

Text of Plowden's Address

'Must Balance Humanities And Science'

The following is the full text of the address by Sir Edwin Plowden, chairman of the United Kingdom Atomic Energy Authority, at Commencement exercises for the class of '58:

I should like to begin by thanking you for your invitation to come here today. I am glad that I was able to accept it, for it is a high honour to receive the degree of Doctor of Science of this University and to give this address. It is an honour not only for me personally but for the United Kingdom Atomic Energy Authority.

When I knew that the ceremony would require me to stand up and speak to you, I could not help thinking of a remark of George Bernard Shaw in the Preface to *Pygmalion*, or perhaps I should now say *My Fair Lady*, Shaw wrote. "It is impossible for an Englishman to open his mouth without making some other Englishman despise him." I am comforted by the thought that besides myself there are few, if any, Englishmen here today.

But though I am an Englishman—you have only to listen to my accent to know that—I have some connection with this State and consequently with this University, because my mother is an American, and my grandfather was born in this State of Pennsylvania.

Memorable Day

I am proud to renew my family link with Pennsylvania. I hope I may be allowed to claim a special bond with every member of today's Graduating Class. You and I are receiving our degrees together. Some of you may think that you have had to do a good deal more work to get your degree than I did to get mine, but at any rate I like to think that we are united by this ceremony and that we shall have in common for the rest of our lives a special memory of this day.

For me it adds to the pleasure of a memorable day that among those present should be my friend Admiral Lewis Strauss, Chairman of the United States Atomic Energy Commission. I shall be referring later to the value of co-operation between the United States and Britain, but I should like to say now that Admiral Strauss' presence here symbolises a very pleasant feature of that co-operation, namely that it is founded on personal friendship between those concerned on both sides of the Atlantic. I am happy indeed that he has been able to come today.

It is, I believe, customary for the speaker of a Commencement Address to offer to the Graduating Class some words of exhortation and advice for the life that lies ahead of them. I cannot do better than remind you of some words of a great American who lived long in Pennsylvania, Benjamin Franklin: "Be in general virtuous, and you will be happy." I trust that the Graduating Class will be virtuous—at least in general—and I certainly hope they will be happy.

The idea that virtue and happiness go together is of course much older than Benjamin Franklin. I suppose it is most familiar as a doctrine of the ancient Greek philosopher Aristotle. I should like to draw your attention to another way in which Benjamin Franklin resembled Aristotle, namely in the wide range and variety of his interests and studies. Printer—for that is how Franklin began life—philosopher, man of letters, economist, statesman, he was also a scientist with a special love of scientific experiment. Aristotle too was not only a philosopher in the modern narrow sense of logician, moralist, metaphysician and political theorist, but also a natural scientist of the first magnitude; indeed it is sometimes held that the fundamental influence in his approach to philosophy and in the whole of his thought was his study of biology. Aristotle was the complete philosopher in the original wide

sense, that is to say a lover of wisdom in all its forms.

In the modern world the natural sciences are the foundation of our civilization. Science has transformed man's way of living. Ours is an age of triumphant scientific achievement. It is also an age of scientific challenge.

Not many months ago the first Russian sputnik startled the world. The sputniks, and all the scientific and technological achievements of which they are a symbol, are a challenge to the free nations. We claim that the free way of life is better than communism. The message of the sputniks is: prove it—prove it in the test of achievement.

It is not the only test, but it is one that the free world must meet. I believe that we can do so. In my job as Chairman of the United Kingdom Atomic Energy Authority I have the privilege of working in close association with leading scientists on both sides of the Atlantic. I believe that our scientists are second to none.

But there are not enough of them. Neither in your country nor in mine are we producing enough scientists for our ever growing needs. Nor in proportion to our population are we producing anything like so many as the Soviet Union.

That great Englishman, Sir Winston Churchill, has written: "It is only by leading mankind in the discovery of new worlds of science and engineering that we shall hold our position and continue to earn our livelihood. It is our duty to muster and conscript all the native ingenuity with which God has blessed and endowed us. We must provide technical education as high as any that exists. We must be content with nothing but the best." In Britain Sir Winston has in this as in so much else himself set an example. He has taken the lead in founding in my own university of Cambridge a new college, to be called Churchill College, which will be specially directed towards technological studies.

The root of the matter is in education. This is not a race which we win or lose in a moment of time by matching or not matching this or that particular feat of technology. What matters is our general standard of achievement over the broad front and over the years. Our schools, colleges and universities must give us in full measure the scientists of tomorrow, on whom we shall depend.

Most of you who are receiving your degrees today have I believe been studying scientific subjects, and you will need no words from me to stress the importance of education in them. But when just now I referred to Aristotle and Franklin it was not simply to claim them as scientists, but to draw your attention to the fact that they were learned not only in the natural sciences, but also in the humanities or liberal arts. In the past such a combination has not been uncommon. Today it is becoming as rare as it is valuable.

Combination Is Rare

It is easy to see why it should become rare. Partly it is a consequence of the sheer volume of accumulated knowledge. As the volume of knowledge grows, the proportion which can be grasped by a single intellect becomes ever smaller. This is conspicuously true of scientific knowledge, but it is no less true of other studies. The result is a continuous trend towards specialisation.

This has been illustrated for you in the University by the way your studies are arranged. You have chosen a particular subject, or group of subjects, and specialised in it. You will find that later in life you tend even more to concentrate on your own particular field. More and more, in our studies, and in our careers, we specialise. We live today in an age of specialists.

Specialisation, used in the right way, is a valuable tool. It is one of the most important tools of our civilisation. But it is only a tool, and I want to suggest to you that it has its dangers.

In the first place, it can be carried to excess. In excess, like other excesses, specialisation deforms a man.

We can take an analogy from the development of the human



Sir Edwin Plowden
Commencement Speaker

body. In a well developed body all parts, all the limbs, are developed to the same degree and in just proportion and balance. Overdevelopment of one limb deforms a man's body. In the same way overdevelopment of one line of thinking, to the neglect of the rest, deforms a man's mind. In the mind as in the body, the ideal is proportion and balance. It is a commonplace to say that a man needs a balanced outlook, so commonplace that we tend to forget what it actually means. Yet the phrase is true in the full and precise meaning of the word "balanced."

Consider the man who is totally absorbed in his own specialism. What a lot he misses. Here is the world spread before him in all its wonder, variety and colour, and he insists on looking at it as if through a single high-powered telescope, and that on a fixed line. If it is trained on a cornfield he may see every detail of a single ear of corn, but he knows nothing of the beauty of the hedgerow.

Such a man misses most of the joy and interest of life. To that extent his narrowness harms the man himself. It is all too easy for it also to harm others. However expert we become in our own line and however absorbed in it, we must be able to stand back and see how it fits the general pattern of things. Like it or not, we have to live in the general pattern of society.

We may think of society as an orchestra. Not only must each player be expert in his own instrument but he must play it in proper combination, in proper balance, with the rest. The narrow specialist is like a player in the orchestra who looks only at his own line of music and never at the whole score or at the conductor. Before long he will be playing too loud or too soft or out of time and spoil the performance of everyone else.

This brings me to a second danger in specialisation. A specialist in one field is apt to underrate the value of specialists in other fields. I am thinking particularly of the sciences on the one hand and the humanities on the other. Too often (and perhaps over-specialisation in education is to blame for this) something like an iron curtain divides the two.

Humanities Stressed

In a civilised society we need specialists both in the natural sciences and in the liberal arts. The material progress of our civilisation is the achievement of science, but it is the humanities which hold the key to the moral and intellectual values by which our material progress should be guided and must be judged.

Achievement in both fields, and a balance between them, are the characteristic of the truly civilised society. Consider the opposite extremes. Imagine a people who had the most wonderful philosophy and the most wonderful art, but no science of any kind. They would live like savages in caves. We should not call them civilised but barbarians. Conversely a society whose achievement was

only in science would be essentially barbarous.

The same applies to the individual, and here, I believe, is the clue to reaping the benefits of specialisation without the dangers of which I have been speaking. We need our specialists, both scientists and humanists; but in neither case should they be narrow specialists.

Just as an exclusively scientific society would be barbarous, so the individual scientist who has no knowledge of the humanities is, if I may so put it, a sophisticated barbarian. So is the humanist who knows nothing of science. The remedy is clear. Those who are scientists have a duty to themselves and to their fellow men to acquaint themselves with the humanities also. Equally those who like myself were educated not in science but in the humanities have a duty to acquaint themselves with the sciences, with the ideals and ways of thought of scientists.

I want to emphasize that this argument applies both ways. It is not uncommon for scientists to claim that non-scientists are deficient because of their ignorance of science, and it is not uncommon for non-scientists to complain of the narrowness of scientists. In fact narrow specialists of either school are equally deficient. I am not suggesting that we can all become experts in both fields, but we can at least understand what those who work in the other fields are trying to do, and give them our respect.

Must Deal With People

There is a practical point here too. Constantly in life we have to deal with people who are expert in other fields than our own, and we may have to make decisions affecting them. Experts sometimes dislike decisions which affect them being taken by those who are not expert in their field. But in order to deal with an expert in a particular field it is by no means always necessary to be an expert yourself. The conduct of life would become impossible if it were. You may remember Dr. Johnson's remark: "You may scold a carpenter who has made you a bad table, though you cannot make a table. It is not your trade to make tables." You need not be a carpenter to recognize a bad table, but you must at least know what a table is for and have some experience of using it. Similarly in a world which depends so largely on the achievements of science we must have at least some acquaintance with science if we are to have any understanding at all of many of the issues of our age.

A university education helps us to bridge the gap between the humanities and the sciences in two ways. In the first place, while we are at university we live and work with people studying other subjects than our own. We probably make friends with them, and so acquire some understanding of the way their minds work and of their interests.

Helpful Foundation

This is a helpful foundation, but in another way a university training is ever more important. For what is the essence of a university education? At a university we acquire knowledge. For many of us the knowledge so acquired is something that will be of daily use to us in our later life. But the acquisition of knowledge, useful and important though this may be, is really no more than a by-product. In the process of acquiring knowledge, in the process of learning, and especially of learning at the advanced levels of a university course, we exercise our mind in a particular discipline. That exercise and that discipline give the mind a new flexibility, power and agility. That is the real benefit of a university education.

A mind thus trained not only provides skill in a particular discipline but can be turned profitably to any other discipline. The capacity to apply his mind successfully to unfamiliar problems and to unfamiliar fields is the mark of the truly educated man. It is the key to the ideal of balance of which I have been speaking.

I believe that today we have a special duty to pursue this ideal

of balance, both in ourselves and in our society. I referred earlier to the Russian sputniks. Is not the free world's real answer to them the balance that we maintain between science and the humanities, and our success in both?

We must take up the challenge of Russian science, and meet it with all the skill and ingenuity of Western scientists and technologists; and we must see that our educational system gives us the scientists we need.

But science alone is not enough, for the challenge is wider than science. It is a challenge over the whole range of human life, over the whole range of human spirit. On our side of the Iron Curtain we claim to stand for freedom. It is our duty as citizens of free countries, to demonstrate in our society the full fruits of freedom. We must show to all the world the full splendour of human genius in all its forms, not only in science but in the whole field of ideas, in one complete and balanced whole.

We must show too that free countries can work together. We often speak of the Soviet Union and its satellites as the Soviet bloc. It is an expressive term for a cooperation at once massive and powerful. We may deplore the methods by which this cooperation is achieved. But it is effective. Free countries work together in a different way. Theirs is the cooperation not of a monolithic bloc but of free partnership. We must show that free partnership is no less effective.

When I speak of partnership between free countries as an Englishman I naturally think first of the British Commonwealth, that great band of free nations and peoples, rooted in tradition and history and bound together today not only by the spiritual ties of common ideals but also by material ties of common advantage.

But this morning it is appropriate for me to dwell especially on another great free partnership, the partnership between the United States and Britain. Formally we are joined together by the North Atlantic Treaty Organisation, but the links between us are of course far deeper and wider than that. We are partners in a whole way of life. We have a common history and a common language. We have common ideals, the ideals of freedom, of the democratic way of life, of spiritual values, of the value of the individual. We have the memory of alliance, and of victory, in two great wars.

Atomic Cooperation

The importance of these links between your country and mine needs no stressing. They are the foundation of the strength of the free world and of our hopes for the future.

In no sector of our relations is cooperation more important or more valuable than in the field of atomic energy. Nowhere are greater benefits to be gained. The story of cooperation between the United States and Britain in atomic energy matters goes back a long way, to 1941, when British and American scientists worked side by side to produce the first atomic bomb. Since then both you and we have built up great organisations, and great advances have been made on both sides of the Atlantic not only in the military but also in the peaceful uses of nuclear energy. We have always kept in close touch, and this cooperation is of enormous benefit to both sides.

Not only in atomic energy but generally, it is part of the duty of our two countries, as leaders of the Western world, to set an example to show how two great nations can work together for their common benefit. Let me again quote Sir Winston Churchill: "Technological progress . . . is a theme on which the English-speaking peoples can and must work in concert, disregarding national boundaries and seeking unity in the benefits their joint efforts can offer to all men". That is an ideal both for technological collaboration and no less for the whole field of relations between our two countries. Nearly 2,500 years ago there was a famous saying in the ancient world that the city of Athens was the school of Hellas, that is, an example to the whole of Greece. Today let us try to make our two

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