Advanced English Extensive Reading

高级英语泛读（2）

东南大学出版社
Southeast University Press

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CONTENT

UNIT ONE
Text 1

Basic Research and Graduate Education

Glenn T. Seaborg

(1) Basic research is the cutting of paths through the unknown. As most of us know today, it is the pacesetter for technology and the raw material of invention.

(2) Because basic research is aimed at understanding rather than at practical results, the layman sometimes assumes that it is entirely abstract and theoretical, and that only when it becomes a matter of industrial development does it "come down to earth". This is a false notion, and its falsity becomes increasingly clear with time. Indeed, one striking characteristic of our scientific age has been the disappearance of the barriers between pure and applied science. Not only are we finding important technological application for mathematical and scientific knowledge which was formerly thought of as abstract and "useless", but the advance of technology has both generated new problems in pure science and provided new tools with which such science can be advanced more effectively. The development of the techniques and hardware for radar during the war, for example, gave the physicist and the chemist a new

and refined tool for investigating the properties of solids and of chemical compounds. Conversely, the extensive use of this tool in basic science has opened the way to entirely new techniques in electronics. Similarly, the development of large-scale electronic computers has led engineers to find practical uses for some of the most abstruse and "impractical" branches of higher mathematics, while the understanding of the techniques of using computers has, on the other hand, given us deeper insight into some aspects of the behavior of complex biological and social systems. Basic and applied science today are distinguished less by method and content than by motivation. Very often, indeed, the same man can be both "pure scientist" and "engineer", as he works on different problems or on different parts of one problem.

(3) By the word scientist we mean someone who is fit to take part in basic research, to learn without a teacher, to discover and attack significant problems not yet solved, to show the nature of this process to others—someone, in short, who is equipped to spend a lifetime in the advancement of science, to the best of his ability.

(4) The process of graduate education and the process of basic research belong together at every possible level. The two kinds of activity reinforce each other in a great variety of ways, and each is weakened when carried on without the other.

(5) If graduate education aims at making scientists, and if inquiry into what is unknown is the moving principle of all science, it is not surprising that experience of this kind of inquiry should be essential in graduate education. Clearly such experience is best obtained in association with others who have had it

or are having it themselves. The apprentice scientist learns best when he learns in an atmosphere of active research work. In all forms of scientific work a man's effectiveness is multiplied when he has that depth of understanding of his subject that comes only with the experience of working at a research problem.

(6) The process of graduate education depends on "research" just as much as upon "teaching "—indeed, the two are essentially inseparable—and there is a radical error in trying to think of them as different or opposite forms of activity. From the point of view of the graduate student, the teaching and the research of his professor are, at the crucial point which defines the whole, united. What he learns is not opposite from research; it is research. Of course many necessary parts of a scientist's education have little to do with research, and obviously, also, for many professors there must be a gap between teaching a standard graduate course and working at one's own problems. Moreover, many good teachers—men who keep up with the new work in their subject and communicate its meaning clearly to their students—are not themselves engaged in research. Yet we insist on the central point: the would-be scientist must learn what it is like to do science, and this, which is research, is the most important thing he can be "taught".

(7) So far we have been arguing that graduate education requires the experience of basic research. What happens when we turn the matter around, and ask whether basic research must be carried on only in conjunction with graduate education? Here the answer cannot be so categorical. Though our general conviction is that a fundamentally reciprocal relation does exist,

it is clear that research of outstanding quality is often carried on in isolation from teaching and indeed quite outside the universities. While the great teacher of graduate students is almost invariably a research man too, there are many notable scientists who have as little as possible to do with teaching. First-rate industrial and governmental laboratories with commitments to specific programs are necessarily separated in some measure from teaching of a conventional sort. Thus, basic research can be, and is, carried on without much connection to graduate education.

(8) Yet in the long run it is dangerous to separate research in any field entirely from education. The pool of graduate students in our universities is the pool from which the scientist of the future must come. These young people do not easily study what is not taught; they do not often learn the meaning of research which does not exist in their environment. A scientific field which has no research life in the universities is at a grave disadvantage in recruiting new members. As learning and teaching require research, so research, in the end, cannot be sustained without teaching. Hence it is always important for research installations to maintain effective connections with students.

(9) There is also the fact that in the wider sense all first-rate research laboratories are permeated by an atmosphere of learning. Successful research can be defined, indeed, as learning what has not been taught before, and a good scientist is constantly learning from others. We believe that research, learning and teaching are deeply connected processes which should be kept together wherever possible.

Ⅰ. *VOCABULARY*

abstruse	a.	难解的,深奥的
advancement **	n.	先进,促进;进步
electronics *	n.	电子学
falsity	n.	虚假,不真实;欺诈,谎言
generate *	v.	产生,发生
impractical **	a.	不切实际的,不能实行的
inseparable	a.	分不开的;不可分割的
insight *	n.	洞察力,见识
installation **	n.	就职,就任;安装,设置;安置
invariably **	ad.	不变地,永恒地;总是
isolation *	n.	隔离,孤立,分离
layman **	n.	俗人;门外汉,外行
notable *	a./n.	值得注意的,著名的;著名人物
pacesetter	n.	定步速者,带步人
permeate **	v.	渗入;透过;充满
pool	n.	集中备用的物资;备用物资贮存处
radical *	a.	基本的;重要的;激进的
recruit	v.	征募(新兵);吸收(新成员)
refined	a.	精练的,文雅的
would-be	a.	将要成为的;想要成为的

Ⅱ. *COMPREHENSION*

1. According to the author, basic research ______.

(A) is aimed at understanding, and therefore, is basically abstract and theoretical

(B) has opened the way to entirely new techniques in electronics

(C) gives us deeper insight into some aspects of the behavior of complex biological and social systems

(D) is sometimes hard to distinguish from applied science

2. Our scientific age is characterized by ______.

(A) the vanishing of barriers between pure and applied science

(B) the disappearance of differences between pure and applied science

(C) practical application of some of the most abstract and impractical branches of science

(D) the invention of new and refined tools for investigation and research

3. The reciprocal effect between pure and applied science is shown in all the following examples except ______.

(A) the development of large-scale electronic computers

(B) the development of the techniques and hardware for radar during the war

(C) the advance of technology that has both generated new problems in pure science and provided new tools

(D) the fact that the same man can be both "pure scientist" and "engineer"

4. According to the author, a scientist is one ______.

(A) who is able to participate in basic research and work on the unsolved problems

(B) who is able to develop his abilities in solving problems

(C) who is competent to show the process of research to others

(D) who is capable of doing all above-mentioned

5. In discussing the relationship between research and graduate education, the author holds that ______.

(A) graduate students learn better when they work at a research problem

(B) graduate education depends on research just as much as upon teaching

(C) graduate education requires the experience of basic research

(D) graduate education and research are inseparable and depend on each other

6. An apprentice scientist learns better in an atmosphere of research work because ______.

(A) graduate education requires the experience of basic research

(B) many professors are engaged in research and this is the most important thing they can teach

(C) when a person is doing research he has a better understanding of the subject he is learning and thus, the effectiveness is increased

(D) the process of graduate education and the process of the basic research belong together at every possible level

7. Which of the following statements is true?

(A) Basic research must be carried out only in conjunction with graduate education.

(B) The great teacher of graduate students is invariably a research man.

(C) Many scientists carry out their research in isolation from teaching.

(D) First-rate industrial and governmental laboratories are not separated from teaching.

8. Which of the following statements is not true?

(A) Graduate education requires the experience of basic research.

(B) Basic research can not be carried on without graduate education.

(C) Research of outstanding quality is often carried on in isolation from teaching and outside the universities.

(D) While the great teacher of graduate students is almost invariably a research man, many scientists are not engaged in teaching.

9. Which of the following should not be considered as the author's viewpoint?

(A) Ultimately, it is dangerous to separate basic research in any field entirely from education.

(B) The scientists of future will come from the pool of graduate students in the universities of today.

(C) Young people are prone to studying passively.

(D) A scientific field is always at a grave disadvantage in recruiting new members.

10. Which of the following can be considered as the author's conclusion of the whole essay?

(A) It is important for research installations to maintain effective connections with students.

(B) All first-rate research laboratories should be permeated by an atmosphere of learning.

(C) Successful research can be defined, and a good scientist is constantly learning from others.

(D) Research, learning and teaching may be considered as deeply connected processes which should be kept together wherever possible.

Ⅲ. *DISCUSSIONS*

1. What is basic research? How does the author explain it? What is the layman's opinion? And what is your opinion?
2. What examples does the author give to illustrate the interaction between pure research and applied science? And what do these examples indicate?
3. According to the author, how are basic and applied science distinguished? In what sense can a man be both pure scientist and engineer?
4. According to the author, what is the relation between research and education ? What is your opinion?
5. How does the author conclude the essay? Taking the text as a whole, how do you understand the author's argument?

UNIT ONE
Text 2

Scientific Knowledge and the Young Scientist

Paul Freedman

(1) The initial fund of general scientific knowledge is an invaluable asset, but the young research worker should have no illusion about how little it is compared with what he or she should acquire during succeeding years. As to the precise value of this initial fund of knowledge, this depends to a great degree on how it has been acquired and on who has been imparting it. Young scientists cannot realize too soon that existing scientific knowledge is not nearly so complete, certain and unalterable as many textbooks seem to imply. The original papers of great scientists describing their discoveries and expounding their theories are never as rigid and self-confident as the resumes of these discoveries and theories in textbooks by other men often suggest. Young scientists consulting these original works will find in them "it appears that", "it probably means ", "it seems likely that", more than once, not as expressions of good manners or false modesty, but as expressions of elements of doubt which great men felt and honestly put on record. Many statements which have appeared in textbooks as universal and in-

controvertible truths have, in their original form, been put forward as only approximately true, or true only in certain circumstances.

(2) Immediately upon starting on the first serious piece of research, a young scientist must therefore do two things. The first of these should be a careful reading of original papers or books relating to the problem, written by investigators whose technique and judgement he can trust. While reading these publications in a most attentive and receptive manner, the young scientist must not fall into the error of placing in them a greater confidence that their author would wish him to do . No great scientist ever wants his pupils to be mere gramophone records, faithfully reproducing his remarks, never questioning anything, never wanting to add or subtract from what he has given them.

(3) The second thing a young scientist must do, almost but not quite simultaneously with the first, is to proceed with observations and experiments. The initial observations and experiments will be failures, but they will help the development of the appropriate experimental technique, and they will give a greater understanding of the literature the young scientist is studying.

(4) From that point onwards , reading will be a guide to experiment, and experiment will enable a proper appreciation of that which is read, to be made, and enable the young scientist to judge more accurately what must be accepted as an enlightening truth, and what must be viewed with scepticism. Eventually the young scientist will be able to grasp the problem thoroughly with that combination of understanding, optimism,

and caution which is essential. In the later stages of the particular piece of work further reading, except to keep abreast of anyone else in the field or to note new techniques in other branches of research which may be turned to his advantage, will become unnecessary. The young investigator will be no longer in need of finding what is known, but will be adding to that knowledge.

(5) Naturally, reading does not permanently cease at that point and will have to be resumed for the next problem, or even for the present one if either an unexpected difficulty or a new, highly important, publication turns up. Each time the balance between receptivity and scepticism will be easier to achieve.

(6) Reading is not the only way to acquire knowledge of preceding work. There is another large reservoir which may be called experience, and the young scientist will find that every craftsman—the glassblower, the instrument maker, the practical gardener, or the man expert in furnacing—have all of them something they can teach and will generally teach gladly to any young scientist who does not look down upon them with ill-concealed disdain. The information from these quarters differs from information in scientific books and papers chiefly in that its theoretical part—the explanations of why things happen — is frequently quite fantastic. But the demonstration and report of what happens, and how it happens, are sound even if the reports are in completely unscientific terms. Presently the young scientist will learn, in this case also, what to accept and what to reject. One important thing for a young scientist to remember is that if Aristotle could talk to the fisherman, so can