Education's Role in Nation Building

Eugene Staley

"War is much too serious a thing to be left to military men." Similarly, education is much too important to be left to professional educators—at any rate this seems to be the implicit doctrine of many natural and social scientists who have lately been flocking to the aid of the educators. In America, for example, we have witnessed the educational pioneering of natural scientists in the Physical Sciences Study Committee and the Biological Sciences Curriculum Study, the rise of "new math," and the intellectual migration of James B. Conant from chemistry to authorship of a highly influential series of studies on educational policy for the public schools. In Europe, the Organization for Economic Cooperation and Development, through its Directorate of Scientific Affairs and especially in its Mediterranean Regional Project, has brought economists and other social scientists into the field and has stimulated a ferment of rethinking about education by relating educational planning to economic growth and social advancement. With respect to the emerging countries of Africa, Asia, and Latin America, a momentous change is under way in the thinking of development planners and technical assistance experts. Investment in education and human resource development is coming to be regarded as at least equal in importance to any other kind of developmental effort, including investment in physical capital. A symbol of the change is that the World Bank will now make loans for educational projects, along with traditional loans for power plants, factories, and harbor improvements.

Economists, especially those whose scientific interest or professional consulting work centers on economic growth and development, have been among the leaders in putting new emphasis on the instrumental role of education in nation building. They have joined forces with professional educators in evolving new kinds of educational planning linked more closely to anticipated requirements of the economic, social, and political system.

One good way to see what economists are up to in the field of education is to look through the following three books (all are collections of papers, and only a devoted specialist will want to read every paper):

Economic and Social Aspects of Educational Planning (UNESCO, Paris, 1964. 264 pp., $5.50), a handbook issued to assist planners in newly developing countries to formulate educational plans related to economic and social needs, consists of contributions by economists, educators, sociologists, demographers, statisticians, and administrators. The outstanding piece is the 40-page first chapter, "Education and development" by H. M. Phillips of the Social Sciences Department of UNESCO. In it he achieves a remarkably comprehensive and incisive analysis of the ways in which education is related to economic and social development, the key policy questions that have to be faced in educational planning, and the different techniques of incorporating education into development planning.

The papers in **Education and Economic Development** (Aldine, Chicago, 1965. 448 pp., $10.75), edited by C. Arnold Anderson and Mary Jean Bowman, were presented at a conference on the role of education in the early stages of development, which was held in 1963 under the auspices of the Committee on Economic Growth of the Social Science Research Council and the Comparative Education Center of the University of Chicago. The papers are a very mixed bag with respect to quality and to subject matter, some being historical-descriptive, some theoretical, and some addressed to practical problems. Outstanding, in my opinion, are the following essays—"The vocational school fallacy in development planning" by Philip J. Foster; "Education and agricultural growth: The role of education in early-stage agriculture" by Clifton R. Wharton, Jr.; and "The prime movers of innovation" by Frederick Harbison.

In **The Economics of Education** (Macmillan, London; St. Martin's, New York, 1966. 792 pp., $16), edited by E. A. G. Robinson and J. E. Vaizey, we have the papers submitted to a conference sponsored by the International Economic Association, together with a lengthy and generally excellent summary record of the discussions. This record is particularly interesting and valuable because it presents some sharp confrontations among exponents of clashing views on several of the key topics. The papers and discussions deal with the role of education in economic progress, the demand for and the supply of educated manpower, the cost and financing of education, the balance between general education and vocational-technical education or training, and international aid in education.

Many themes are explored in these papers, but I have selected only three outstandingly important ones for comment:

1) *The creation of human capital by investment in education is now recognized as an important element in economic growth.* Traditionally, economists have grouped the "factors of production" under three headings: land (or natural resources), labor, and capital. The concept of capital (produced wealth used for further production) has conventionally been limited to material things like factories and transport systems. Education has been treated as an item of consumption, or its general importance in augmenting production has been recognized in a paragraph or two and then quietly dropped from the analysis. In the last ten years, though, studies of economic development both in the highly developed and the newly developing countries have forced economists to give more and more weight to human factors like knowledge, skills, and motivations, which in considerable part are products of education. Hence —and this is the important new emphasis attested to by almost every page —education has to be analyzed seriously for its contributions to production. In economic terminology, it has to be treated as an investment good, not only a consumption good.

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A paper in the Robinson-Vaizey volume, "Measuring the contribution of education to economic growth," by E. F. Denison of the Brookings Institution, estimates that "improvement in the quality of the labor force through additional education made a very large contribution to United States growth rates in the 1929–57 period, equal to 23 percent of the growth rate of total real national income and 42 percent of the growth rate of real national income per person employed. In terms of percentage points in the growth rates, the contribution was only about half as large in 1909–29, and will continue at about the 1929–57 level in 1960–80." These calculations, it should be said, rest on numerous conceptual and statistical assumptions which can be challenged, but almost no one doubts that the contribution of education to economic growth is substantial.

Recent attempts have been made in the United States and other countries to measure the rate of return (social and private) on investment in education. Russians—both under the Tsarist and the Soviet regimes—can claim a considerable priority in this field of investigation. Arcadius Kahan, in "Russian scholars and statesmen on education as an investment" (in the Anderson-Bowman volume), quotes interesting Russian studies, made in 1895 and 1896 and in 1912, on education and wage differentials, as well as studies by Stanislav G. Strumilin (Academy of Sciences of the U.S.S.R.) and others from 1919 through the 1920's. A paper written by Strumilin in 1962, "The economics of education in the U.S.S.R.," is included in the UNESCO volume, and one of his early papers, "The economic significance of national education" (1925), appears in translation in the International Economic Association volume, along with four current contributions by Soviet authors. The Soviet studies of the 1920's seem to have been stimulated by a draft ten-year school development plan which was before the State Planning Commission for analysis. Strumlin argued, on the basis of empirical data, that ". . . a more profitable 'capital' investment would be difficult to think of even in a country of such immense possibilities as our Soviet Russia." From the 1920's on, immense investment in education, linked instrumentally to the aims of the state, has been one of the most important characteristics of Soviet development policy.

2) *Educational planning should be closely linked with general development planning.* Education has long been a means employed by societies to perpetuate their ways of life, but the deliberate use of education to promote development—that is, to change things—is a relatively new concept. As H. M. Phillips points out in the UNESCO volume, "The country which was earliest in obtaining economic development in a modern sense, the United Kingdom, did so without an early introduction of universal education. By 1850, in the United Kingdom as in France, half the population was illiterate, although remarkable economic growth had been achieved. . . ." Other countries, which came later to modern economic development (the United States and Germany), introduced compulsory universal education at an earlier stage. Japan, the Soviet Union, and many of the countries currently engaged in modernization have from the outset of their development efforts made conscious and oftentimes massive use of education at its various levels as an instrument for the attainment of national goals. Educational planning has come to be regarded as a vital element in general planning for economic, social, and political development.

Many papers in these volumes suggest techniques or offer useful data for planning education as a part of general development planning. For example, one among the International Economic Association papers is a mine of information and comparative analysis—"Expenditures on education: Statistics and comments," by F. Edding of Germany.

The UNESCO volume is directly focussed on the planning problem. I have already mentioned the excellent comprehensive discussion by H. M. Phillips. Frederick Harbison outlines a broad strategy of "human resource development," calling for systematic assessment of requirements for qualified manpower, programs for development of formal education and for training-in-employment, attention to incentives and to health development, and machinery for integration of human resource planning with general development planning. George Skorov of UNESCO describes methods used in the Soviet Union and other centrally planned economies for relating manpower needs to educational planning. Jan Tinbergen, of the Netherlands Economic Institute, presents a detailed analysis of the relations between economic output, total and sectoral, and requirements for qualified manpower; appended is a macro-economic model showing how the large number of interrelated economic and educational variables can be handled algebraically. There are other chapters useful to the planner, including two on statistical analysis and statistical data and one on project analysis and programming for international financing.

3) *Educational content and methods also demand attention in relating education to development.* Economists are more adept at dealing with the quantitative aspects of planning education for development than the qualitative. Many studies on the economics of education and certain planning techniques tacitly assume that the number of years or hours of education can be correlated with economic and social results regardless of the subject matter, the methods of instruction, the qualifications of the teachers, the motivations and social backgrounds of the students, and other qualitative factors. Economists know that the nature of the educational effort may be as important as the amount of it in determining its economic and other effects. But the nonquantifiable factors (or those which, if measurable, have not yet been measured) are harder to handle and are less amenable to analysis by techniques which are scientifically respectable in the sense that the procedure can be replicated by others and lead to confirming results.

Nevertheless, there are attempts to grapple with the qualitative problems in these volumes. M. Rashid of Pakistan, in a paper entitled "Absorption of the educated" (in the Robinson-Vaizey volume), points to features of the education system inherited by India and Pakistan—and many of these features are found in other newly developing countries—which contribute to "the twin problems of unemployment of the educated and shortage of properly trained and technically qualified personnel badly needed for accelerating the pace of development." He speaks of poorly qualified, ill-paid, and untrained teachers, the lack of educational and vocational guidance, defective curricula overweighted on the side of general studies and humanities and underemphasizing science and technical studies, the dominance of the educational process by rigid syllabi and external examinations which ask stock

questions on stock material, and antiquated methods of teaching that promote memorization rather than discovery and problem solving.

A qualitative issue raised in all three volumes is the desirable relationship, at various educational levels, between general education and technical and vocational training. Should the formal school system train youngsters for specific jobs in industry, or should the schools produce trainable people, with specific training made the responsibility, wherever possible, of employing organizations? What should be the content of education in rural areas? Should it be basically the same as in urban areas, or strongly aimed towards agriculture as a vocation and towards distinctively rural problems?

In discussion at the conference sponsored by the International Economic Association, J. Miner of UNESCO warned against overemphasizing the manpower element when considering the effects of education on economic growth. There are other ways by which education influences economic growth besides its contribution to the output of a more highly skilled labor force. Education promotes technological change and the shift of people into more productive economic sectors; it has effects on aggregate demand; there are social-cultural effects, including the creation of modern literate societies in which economies of scale become significant; and education has important effects on political stability. The most significant aspect of education's relation to economic growth in the developing countries, he concluded, is not its production of qualified manpower but rather its role in transforming the character of society. Vital, though hard to pin down and measure!

Teachers' Mathematics Reference Series

In this book, **Explorations in Elementary Mathematics** (Prentice-Hall, Englewood Cliffs, N.J., 1966. 288 pp., $5.95), Seaton E. Smith, Jr., presents an intuitive discussion of the real number system, beginning with the natural numbers and working up to a brief discussion of the irrationals. Sets, systems of numeration, and some nonmetric geometry are also included. As stated in the preface, the text is designed primarily as an introductory course in modern mathematics for elementary teachers (preservice and in-service).

In general, the exposition is clear, and there is an adequate number of examples and exercises. Concepts are developed intuitively through specific examples, number lines and tables, and no formal deductive reasoning is required (only one proof—that $\sqrt{2}$ is irrational—appears in the book). This approach makes it palatable reading for the mathematically unsophisticated; whether it is sufficient for the elementary teacher (especially the preservice teacher) is another question.

In my opinion, some effort should have been made to at least occasionally *supplement* the intuitive approach with a small taste of formal deductive reasoning. For example, the reader is led to the product $-2 \cdot 3 = -6$ by observing a pattern in a table and assuming that the "patterns are reliable" (p. 107). It would seem equally reasonable to assume distributivity for integers (as on p. 108), along with the additive inverse property (p. 70) to present the following argument:

$$\begin{aligned} 0 &= 0 \cdot 3 \\ &= (2 + -2) \cdot 3 \\ &= 2 \cdot 3 + -2 \cdot 3 \\ &= 6 + -2 \cdot 3 \\ &= 6 + -6 \end{aligned}$$

Similarly, the author sidesteps distributivity of division over addition, when this could have been easily demonstrated in chapter 6, using the definition of addition for rational numbers and $a/b = a \div b$.

In general, the author's attempt to communicate with the unsophisticated reader without a loss of mathematical precision is commendable. I noted only a few exceptions. In defining an infinite set, some confusion exists as to what is really meant by a one-to-one correspondence (p. 12). On pages 76 and 108 needless restrictions are placed on a, b, and c. Why should $a \neq b$ and $b \neq c$? The phrase "numbers represented by the denominators" (p. 123) implies denominators are numerals. In discussing separations, for example, one says that a line separates a plane into *three* sets: two half-planes and the boundary line. If the plane is divided into two sets, where does the line belong? Irrational number is incorrectly defined in the glossary.

These errors can be easily corrected and should not deter those who wish to use the book. The omission of deductive reasoning may be appropriate for a *first* in-service course for elementary teachers. However, in view of the continual improvement in our public school mathematics curriculum, today's elementary education majors may find this text somewhat elementary.

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Regeneration in Animals

More than three dozen distinguished investigators gathered in Athens, Greece, in the spring of 1964 to assess progress in the study of regeneration and to present, often in a historical fashion, progress made in their individual laboratories. Their presentations, creditably edited and indexed by V. Kiortsis and H. A. L. Trampusch, appear in this lengthy volume, **Regeneration in Animals and Related Problems** (North-Holland, Amsterdam, 1965. 592 pp.).

This publication will be valuable because of its comparative approach. After a discussion of some general problems in the field, the reader systematically embarks on a phylogenetic trek through the major invertebrate phyla and then enters the vertebrate kingdom, related in a less systematic but engaging fashion. First, there is a discussion of regeneration in vertebrates (mainly amphibian), followed by a section entitled "Related problems" in which regeneration is discussed in light of tumors, hyperplasia, cell migrations, and the like.

What impressed me most, after the initial reading, was the enormous lack of progress during this century in this vital area of development. The questions asked by T. H. Morgan more than 50 years ago are the questions being asked today. This is not in itself detrimental except that, in general, the approach to the problems has not significantly altered either.

Repeatedly, the reader finds himself presented with an idea, implied by its author to be catastrophically original, when it is nothing more than a restatement of a concept that was in vogue several decades ago. The importance of the nervous system in regeneration, for example, is timeworn. Still no one has concentrated or characterized the topic material, nor has anyone developed a hypothesis concerning the mechanism of action of such a mate-