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Education  
—Some  
Neglected  
Opportunities

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**THEODORE O. YNTEMA** is an outstanding example of a man who has developed the **kinds of transferable skills and abilities discussed in this paper.** Mr. Yntema, chairman of the finance committee and vice president of the **Ford Motor Company**, has served with imagination and distinction in several fields.

**His ties with the Graduate School of Business of the University of Chicago span four decades.** After receiving the A.B. degree from Hope College in 1921, and the M.S. in chemistry from the University of Illinois in 1922, he came to the University of Chicago, where he received the A.M. degree from the Business School in 1924, the year in which he passed the C.P.A. examination in Illinois.

He received the Ph.D. degree from the School in 1929. His doctoral dissertation, "**A Mathematical Reformulation of the Theory of International Trade**" (University of Chicago Press, 1932), is a classic in its field.

He served on the faculty of the Graduate School of Business for 26 years—from 1923 to 1949, when he joined the **Ford Motor Company.**

While on the faculty, Mr. Yntema served as consultant to a number of government and business organizations, including the U.S. Steel Corporation and the War Shipping Administration. He was the first research director of the **Committee for Economic Development**, serving from 1942 to 1949, and is now a trustee of the **Committee and Chairman of its Research and Policy Committee.**

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## Education-Some Neglected Opportunities

A **TRUSTEE** is not supposed to have ideas on education. If he has them, he is not supposed to say anything about them-least of all in the councils or halls of the University. So I speak, not as a Trustee, but as a kind of Jack-of-all-trades-with more or less experience as a farmer, physical chemist, accountant, statistician, economist, research director, teacher, consultant, and executive. As I have moved from one type of work to another, I have had some surprises which prompt my remarks today.

You, too, will have surprises. Many of you have planned and know (or think you know) what you will be doing ten, twenty, and thirty years from now. Some of you will continue on your course, but some, perhaps many, of you will find opportunities that will take you into new fields of learning and endeavor. All of you will be called upon for advice, decision, and action outside your field of specialization. All of you will face the choice of continuing self-education and self-development-or neglecting your talents and letting them wither.

St. Augustine asserted that as a result of his education he could read anything that was written and understand anything he heard said, as well as say anything he thought. A Renaissance man could be accomplished in the arts and learned in all the sciences. Today this is impossible. Human knowledge is so vast that no man can even describe its bounds or subdivisions, let alone comprehend what lies within them.

### *The Knowledge Explosion*

Moreover, knowledge is expanding at an explosive rate. New knowledge will make ex-

isting knowledge and specialized skills inadequate and obsolete. If you stop learning, you will soon find yourself on the intellectual scrap heap.

In a recent seminar Theodore Schultz, a distinguished member of the University of Chicago faculty, appraised the prospective obsolescence of various types of educational attainments. In order of decreasing obsolescence and increasing durability he listed: (1) vocational and job skills; (2) knowledge of principles and theories; (3) ability to solve problems and develop analytical tools; (4) ability to keep on learning. Fleeting facts memorized for examination, debate, or other special occasion he did not even bother to list.

Let me emphasize these points. Specialized vocational skills are likely to be made obsolete by advances in science and technology. The subject matter of science will be more permanent, but it, too, will undergo correction and modification as well as enormous expansion. Problem-solving ability and the ability to continue one's education will be least subject to obsolescence and most likely to be useful throughout life.

I would expand Schultz's list of durable skills in a few respects. And then I would point out that those skills and abilities which are most durable are likewise most universally useful-needed in all walks of life and transferable from one field of endeavor to another.

#### *Five Aspects of Education*

It would be reasonable to expect that the skills and abilities which are most durable and most widely needed would be a primary focus of general education. In part, they are; but, in the main, I think it is fair to say that they are not.

Let me try to put my ideas into perspective. I have found it useful to think of a liberal or general education as having five parts or as-

pects. From such an education one should acquire: (1) a sense of values; (2) the basic skills and abilities generally useful in all fields and largely transferable from one to another; (3) an understanding of the main ideas in the physical, biological, and social sciences and the ability to read about them; (4) an understanding and appreciation of the humanities; and (5) the capacity to find joy and well-being in seeing, hearing, touching, thinking, and doing-in all the aspects of a life.

In addition, an educated man usually has special competence in a particular field. Indeed, if a person does not have some depth of experience, breadth of exposure is not likely to make him an educated man.

Without implying that the basic, transferable skills are more important than the other aspects of education, I should like to draw your attention to them. They may be described as (1) the ability to perceive problems and solve them; (2) the ability to understand people, to communicate with them, and to deal with them well, as individuals and in groups; (3) the ability to organize, to structure data into an ordered pattern, to marshal scarce resources for given ends. You might add to this list two other generally useful skills and habits: memory and the devotion of wholehearted effort to the task at hand.

Why can Robert McNamara within a few months master and direct the defense efforts of this country? Why can George Beadle turn from his Nobel Prize-winning work in genetics and become a distinguished president of a great university? Why can consultants tackle problems new to them and solve them with dispatch? Why can good teachers become successful executives? Why can men change careers and achieve greater success than if they had stuck to one last? Why do some men have

perception and wisdom in matters outside as well as inside their specialties? Simply because problems are problems, people are people, organization is organization; because there are transferable skills and abilities; and because these men possess such abilities in high, even superlative, degree.

If you can see and solve problems, if you can deal with people effectively, if you can organize the resources you command, if you can work wholeheartedly, if you have a good memory, then you can be a success in any of a wide range of careers, and you may be able to change careers without much loss and perhaps with much gain.

I do not imply that overnight you can become a great surgeon, or physicist, or lawyer, or singer. Some careers require special talents, and some require long training. I do say, however, that in practically all walks of life these basic, transferable skills are needed and that in some they constitute a substantial part of the requisites for success. Moreover, as noted, they are durable-useful throughout life.

#### *Areas of Neglect*

On other occasions I have tried to describe the transferable skills and abilities in some detail. Today, since I must be brief, I shall leave these ideas for your own exploration and reflection. I shall only try to point out those aspects most neglected in formal education.

In all matters there is a temptation to do what is easy and neglect what is difficult. So there is a temptation to teach facts and neat theories and to neglect some of the basic skills and abilities that are not so readily reducible to fact and formula.

The process of seeing and solving problems I shall call the "scientific method"—even though this usage may offend some of my

scientist friends. The scientific method involves observation, the detection of similarities and dissimilarities in phenomena, the tentative specification of categories and relationships based on observation and on deduction from prior discoveries, and the testing of such tentative hypotheses by experiment and experience.

Logic and mathematics and statistics are, in various degrees and forms, required in particular applications of the scientific method. The process may be formal and extensive or informal and limited. The scientific method, as I am using the term, is not the special prerogative of the physical, or biological, or social sciences. Science and scientific method are not the same thing. Science is the body of ordered knowledge. The scientific method is the process of seeing and solving problems. Many students in the sciences do not learn the scientific method because they do not learn to perceive problems or invent hypotheses for their solution.

### ***Perception and Discovery***

In the conventional curriculum there are courses in analytical methods, in logic, in mathematics, in a priori and inverse probabilities, and in statistics. But where and how is the student to learn perception of the problem and discovery of hypothesis-invention, if you will? And how much practice does he get in taking a vague general idea and converting it into specific form to be tested? How does a student learn to summon and take account of all pertinent evidence and appraise its relevance, its importance, and its credibility? How does he learn to form sound judgments?

Or take the matter of understanding people, communicating with them, and dealing with them effectively as individuals and in groups. I suppose that there are more courses in these subjects offered in this University than a per-

son could complete in a lifetime of study. Yet most of these courses are specialized, as in psychiatry or education; or else they deal with people impersonally or en masse, as in economics or political science.

How shall the student improve his understanding of the individuals and groups of individuals with whom he has personal contacts? How shall he learn to perceive their motivations, their probable reactions, their abilities, their potentials? How shall he learn to communicate with them, not only by written word but by speech, in all the variations appropriate to the particular occasions? How shall he learn to communicate by actions that speak louder than words and by all the other means that affect the senses? How shall he learn to give and to take; to speak and to be silent; to trust and to distrust; to compete and to cooperate; to follow and to lead; to serve and to direct?

The scholars in a university know a great deal about people. There is also a great deal that they do not know. But the fact that they do not know everything, or nearly everything, is hardly an excuse for failing to make available to college students in systematic form the essence of what they do know. Helping the student to learn about people may be difficult, but it should not be beyond the ingenuity or beneath the dignity of an academic institution.

Next we come to organization. In every science we try to structure facts into knowledge, and in every aspect of life we try to utilize scarce resources to achieve some objective in the best possible way. Here is a process universal in our experience—a process susceptible to analysis and generalization.

In the common operational sense, organization is the marshaling of scarce resources for

identified ends. It makes use of the same concepts and processes as those used to structure facts into a science. The proliferation of facts would make education impossible were it not for order and organization. Life would be impossible if we did not practice organization and is inefficient if we do not practice it well. In the educational process, however, we have to learn organization in bits and pieces-with hardly ever an indication that this is the essence of science and of rational existence. Because organization is not a conventional category of research, it does not usually qualify as a respectable subject for instruction. Should this be so?

When I raise these questions, I am told that such skills and abilities cannot be taught. Well, of course, you cannot teach anybody anything. As Dean Berry of the Harvard Medical School once said, " 'Educate' is not a transitive verb." The question is not whether you can teach perception and judgment and understanding people and organization. The question is whether you can help the student to learn these things, and then whether what he learns is worth the cost of helping him.

### *Tentative Suggestions*

How can the student learn the transferable skills and abilities most effectively? The answer to this question requires more knowledge and wisdom than I possess. I can offer only a few tentative suggestions.

First, breadth of liberal education, comparable to that required in the College of the University of Chicago, is helpful. The student exposed to problems in various fields may perhaps discover that the skills required in one are needed in another. I still remember my surprise and excitement one night forty-odd years ago when I discovered that the calculus I had learned for physical chemistry enabled me to read easily the differential equations de-

scribing economic theory-and thus to compress months of undergraduate study into a single evening.

In his famous Rede Lecture, "The Two Cultures and the Scientific Revolution," C. P. Snow describes the gulf between the humanists and the scientists. This gulf is being bridged by the colleges that require study in both the sciences and the humanities, as the College of the University of Chicago does. There seems to be agreement that a man who has little knowledge of or feeling for the humanities does not possess a liberal education. Surely, the converse is also true: That a humanist who cannot read the universal language of mathematics, including differential equations, or who cannot read the descriptions of the world about him in simple scientific terms is illiterate.

We have too many teachers in particular sciences who are ignorant of the other sciences and the humanities, too many mathematicians ignorant of the uses of their subject, too many humanists illiterate in science and mathematics.

How many of you learned from your mathematics teachers the pervasive importance and power of the idea of a maximum or minimum? How many of you learned that the difference in natural logarithms gives us a measure of relative change, invariant with respect to the direction of change, and learned also the enormous importance of having such a measure? How many of you gained an appreciation of the means by which order is achieved in the physical universe, in the biological universe, and in the social universe; and an appreciation of how much alike some of these means are in all universes? How many of you learned in class the organizing concepts and methods by which we come to understand

order in a larger world and to achieve it in our own small sphere?

We need at least some teachers who can recognize the common factors in education and the common concepts transferable from one field to another and who will give the student some clues in this respect.

At the hazard of being ridiculed, I suggest that it may even be feasible to have courses in such subjects as perception of problems, invention, judgment, understanding people and working with them, and organization. This suggestion does not imply that these abilities can best be developed by studying them in the abstract; on the contrary, they can best be learned, I think, by studying them in relation to real or well-simulated problems. Perception, invention, judgment, dealing with people, and organization are not, however, respectable academic categories. Consequently, it will be extremely difficult to introduce such subjects into the curriculum, to find competent teachers, and to develop instructional materials.

Progress has been made. We do have courses in English composition. Now, composition is notoriously difficult to teach. Perhaps it is difficult just because it does involve organization and perception-skills usually neglected in education.

Those of you in the arts and sciences would be wise not to look down your noses at the professional schools. Much of what goes on in many professional schools is designed to compensate for the usual deficiencies in liberal education, particularly in the transferable skills. Why are cases widely used in law schools and business schools for instructional purposes? Why are decision theory and game theory and game practice beginning to appear in the curriculum? These are efforts to simu-

late real situations and to call forth perception, invention, judgment, organization, and consideration of human behavior as an important variable.

John Maynard Keynes, who was something of a modern Renaissance man, wrote: "Professor Planck, of Berlin, the famous originator of the Quantum Theory, once remarked to me that in early life he had thought of studying economics, but had found it too difficult! Professor Planck could easily master the whole corpus of mathematical economics in a few days. He did not mean that! But the amalgam of logic and intuition and the wide knowledge of facts, most of which are not precise, which is required for economic interpretation in its highest form is, quite truly, overwhelmingly difficult for those whose gift mainly consists in the power to imagine and pursue to their furthest points the implications and prior conditions of comparatively simple facts which are known with a high degree of precision." I cite Keynes not to elevate the status of economics or economists but simply to indicate that there are in the social sciences unusual opportunities, if they are utilized by teacher and student, for the development of the transferable skills and abilities.

### *Remote from Reality*

A great educational tragedy of the twentieth century is the decline of the family enterprise, the store, the shop, and especially the farm. In the small enterprise, young people had a chance to perceive problems, to work out their solutions, to deal with people, and to practice organization. In so much of education the student is remote from reality—an outsider, a spectator, a critic. In some part of his education he needs to be involved per-

**\*J. M. Keynes, *Essays and Sketches in Biography* (New York: Meridian Books, 1956), pp. 327-28.**

sonally in a complex of problems, people, and organization, so that he can develop by practice the essential skills needed in all fields of endeavor.

This can be accomplished in many ways. Formal courses in some fields can present realistic, many-faceted problems. Work in the field of concentration can be broad in its demands for the utilization of the transferable skills. Responsible participation in home life and engagement in student activities and summer work are important. All life, in school and out, on the job and off, presents endless opportunities for seeing and solving problems, for learning how to deal with people and for practicing organization. Some persons seize these opportunities for continuing education and development; some blindly pass them by. While a college cannot provide the whole of a liberal education, it should not leave the student blind in this respect.

Clark Kerr in his remarkable book, *The Uses of the University*, observes the great strides that have been made in research and graduate education. He also recognizes the relative deterioration of undergraduate education in most institutions. There are notable exceptions to such deterioration, and Chicago is certainly one. Furthermore, in absolute terms much progress has been made in both secondary and college education. The deterioration is relative-relative to the progress in the graduate schools and to the opportunities for improvement.

#### *Deficiencies Are Vast*

The deficiencies in education are no small matter. Counting the value of students' time, education absorbs about one-twelfth of all our productive efforts. Education and research are by far the most important sources of economic progress and improvement in our standard of living. Investment in education is highly pro-

ductive, both for the individual and for the community.

In our schools, colleges, and universities we shall need more money, more teachers, more buildings, and more equipment to make places for the coming avalanche of students. But expansion is not enough. In this industry, so huge and so critical to our growth and well-being, there are pitifully small resources devoted to research aimed at improving the product and the process of production. In the federal government the resources allocated to research in education are less than those provided for fish and wildlife research. I suspect a similar situation prevails in the individual states. Nor do private universities devote large sums to such work.

There is no field in which high-quality research would pay off so handsomely to the people of this country as in education—its objectives and substance as well as its technology. This cannot be done in our departments of education alone. It will take men of high competence from many fields and men of large talents and great wisdom. I cannot write a prescription for this work. I can say only that I have a deep conviction it can be done if sufficient resources and talents are devoted to it.

If education can become more efficient, it will not only economize resources, especially the very costly time of students, which is too often regarded as a free good; it will also yield enormous dividends in better-equipped and more productive people, who are the source of our growth and strength and well-being.

#### *Restatement of Objectives*

During the past twenty years I have had the privilege of participating in the work of the Committee for Economic Development. In this work, men of affairs, scholars from the universities, and technical experts study and

discuss important questions of public policy. Statements on these questions are then issued by the Research and Policy Committee of CED, composed of businessmen and a few university presidents. Perhaps the time is ripe for a Committee for the Advancement of Learning and Teaching to review and restate the objectives and potentials of education. The efforts of such a committee, however, would be ineffective unless they were paralleled and implemented by the efforts of scholars from many fields working individually and jointly. Perhaps some of this work could be organized in an institute, or in a few institutes, in our universities.

Over a century ago, Cardinal Newman wrote **Idea Of** *a University*. He failed to understand the role of the university in research and in graduate study related to research. But he did have extraordinary perception as to the goals of liberal education, and his words are eloquent. A liberal education "is the education which gives a man a clear conscious view of his own opinions and judgments, a truth in developing them, an eloquence in expressing them, and force in urging them. It teaches him to see things as they are, to go right to the point, to disentangle a skein of thought, to detect what is sophistical, and to discard what is irrelevant. It prepares him to fill any post with credit, and to master any subject with facility. It shows him how to accommodate himself to others, how to throw himself into their state of mind, how to bring before them his own, how to influence them, how to come to an understanding with them, how to bear with them,. He is at home in any society, he has common ground with every class; he knows when to speak and when to be silent; he is able to converse, he is able to listen; he can ask a question pertinently, and gain a lesson seasonably, when he has nothing to impart himself; he is ever ready, yet never

in the way; he is a pleasant companion, and a comrade you can depend upon; he knows when to be serious and when to trifle, and he has a sure tact which enables him to trifle with gracefulness and to be serious with effect. He has the repose of a mind which lives in itself, while it lives in the world, and which has resources for its happiness at home when it cannot go abroad. He has a gift which serves him in public, and supports him in retirement, without which good fortune is but vulgar, and with which failure and disappointment have a charm. The art which tends to make a man all this, is in the object which it pursues as useful as the art of wealth or the art of health, though it is less susceptible of method, and less tangible, less certain, less complete in its result."\*

Graduates, I salute you. Your education is well begun. May you grow in stature and find success. Theodor Reik tells us there are two roads to happiness, one achievement and the other love, and we must travel both of them. Godspeed!

\* **John Henry Cardinal Newman**, *The Idea of a University* ("Image Books" ed.: Garden City, N.Y.: Doubleday & Co., 1959), p. 192.