cast report, written by an ambitious young scientist, Alexander Dallas Bache, outlined the experimental techniques used to analyze the design, materials, and constructions of steam boilers, various safety devices available, and procedures for safety checks of equipment in service.

A fortuitous combination of aspiring young scientists located in or near Philadelphia in the 1830's pulled the Institute toward professionalism. Its *Journal* was transformed from an eclectic and reportorial newsletter to an organ for new research; expert opinion was solicited on articles submitted, and the editor was relegated to the routine tasks of circulating material and checking proof and copy. The young leaders insisted that more emphasis be placed on investigation than on exhibit, on exploring for the future than on lauding the past. Not surprisingly, there was a growing tension between persons interested in popular programs and those concerned with research.

Some of the popular and educational schemes were old-fashioned (though of a sort in current usage), as for example the competitive exhibits for producers of textiles or machinery and gala fairs to demonstrate local enterprise. Sinclair might have assessed such programs more carefully. Although they attracted attention, it is not clear that they fulfilled the initial intention of providing incentive for new invention.

The Institute's stated goal was to elevate the mechanic and enhance the quality of American technology. Sinclair never comes to terms with the class bias evident in the leadership of the organization, nor does he spend much time on the individuals who participated in short-term educational programs.

The enthusiasm of the young Institute, which fit so well into the optimistic, progressive outlook of a new nation, was contagious. Sinclair concentrates on the formative years during which the Institute's activities brought it international recognition, paying less attention to subsequent programs whose successes were more limited. For the most part he is objective, but he is clearly attracted to the goals of the scientific leadership and occasionally dominated by their enthusiasms and by their later disenchantment. Toward the end of the study detail overrides analysis, perhaps because the problem of decline is difficult to discuss.

Years of research are evident in Sinclair's familiarity with the persons in his study, and he generally confines his fascination with tangential data to footnotes. The documentation is thorough, the bibliography excellent, and the annotated index helpful. An added bonus is four pictorial essays illustrating the persons and apparatus common to Philadelphia's technological effort. More discussion of the equipment shown and the relationship between selections in each section would