school science education in Japan (by Kay Michael Troost), the People's Republic of China (by Paul DeHart Hurd), East and West Germany (by Margrete Siebert Klein), and the Soviet Union (by Charles P. McFadden and Izaak Wirszup).

The information presented for the five countries is remarkably uniform, a testimonial to the editors' organizational skill and the authors' persistence in ferreting out comparable data on which some generalizations could be based. The presentation for each country includes a description of the general organization of the school system, a discussion of the philosophy underlying the teaching of science, descriptions of the science time and subject requirements at various grade levels in the elementary and secondary schools, samples of the subject-matter content of science courses, and a discussion of the examination system. Also presented is valuable information about the country's science teachers, including their status and compensation, requirements they must meet for initial certification to teach, and their opportunities for in-service education. Well-chosen, informative tables and figures complement the text throughout. The data from the several countries are collated and analyzed by F. James Rutherford in the concluding chapter, a trenchant highlight of the book. The lessons Rutherford derives from studying the five countries include the specifications of the components of a national commitment to science education. He recommends nine specific actions that must be taken by local schools and the federal government if the verbal commitment already made to science education is to be implemented in the United States.

We can only be pleased that this pioneering comparative study was undertaken. Nevertheless, the study whets our appetite for further information. Though it yields much information about the context for science learning in the various school systems, little is said about outcomes. What is the achievement level in science after the students in these countries complete their courses? after they have graduated from secondary schools? How thorough is their understanding of key science concepts and theories, and how well do they understand scientific inquiry? Which misconceptions about the natural world do students cling to even after years of science instruction? How adept are they in solving new science problems and in applying science knowledge and principles in their daily lives? Do they understand the interplay of science, technology, and society? And so forth. Put another way, how successful are the school systems in these countries in attaining the goals they have set for their own science education programs or goals for which a consensus is emerging among science educators internationally?

To make balanced judgments about the worth of various countries' science education programs we also need knowledge about the transactions that mediate between the contextual factors and the outcomes. For instance, we need information about the instructional methods and procedures teachers use, the social interactions in the science classroom and laboratory, the interactions of students with materials of the natural world, the availability and use of computers as aids to science teaching, the nature of procedures for assessing and evaluating students, and the design, manner, and styles of science textbooks and other instructional media. It is from such knowledge that we can hope to deepen our understanding of the dynamics of science teaching and learning. It is here also that knowledge about the practices leading to differential outcomes may be the most useful.

This book's timely recommendations are of importance to American policy makers, lawmakers, and educators, but the editors and authors of *Science Education in Global Perspective* also make a valued contribution to our understanding of science education internationally. The book gives us much information and lets us see what studies are still needed if we want to understand science education in these and other countries.

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Traditions and Reforms

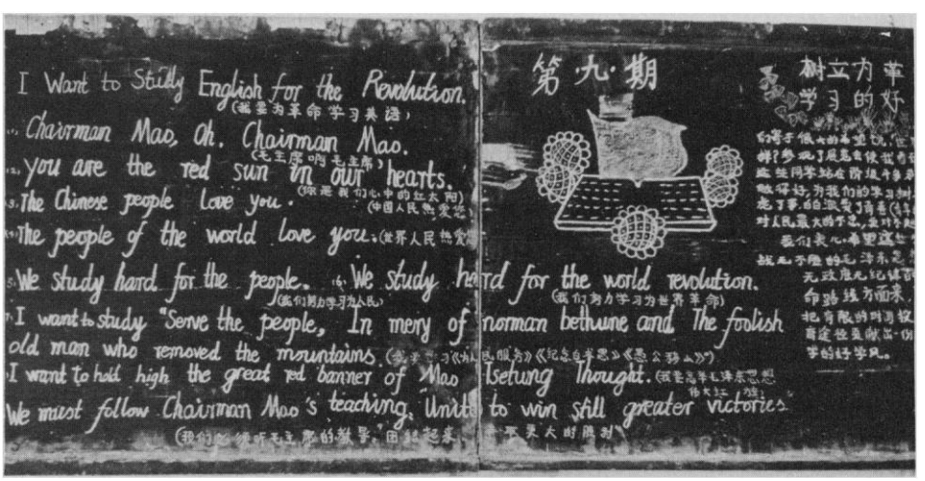
The Schooling of China. Tradition and Modernity in Chinese Education. JOHN CLEVERLEY. Allen and Unwin, Winchester, MA, 1985. viii, 319 pp., illus. $27.95; paper, $13.95.

With approximately 182 million full-time students, China has three-quarters as many people in school as the United States has citizens. There are more teachers in China (over nine million) than there are people living in New York. Yet China also counts over 200 million illiterates among its people.

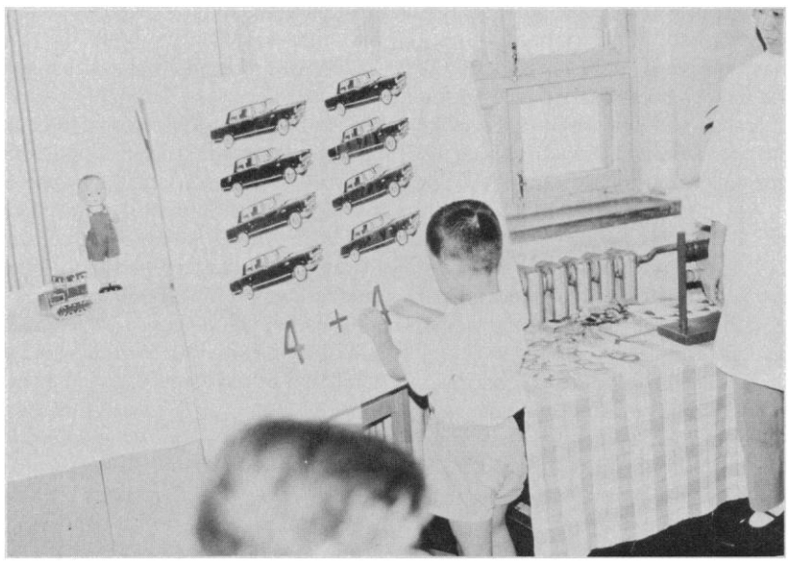
These facts alone are impressive enough to make the topic of John Cleverley's book worth examining. What makes his work even more intriguing is the breadth with which he treats his subject. Cleverley, like the Chinese, views education historically and in its economic, political, and social context. The result is an overview of education that in its scope is as ambitious as the leaders in the People's Republic have been in their efforts to transform schools.

The Chinese education system traces its lineage further than most American descendants of John Dewey can comprehend. Forms of schooling were in evidence over 3000 years ago; the roots of a systematic philosophy go back 2500 years to Confucius. These original models have left a powerful imprint on modern Chinese educational practice and debate, particularly with respect to the importance of examinations, the centrality of moral education, and the recurring dominance of an elitist approach to schooling. Cleverley, like many of China's own critics, points out the strength of these continuities and their influence on attempts to change.

Details of China's repeated efforts to alter these persistent educational patterns are as



"An English lesson on the blackboard, Zhengzhou Middle School, 1972." [From *The Schooling of China*]



"Changchun No. 1 motor vehicle plant's kindergarten, 1978." [From *The Schooling of China*]

interesting as the traditional foundation. From imperial times to the Republican control by the Nationalists, and more recently under the leadership of the Chinese Communist Party, state and education leaders have proposed reforms that alter the Confucian definition of education. The close link of education to political, social, and economic goals of the state justified the reforms. Many times in the past century schools have been called on to serve national interest, to help develop "wealth and power." Yet also throughout this period traditional patterns have demonstrated their vitality and intransigence in the face of reform.

Cleverley quickly leads the reader through these efforts to make China's educational system first modern, then nationalist, then Communist. In these reform movements the Chinese frequently looked to examples from other countries. Through missionary influence, lessons drawn from returned overseas students, and recommendations of international commissions, early reformers proposed changes in the structure of schooling, the curriculum, and the training of teachers. Foreign educational influence and modern schooling in general were both appreciated and criticized before the victory of the Communists, suggests the author, although he convinces us that a significant change in the general acceptance of the idea of modern schooling occurred by the downfall of Chiang Kai-shek's Kuomintang.

It is with the rise of the Chinese Communists and Mao Zedong that the greatest transformations happened. Mao, who wished to be remembered as a teacher, intervened actively in the shaping of an educational system that, compared to all previous Chinese schooling, was to reach more people, expose them to a greater range of knowledge, and instill new political and social ideals.

Cleverley's assessment of the significance of Mao's contribution is evident from his devotion of an entire chapter to Mao's educational experience and philosophy. The chairman's own training covered much of the range of educational possibilities in early 20th-century China: traditional village schooling steeped in Confucian classics and recitation; modern schooling distinguished by the teaching of separate disciplines, instruction in English and commerce, and exposure to "great heroes of the world" such as Napoleon, Peter the Great, and—one of Mao's favorites—George Washington, and self-study. These, combined with his extracurricular activity in politics, community development, and sports, inspired Mao to criticize traditional education and instead value more flexible, often nonformal education that would reflect local community needs. For the rest of his life Mao saw education—broadly defined—as a vehicle for social change.

This vision of education, as Cleverley indicates, changed over time. The changing political climate also had a significant impact. The Communists claimed that "children are our future, our hope; we must give them the best of everything," but definitions of "best" clearly shifted with political currents. Early Russian influence on Chinese textbooks, curriculum, and administration was replaced by efforts at an indigenous model that would encourage students' self-reliance. The virulent anti-intellectualism and practical orientation of the Cultural Revolution student experience have been followed by a preoccupation with test-driven learning and promotion. Cleverley's discussion of these radical shifts is wide-ranging. He includes information on formal and nonformal schooling; preschool, precollegiate, university, and adult education; education of women and minorities; and more. His account is filled with compelling and often evocative illustrations, though one wishes for more aggregate data to document this interpretation of national trends.

The People's Republic's long-held goal of education's being both "red and expert" (politically correct and technically sound) has hardly been as sorely tested as in this current period. Here Cleverley is at his best, relating the rapid changes in the economy and society to challenges for education today. With an ambitious development strategy, reform in agricultural and factory production, a rigorous family-planning policy, and expanded foreign influence, China requires major advances in both the quantity and the quality of its educational training. But criticism abounds. The examination system is seen as too exacting, funding for education as insufficient, parental support as inconsistent, teacher quality as low, and student morals as weakened by doubting, cynical youth. Cleverley's list of problems may sound surprisingly familiar to American parents, teachers, and students. The author, by providing the historical context, explains the uniqueness of these challenges for China, but the lessons to be drawn about the significance of and constraints on education have relevance for people outside China as well.

This book attempts a great deal. Perhaps the ambitiousness of the project explains why there has been no comparable offering before. In trying to describe a history spanning thousands of years, the author necessarily makes choices about focus. One can quibble with what appears to be a perfunctory treatment of much of the early historical periods or the over-attention to loosely related details within individual periods in the People's Republic's history. One can also question the uneven balance of description and analysis throughout the book or challenge the blurred interweaving of description, official propaganda, and interpretation in the sections on the Cultural Revolution and its immediate aftermath.

Yet, on balance, the book, like its subject, impresses the reader for its scope. At the end of his work, Cleverley, while acknowledging educational flaws and opposition, describes the Chinese school system as "remarkably successful." This book also is a success, a useful contribution to all who want to know more about China, its social history, and educational change.

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