Work in Science

CAREERS IN SCIENCE. By Philip Pollack. In collaboration with Vocational Guidance Research, Evelyn Steele, Director. New York: E. P. Dutton & Co. 1945. 214 pp. \$2.75.

Reviewed by Waldemar Kaempffert

N every year in normal times 3,500,-000 young men and women graduate from American high schools. Many of these graduates will choose careers in which they can make some use of what scientific knowledge they have acquired. But what careers of this type are open to them? It is this question that Mr. Pollack's book an-

Despite the new opportunities which have been created by the war it is not easy for a young man or woman with some scientific training to select the right career, assuming that he is a free agent. The scientific habit of mind is an essential. That habit is partially inborn, partially acquired. When William A. Hayes, a young Westinghouse electronic engineer, first went to work he probably never



thought he would one day be worrying about spaghetti. He was watching workers as they inserted nails within the coiled filaments welded to the mechanism of electron tubes. The nails supported the coils during the welding operation, but five minutes were lost in removing them. These five minutes were precious. Could a stick of spaghetti be cut and used instead of nails? It could, as Hayes found, A bottleneck was broken.

Mr. Pollack tells many a tale of this kind to illustrate his review of careers in science and technology. He examines chemistry, physics, biology, geology, invention (there is a good chapter on this by Charles F. Kettering written in his usual lively style), and always he points a moral with a tale of ingenuity and with the advice of successful scientists and engineers. The result is not just an uplift book, full of pep talk, but a practical guide. The reader finishes Pollack's book impressed by analyses of scores of industries and their requirements and impressed, too, by the warning not to enter an industry with the idea of making a fortune but with the idea of making a good living.

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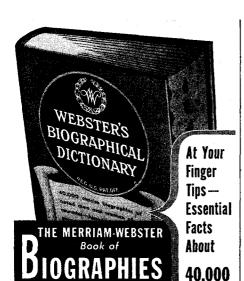
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MOHAMMED AND THE MOUNTAIN

(Continued from page 10)

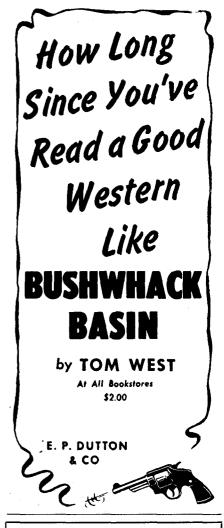
not anticipated by their originators. In 1934, three-fourths of the 166,000 students enrolled in these institutions were part-time and adult. In 1944, a Gallup poll revealed that more than one-third of the adult population of the country, some twenty-five million people, would like to enroll in adult education schools in the post-war period attending classes and taking special courses.

Recently, both the states of Michigan and New York recognized this growing interest in adult education and appropriated funds to support adult education programs. There are also proposals under consideration for federal aid to university extension programs in adult education and for enlarging federal aid to vocational education, such as the George Bill. If these proposals become law, adult education funds will be available for the states in much the fashion of the successful Smith-Hughes and George-Deen laws, which encourage technical and distributive education respectively on a secondary school level.

Such public funds should be allotted for liberal arts and general education and not be restricted to technical, vocational, or business training. Indeed, too many prestige-hungry universities now are providing generously for their professional schools of technology, medicine, and law at the expense of their liberal arts colleges. Without adequate social controls the marvelous progress of science and technology may in the end be ruinous to mankind. The achievement of such social controls requires as much financial support and careful planning for liberal arts and general education as for scientific education.

Public funds for adult education are unquestionably needed. To realize this one has only to consider the weaknesses still bedeviling higher education, and especially medical school education, in this country. Although such educational opportunities are theoretically open to all according to ability, the economic need among the poor for earning a living for the family as soon as possible has prevented many a gifted youngster from entering college or medical school. Indeed, the medical schools today inquire rather closely into the financial status of a candidate's family, so that they may reduce to a minimum the resignations due to financial needs. There should be no fees for adult education because those who need it most can least afford to pay.

It is an anachronism to hold that





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New York Atlanta Boston Dallas Chicago San Francisco society represented by our agencies shall be concerned only with the education of youth to the age of sixteen or eighteen, while it is admittedly concerned about the social security, the health, housing, and working conditions of the adult, and especially the care of the aged. The education and training of citizens of all ages is the proper concern of a democratic society no less than their physical health and other aspects of their well-being.

Unfortunately, it is true that the majority of American communities still do not regard adult education as an important or even a secondary responsibility of the public educational system. Many school board members stubbornly maintain that the job of the public educational system is to educate the young, and that no funds are available or obtainable for adult education. As a matter of fact many of these schools officials do not favor adult education because it is incompatible with the routines of the educational system as it now exists. These officials will either change their views or be replaced when local public demands become sufficiently strong.

As state or federal funds become available, increasing interest will be evinced in the ways and means and methods of adult education. Educators will examine programs under way and seek to learn what to avoid and what to adapt to their own communities. It is often remarked that adult education is a "jumble" of activities and varied programs, but it must be remembered that adult education meets interests and demands as varied as life itself. These activities include town hall meetings, lectures, workshops, correspondence courses and university extension courses, radio programs of a discussion or informational type, and formal classes. Fortunately there is a simple test for the value of any program: does it attract the adults and hold most of the group to the end?

If federal and state subsidies are provided in the near future, such subsidies will be available to improve and expand adult education programs now under way.

How much has your community done to meet the educational needs of its adults?

Has it any facilities to help adults become informed and enlightened with regard to the many civic problems and issues constantly confronting citizens in a democracy? It might well develop town hall meetings with panel discussions and lectures.

Has it any public school program to help parents to establish a wholesome and integrated home life and to assume effectively their responsibilities in the mental, emotional, and physical development of their children? Classes for parents will do much to reduce juvenile delinquency and foster a happier home life.

Is there any community program to help housewives and other consumers to purchase and utilize the necessities of life more wisely? If public funds will be used to supplement insufficient incomes, surely public funds should be provided to encourage the most economical use of income.

Why cannot means be found to educate people to understand the fundamentals of our economic life: the advantages of free enterprise, the basic factors conditioning successful production and distribution and creating a means for people to earn a living? If more people really understand our economic system, we might have less worry about inflation, half-baked "isms," and crack-pot "share the wealth" or "ham and eggs three times a day" schemes which delude sections of our population from time to time.

Does your community provide literacy education or elementary education for adults? According to the 1940 Census Report, among the New York City adults over twenty-four years of age 7.6 per cent had no schooling, 7.2 per cent had from one to four years of schooling, and 48.7 had between five and eight years of schooling. How does your community figure in this respect

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and what is it doing about the situation? Has it ever occurred to you that one of the reasons our democracy does not function perfectly is the educational deficiency of so many of our citizens?

What vocational training is available for adults who left school too early or who may have to change their employment in periods of industrial readjustment? Is this training really available to the unemployed? Is it up to date and comprehensive in its offerings? Are there adequate guidance and counselling facilities for such adults?

Does your community utilize its educational facilities to give adults improved ways of utilizing leisure time? Why should your public school buildings close at 3 or 4 P.M., when adults might very well use them to learn foreign languages, seek recreation in art, or learn to read better and faster?

Why cannot employers and workers discuss and study labor-management problems and the economics of business together in the same classroom? What could foster more effectively their mutual coöperation in the solution of their joint problems in actual practice? The State of New York has established a school for Industrial and Labor Relations at Cornell University, but in most localities the labor unions

are left to their own education initiative and limited resources.

Are any of these programs, if they do exist in your community, well-promoted and are they meeting genuine basic needs? It would be remarkable if any community could give an unqualified affirmative answer to these questions

These community programs are necessary everywhere, but they will be established only in progressive communities where the political and educational leaders have vision and faith in democracy. These programs will require persuasive advertising and firstrate promotion. Local businessmen's and women's clubs can perform a notable public service by taking an active interest in adult education and supporting groups like the New York Adult Education Council. Such an organization of citizens, interested in promoting all worth-while adult education programs by furnishing advice and information to the community. can be a leavening influence.

There can be no more socially useful project than to provide opportunities for people to help themselves. All our citizens should be able to live in the greatest possible enjoyment of the capabilities with which they are endowed. Adult Education will help them do it.

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LEARNING FOR LIVING OR EARNING?

(Continued from page 12)

what they ought to expect from public education before the eighteenth year.

The problem of kinds of work to be done matched against those who are to do it, needs equally realistic confronting at the college level. Testimony from business is clear that its demands for highly specialized business training in college is far less than is generally supposed. If we exclude the engineering schools and their technical training for engineering positions, what we actually find is that business in hiring college graduates is looking for potential managerial capacity. All this is not to deny the educational and social values of graduate courses in business, public service callings, and other semi-professional careers. It is rather to emphasize that a liberal arts course freshly conceived in relation to the interests of students and the present needs of society can have genuine vocational value (as it has already abundantly proved itself to have) without extending its instruction into areas of vocational techniques. In other words, there is needed a refusing and reuniting of educational objectives so that every student assuredly becomes the best total person he can be as of that age when he leaves school and becomes ready simultaneously to make a start at an employment which is consonant with his special abilities.

If now the view is accepted that a unifying of educational objectives, and to some extent of process, is sound and necessary as against the sharp separations of today, the question at once arises as to how the interplay of cultural and vocational influences, interests, and emphases can be best assured. I see three levels at which the problem must be addressed: (1) in the restatement of educational objectives and policies by teacher-training institutions, school boards, and boards of trustees; (2) in the conscious interrelation of general and special courses in the curriculum of each student; and (3) in the unifying within each unit course of considerations of cultural and vocational reference.

The restatement of directives and policies is actually the over-all theme of this article. I am urging that we need agreement that a democracy has to afford a common core of general education for all its young people up to eighteen years of age designed to prepare them for family life, citizenship, and personal orientation, as well

as for vocation, and that vocational education should enter in its appropriate place only when the general education is well on its way to its conclusion (as of the age level at which the young person is leaving school).

It is a specific condition of translating the thesis of this paper into operating actuality that it be subscribed to and taught by teachers' colleges and be propagated for by educational leaders generally. Reviewing and reshaping educational objectives is the Number One task.

Second, we come to the interrelationship to be attained between general and special course offerings in the curriculum of each individual school and student. This comes down in part to pedagogical method, but it is nonetheless important for that. Concretely, the teachers of the humanities, the social studies, and the natural sciences have the duty of occasionally orienting their subject matter to its vocational possibilities. A secondary aim for all teachers is to convey a sense of "how my course relates to the world of work, how it is used there, where its matter has application there." I submit that the teacher of every subject can usefully now and again remind the class that his subject matter does have vocational meaning in some direction. I do not say that every general course has, obviously and directly, to justify itself vocationally, or have obvious vocational contexts. But if it is wise to include a given course in the curriculum the chances are excellent that in one way or another it impinges upon our operating economy and dominant culture, and that relationship can profitably be made explicit.

An equally important facet of all general instruction is that the byproducts of good learning should be consciously striven for. Lucid expression, adequacy of communicationthese should be aims of every course. Critical appraisal of facts, conscious use of a problem-solving method (the scientific method), elegance of execution, persistence in attack, thoroughness of effort, promptness, cheerfulness, friendliness in human dealingsall of these, I must insist, are rightful byproducts of the study with every good teacher of every subject. And they should be consciously held in view by every teacher as necessary and valuable aspects of the total learning experience going forward.

Conversely, the vocational teacher at his best at successive levels of secondary, college, or professional school, will explicitly orient the technical job into its total, social, functional, and cultural setting. Every vocation has its history, its science, its

artistry, its great figures, its rationale—and increasingly its ethics. In short, it has its general bearings on life as a whole. All of this the student has a right to become aware of; and the teacher therefore has a duty of interpretation.

I repeat that the importance of college subjects is not primarily in relation to any narrow occupational usefulness that might be imputed to them. But importance is what every subject must be invested with by the teacher. And this is one of the several ways in which ideas are important, namely, because of some bearing they may have upon the significance of the world's work. In fact, far more existent cultural study has direct vocational value than professors usually appreciate. Already in much subject matter a breakdown of the barrier between cultural and vocational is beginning to occur, and it can occur more if educational counselors will give the right guidance on course selection to students and on course orientation to teachers.

This is not the place to offer details as to how the college teacher can gain in knowledge of the occupational relations of his subject. New techniques are being evolved here under the new sense of this need. One item, however, deserves emphasis, namely, the use of

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the vacation periods for study, visitation, interviews, and actual job getting and job holding efforts that are specifically designed to enlarge the teacher's first-hand knowledge of the relevancies of his subject to today's life. I know one institution where it is becoming a point of honor for professors to devote their sabbatical years to getting a paid job of a nonteaching nature and holding it satisfactorily, in some field related to their major competence. Need it be emphasized that the freshness of attack on subject matter which such teachers are destined to bring back to their classes is greatly to be desired?

Similarly, with vocational teachers at the college level, as in engineering and business courses, they have to be as concerned with the why as with the what, with the problem of values as with the problems of operation, with issues of social control of techniques and of scientific advances. Vocational teachers are sending students directly both into corporations and into the professional world. What of standards of ethical practice? What of the place and fruition of vocational associations and worker unions? What of the professional worker's status in a corporation whether as a paid hireling or as a responsible party to collective dealing with management.



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These are but a few of the issues which are part of the broader view of vocational instruction-calculated to assure that trained workers come through a kind of educational experience in which their personal and group relation to the management and ownership interests is sophisticated enough to lessen the chances of the grosser forms of exploitation being practised upon them. If, as I believe, we are actually (and in part legally) building up within our economic life something which may with some accuracy be referred to as a constitutional economic government, it will be essential that the presumptive citizens of that government know how to conduct themselves as such-in respect to responsibilities no less than rights. Thus far vocational as well as general education has soft-peddled a confronting of this whole delicate but dynamic area. In short, vocational teachers at all levels have in the future to surround and support the training they offer with a realistic grasp of the total milieu in which the work for which they train is to take place. And that realism has to include a democratic bias in all its economic implications.

The conclusion to which this analysis comes is that the breach between general and vocational education has to be greatly narrowed.

Vocational education in the narrow, specialized sense should not be commenced until a foundation in a socially oriented general education is assured for *all* young people. And when such vocational education is begun, it should not, until the top reaches of professional study are undertaken, be dissociated from some continuing exposure to general subjects keyed to the maturing intellectual interests.

Teachers both general and vocational have likewise to see their tasks as more nearly identical than is now typically the case. The teacher of liberal arts has to know the contemporary world better. And the teacher of vocational subjects has to be culturally more richly grounded.

The unified and over-all objective of educating whole persons has to be restored to centrality, both in the training of teachers and the shaping of educational policy by those responsible for curriculum building.

We will get good workers for our kind of society only as we qualify all our youth to enter that society as persons and citizens no less than as prospective job holders.

The foregoing article is part of a paper presented at the Sixth Conference on Science, Philosophy, and Religion held at Columbia University, August 24, 1945.

Hope Cuthbert Marbery

By Bridget Dryden

LYING a Mustang on whose aileron you'd scrawled "Good Hope"— like what schoolchildren whittle on an oak, initials grabbing immortality for their young rollicking identity.

"Over New Guinea, from his target, shot down while homing—"
In a point of time, instantaneity too dazzling to be memorial or solemn,
Hope Cuthbert, you became a part of deity, enough, at least, to dip in active flame the twelve invisible letters of your name.
They hovered in the room, above my chair.
But THE TELEGRAPH lay still unfolded there.

"Over New Guinea—from his target—homing—" Do you remember Piper's End at gloaming down a Herts bylane pale gold with primroses, in a half-mist between Red Lion pub and the ivied gate of Strathmore Park Gun Club? I do—And hearing you on split-grass whistle, schoolbag banged down, answer, O joyously, that dear familiar throstle?