

EDUCATION AND NATIONAL SECURITY

Dr. John D. Miller

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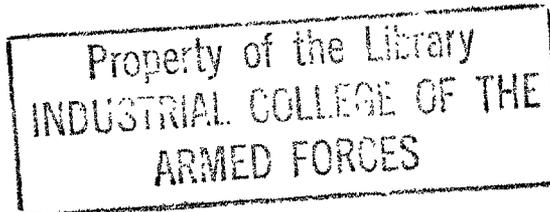
Education and National Strength

1 November 1962

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ADMIRAL ROSE: An educated citizenry is one of the essential components of our national life. How can we be assured that America's schools are making their optimum contribution to our strength as a nation?

Our speaker this morning has devoted many years to problems of education and government administration. You've read his biographical sketch and have seen the jobs that he has had. Now he is President of Miami University at Oxford, Ohio, and he is a Member of the Board of Advisers of the Industrial College. It's a special pleasure for me to introduce Dr. John D. Millett. He will speak on "Education and National Strength."

Dr. Millett, we welcome you back.

DR. MILLETT: Thank you very much, Admiral Rose. Ladies and Gentlemen:

I'm going to have to modify the subject just slightly and concentrate attention upon higher education rather than try to include elementary and secondary education as well. There are lots of things I'd like to say on the subject of elementary and secondary education, but if once started I'm afraid we'd find it difficult to extricate ourselves from some of the difficulties that this whole topic presents. I shall try to cover a good deal of ground as rapidly as I can, and skip over some things with very little attention. However, if some of these items seem of particular interest to you I hope we may come back to them in the question and answer period that follows.

We have a peculiar system of higher education in the United States, one which

frequently surprises our friends when they visit from overseas. I'm tempted to say that in a sense it is an educational system which reflects quite well the cultural traditions of our society. It is, in a sense, a free enterprise system of higher education. There are only two words, and these have been so widely used that they have almost become a caricature at the present time; but there are only two words, really, adequate to describe what we have in this country as an educational system at the higher level. Those words are "variety" and "diversity." A good many people deny that it's even a system. And yet, in its outline it seems to me that it could come under a very broad definition of that word.

Altogether, at the present time, we have something like 2,000 institutions of higher education. At least, they're called institutions of higher education, in the United States at the present time. About 600 of these 2,000 are junior colleges offering work through two or three years of post-high school, but actually less than the baccalaureate degree. There are something like 800 four-year colleges in this country. These are mostly so-called Liberal Arts colleges, although some of them have a broader definition of educational purpose than a strictly liberal arts program. There are about 400 separate professional schools in this country, of which about 115 today are teachers' colleges. There are about 20, I believe, separate engineering schools in this country. And included in my 400 are something like 200 separate theological seminaries maintained by various religious denominations.

And finally, there is someplace in the neighborhood of 200 universities. Now, these categories I use - junior colleges, liberal arts or four-year colleges, separate professional schools - these are categories that are more or less standard in

our usage when we describe higher education in this country. And yet, the definitions that separate one category from another, shade off and it's very difficult indeed, to draw hard and fast lines. I say 200 universities. There are no doubt more than this that claim to be universities. There are lots of four-year colleges that use the title "university" in their title, but this doesn't mean necessarily that they actually have the status that we would associate with a university. Ordinarily what we think of in terms of a university in this country is an institution which offers graduate study and graduate professional study through the Ph. D. degree or other appropriate graduate professional degree.

Sometimes we include universities in this definition of universities, those that have under-graduate schools - more than four of them in the professional fields and graduate programs, sometimes short of the Ph. D. degree. But, roughly, we have, as I say, about 2,000 different kinds of institutions of higher education in this country and they operate different kinds of programs. They also have different kinds of sponsorship and this is important - very important - in any consideration of the subject of higher education.

Of these 2,000 institutions, roughly 300-some are maintained by local governments. These are almost entirely junior colleges. There are only, if I remember correctly, about eight institutions that are maintained in this country, at the university level, by local units of government. The state governments maintain around 400 educational institutions. The federal government, incidentally, has 12 that are classified as such by the Office of Education. There are around 500 privately sponsored, so-called "Independent" colleges and universities. These, by independent,

we mean are separate from any church affiliation. And then, there are about 800 colleges and universities, out of 2,000 in this country, with church affiliations, or, as we say, church-related, in one way or another. About 475 of these are related to Protestant denominations. About 308, to the Roman Catholic Church. And 24, to others.

The national interest in higher education has always been substantial in our country. But this national interest has to operate through other channels than direct control or sponsorship. As I've indicated, out of 2,000 schools, colleges and universities in this country, the federal government maintains only 12 under its own direct sponsorship. Otherwise it is state government and private voluntary groups who are responsible for the operation of our colleges and universities in America. In terms of enrollment, if you exclude junior colleges - and I think there's some justification for this because the great growth of the junior college movement has, it's true, been mostly under public sponsorship in the last few years - if you exclude junior college enrollment from the total enrollments in our country, you'll find that enrollment is almost evenly divided between public and private institutions of higher education in this country. In other words, about 1/2 of all our students in four-year institutions are located in schools operating under private voluntary group sponsorship either independent of church, or church-related. This makes it quite different, indeed, from elementary and secondary education, and this is a distinction not always understood by many people who talk on the subject.

Another aspect of this that I would emphasize is the fact that quality, which is an elusive element at best in our system of higher education, varies considerably from

one kind of institution to another. There is nothing that so insults any educational administrator as to have it suggested that his institution is not of as good quality as some other institution. And once an institution achieves a certain quality reputation, even though it may suffer and decline over succeeding years, this will never be admitted; certainly not publicly. But, in any event, there are measures of quality, although often subjective rather than objective, and such measures of quality as we do have would seem to suggest that we have high quality among public institutions and among private institutions. And we have low quality among public institutions and among private institutions. I often hear it said that all the quality education in the United States is to be found only in the great private institutions like Harvard, Yale, Princeton, Stanford, Chicago, or a few others. And I've often heard it said, well, if you want to find poor educational institutions go to the public universities. Yet, as a matter of fact, some of our public universities in this country maintain far higher standards of educational performance than many, many private institutions.

You cannot use any shortcuts in thinking about American higher education. I can give you for every one high-quality private college - and I wouldn't dare say this in Ohio, you understand - but for every high-quality four-year college in Ohio - and I think there are only five or six - I can show you 20 that won't come in the same category at all; and I'm only talking now about private institutions. Of course, you don't expect me to say anything about the public institutions. You'll bear in mind that Miami is a state-supported institution and I wouldn't dare say anything about my colleagues.

Now, our subject for consideration today is the matter of education and national strength. And increasingly we are aware that education is a matter of great importance to our national strength. I'm going to pass by quickly the subject of education as a matter of cultural importance to a society. I pass this by not because it's a subject to which we don't need to give any attention at all, but rather, because it's a subject which we ought to give a great deal more attention to than time will permit today.

I'm going to pass by the importance of education as a matter of citizenship too. This word "citizenship" in educational discussions frequently bothers me for a number of reasons. You see, there's a ready assumption that the only important aspect of citizenship is voting. The assumption seems to be that you can't vote unless you have had some education. Well, maybe it helps in voting, I'm not sure. But to equate citizenship and voting is certainly a poor definition of citizenship. Actually, the greatest^{social} contribution to citizenship that's made by higher education in our country, in my judgment, is the social mobility that higher education has promoted over all the years of our history.

Education, and higher education in particular, is the principal avenue of social mobility in our society. And I think we ought never underestimate the importance of this phenomenon in our society and the contribution higher education has made to it. Wealth, status in our society have been achieved to a considerable degree by education. And increasingly the most important professional and the most important administrative leadership positions in our society are filled by people with a college education or with more than a college education.

Just the other day I saw a study which had been made of a group of corporation executives of leading business concerns in this country, and I was interested to find that as of the present time 88% of these men were college graduates having at least a four-year college program and degree, and many of them had even more than this. So that, here's an indication, in part, of the importance that higher education has played in promoting social mobility, to the extent that we are a society of talent, or, if you please, an elite of talent, which has been realized in large part through our system of higher education.

A third aspect of higher education is its contribution to the professional needs of American society. We have only begun to consider higher education in this light, in the last few years. And it's a subject which is becoming of increasing concern and attention in the United States. I brought along as my visual aides today some books just to wave at you, on the general principle taken over from my teaching career that it's better to have students at least see the cover of what a book looks like than never to have seen the book at all. This may or may not encourage them to ever go and get the book and look at it, but at least you would hope they'd recognize it if they ever by chance should encounter it on book shelves. And I'm a great believer in the business of just going along book shelves and seeing what, by chance, you may encounter.

I brought along this book published - laid it down indeed; you see the size of it? - this book published last year by the National Science Foundation, and written by Nathan DeWitt at the Russian Research Center of Harvard University, called "Education and Professional Employment in the U.S.S.R. I bring this along and call it

to your attention. I hope, sometime if you do nothing more than leaf through it and look at the chapter headings and some of the tables, this is a tremendous book. Don't ever drop it on your foot. If you do no more than that I think it will be worth your while. Mr. DeWitt is probably a man more acquainted with higher education in Russia than any other person in our society. He has written extensively about it and this is about as extensive as you can get. The whole problem to which he has directed his attention here, and of course of concern to the National Science Foundation, is the use of education to meet the professional needs of a society.

Now, education is planned, and planned carefully, as you would expect, from a national point of view - from a communist point of view in the USSR. In our country we could not indulge and we would not want to indulge in anything like the same degree of careful planning that goes into the Russian educational system. But we've got to be concerned about our capacity, and our abilities and our progress in meeting the professional requirements of American society. In field after field today we realize that we must be prepared, and we're not always making the desirable progress that we should be making toward meeting our staffing requirements in a good many different fields such as medicine, engineering, science, university teaching, public school teaching, and a good many other professions. We realize we are falling behind.

Now, the Russians can use conscious instruments of public purpose to realize their ends. Bear in mind that in Russia the student is paid to go to a university, not the other way around. The student doesn't pay; he is paid during his period of going to a university. This means, further, that he is admitted in the numbers and

to the universities and to the programs, as determined to be necessary to the national economic plan. And manpower, as you are all obviously well aware, a very important part of a national economic plan. In addition, the remunerations provided the various professions are fixed, in substantial part by the state, and the highest remunerations are given to the professions in which they are most eager to have talent directed. This idea that there is anything like equality of remuneration among the top professional personnel of Russia is nonsense, but it is still perpetuated by some people who are studying theoretical communism but no nothing about it in practice. Actually, there are probably much greater divisions and extremes of wealth in the Soviet Union today, much greater extremes of wealth than there are to be found in the United States. A good many of our foreign friends apparently don't know this or haven't caught up with it as yet. But this is actually the case and I'm sure you've heard others say the same thing.

But, in any event, the planning in various ways and degrees, is going on in all countries of the world today, including our own country, in the use of higher education to staff the professional needs of our society as we anticipate them in the years ahead. Here in this country, especially through the Department of Labor, we are getting continuous studies of the distribution of our labor force by various categories. I trust the name of Seymour Wolfbein who is largely responsible for these studies in the Department of Labor, is familiar to all of you. It may very well be that he has or will be lecturing to you this year; but this has been a field to which the Department of Labor has been giving more and more attention in the last few years.

Of course, I'm sure you are also familiar with the basic findings and projections

which all of these studies now provide us. We know that a substantial shift in the character of employment in the American labor force is now taking place. I have here a few statistics that will illustrate what I mean. In 1910, some 50 years ago, 22% of our labor force were in white-collar employment. 37% of our labor force was in blue-collar employment - skilled, semi-skilled and un-skilled labor. 10% in service industries and businesses. 31% were located in agricultural occupations. White-collar, 22%; blue-collar, 37%; service, 10%; farm, 31%.

Now look at the distribution as of 1960. Look what has happened. In this 50-year period, the white-collar proportion of the labor force has risen to 42% from 22% 50 years ago. The blue-collar part has stayed at 37%. It has not increased as a proportion of our labor force. Service has risen slightly, to 12%. And the farm occupations have fallen from 31% to 9% of our labor force. And projections for the future indicate that the great increases will occur in the white-collar level, especially among professional and technical personnel, and there will continue to be a drop in farm occupations. There will be a continued drop in unskilled labor, for example, among the blue-collar class of employees in our society.

The implications of these trends, and these trends are roughly responsive to the demands of our economy, the implication of these trends is vital to our educational system in this country. So that, education, in order to meet professional needs, is a matter of major importance at the present time. We must have the professional qualified people we need to man the changing economy, the changing requirements of our society today.

There's another way of looking at higher education which has only now begun

among economists, and that is, looking at higher education as capital investment by our society. You are familiar, I'm sure, with the concepts of stock and flow in American economics. The three principal categories of stock, that is, of capital which we have in our country, are manpower, land and capital investment. That is, capital plant. This is the stock upon which we build our economy, or any society must build its economy. What we are only now beginning to realize is that manpower - labor supply - is not just human beings, but much depends upon the quality of the human beings who make up that labor supply.

The economist in our country today who is doing more in this field than any other single individual is a man named Theodore W. Schultz at the University of Chicago. He's the past president of the American Economic Association, a very fine person individually, I might add, and fortunately he has now gotten a great many other economists as well, interested in this whole subject. His presidential address to the American Economics Association two or three years ago was on this subject of higher education or the whole system of education as capital investment by a society. I want to wave at you at this point, another book that I would hope all of you would become familiar with.

This is a little volume published by the U. S. Office of Education. It came out about a month ago - in September, I think, of 1962. It's called "The Economics of Higher Education." This, for me, is the most valuable single volume available today, on this particular subject. This is a symposium from many different authors, that has all the faults, of course, of such a symposium, but I wish you would read in particular the sections in here that have to do with the investment in higher educa-

tion, as human capital, including the article in here by Ted Schultz. But what I find even more interesting than Schultz's article here - and I don't know why he has suddenly given it up - a year ago, in 1961, Schultz wrote a little article entitled, "Education and Economic Growth." It was published in the 60th Year Book of the National Society for the Study of Education. And I'm intrigued by one particular table which Professor Schultz uses in this article. He is contrasting the labor input, capital input, total input, into production in this country, with output between two periods of time. The two periods of time are 1919 and 1957.

He finds that total output increased 3% a year between 1919 and 1957. He finds that labor input on a weighted man-hour basis in relation to this output increased only about 1% in this period. Capital input increased by someplace in the neighborhood of 1.8 or 2% per year, but the total input of man-hours and capital together, if you use just man-hours as an index of input and capital investment - he found that these increased 1% a year, together, in this country between these two time-periods of 1919 and 1957, while total output had increased 3%. And Professor Schultz reaches the startling conclusion - I'm sure it's startling to a great many people - that the major part of the increased output in this country between the two periods of time was the result of an increase in the quality of the man-hour input between 1919 and 1957. And quality is a function of education.

There are a lot of figures being used today about how much more a college graduate earns over a lifetime than a non-college graduate; the high school graduate or the eighth-grade graduate. There are a number of different sets of figures floating around at the present time; those that I most commonly see are roughly in

such magnitude as this. We know that on the average the college graduate in a working life between 25, let's say, and 64 years of age, will earn from 150 maybe to \$250,000 more than a high school graduate, and still substantially more than this, maybe \$350,000 more than simply the eighth-grade graduate. A good many people use these figures, first of all, to insist that the students and their families ought to pay, then, for such a capital investment which returns magnificent dividends.

Others argue that the social need has a priority here greater than individual needs and achievements and that a social society should continue a substantial investment. Let's not argue that issue at the moment; it's a real and live issue in educational administration. But, nonetheless there is no doubt a fact here that those people in the labor force who are college graduates do earn more over their lifetime effort, than those who do not have a higher education. This can create all kinds of troubles. I'll stop just long enough to tell one anecdote - I've not told any today and that's a record for me - but President Eisenhower's committee on education beyond high school was in session here in Washington in 1957 or '58, I guess it was. Deveroe Joseph, the very distinguished Chairman of the New York Life Insurance Company - the Chairman of the Board of the New York Life Insurance Company and a very fine gentleman indeed - began to get kind of interested in the possibilities as to the way to finance higher education through a loan fund.

He got more and more interested in this, and one day I couldn't resist having a little bit of fun with Mr. Joseph. I'm not sure he altogether liked this, which is the usual way with some of my stories. But I still couldn't resist it. After he'd heard the story about the young woman on her wedding night who confessed to her new

husband that she had a secret that she had been keeping from him and he wanted to know, of course, what was this secret; well, she said, "I must tell you that I owe \$10,000 on a higher education." He thought for a moment that this was not altogether cricket that she hadn't told him about this \$10,000 debt. And then she brightened up and said, "Oh, but you understand that Deveroe Joseph says that I'm worth \$100,000 more than I was before I had this higher education." He shrugged his shoulders and said, "Yes, but to whom?"

Before anybody goes off on the deep end and decides that the loans and students should take care of all the costs of higher education, I have some more stories I wish to contribute on the subject.

Now, finally let me say a few words about the matter of higher education and research in our society today. I'm sure you've already been given figures about the tremendous increase in expenditures for research going on in our society. I'm told that the expenditures this year - I guess, the Calendar Year, let's say, of 1962 - will probably run in the neighborhood of 16 to 18 billion dollars for research and development just in our federal government alone. And it could be a great deal more than this that's going on in industry and business in this country. Certainly, research and development have become one of the great enterprises of our country.

Our universities are necessarily involved in this effort. The customary division of responsibility that is made is to say that our universities are the source and center of basic research; that our government laboratories and our business laboratories - industrial laboratories - are primarily involved in developmental research. Now, this is a distinction not too easy to draw. As a basic proposition I think there

is something to be said for this distinction. But, on the other hand it is also true that some of our industries - two or three in particular - do maintain some substantial laboratories where magnificent research is going on not related to any company product, not related to any particular line of company endeavor, and not geared to the idea of increasing corporate profits.

On the other hand, there are certainly also some governmental laboratories where some men have been freed from everyday concerns and given an opportunity to undertake long-range research not geared to any specific problem in weaponry or any other governmental problem of the moment.

Nonetheless, I think it can still fairly be said that our universities do remain the primary center in this country, of basic research, and it is this basic research that is constantly being utilized in the advance of our technology and in the advance of our developmental enterprises in our country. Today, in this year, our universities - our higher education as a whole - is spending someplace around a billion two hundred million dollars on research, of which about one billion dollars comes from the federal government, through various agencies. And most of this - a substantial part of it - is geared to fundamental research. There are some large laboratories that are run by universities; one run by M. I. T., as you are well aware; the Lincoln Laboratory; there's the Jet-Propulsion Laboratory run by California Institute of Technology; there's the famous Radiation Laboratory. This is in the hills above Berkley. This is primarily, however, engaged in fundamental research. There is Los Alamos which is operated under contract with the University of California. There are two or three other large governmental laboratories that are operated by

universities under contract with federal government agencies. The costs of these laboratories is included in my figure of about a billion dollars the federal government is now spending this year through our universities in this country.

But, the total cost of these laboratories may run someplace around \$350 million. The other \$650 million, for the most part, is going into fundamental research. There are some people who feel that research has become such a very substantial part of the total educational enterprise in this country today that it's threatening to engulf our teaching and other responsibilities. I don't worry too much about this because it seems to me that the fundamental importance of research in its contribution to education should be so obvious that we'll have to find ways and means of absorbing this volume of activity, keeping it in proper proportion.

This research activity is highly concentrated. I mentioned that there are about 2,000 colleges and universities in this country - two and four-year institutions;- actually, of this million dollars worth of federal money that's going into research, it's concentrated in about 100 universities and technical schools - separate professional engineering schools. The rest of the whole system - 1,900 institutions get small amounts, but very, very small amounts, and many of them get none at all. There is a high degree of concentration, which is being criticized from time to time.

There is another factor here, and that is the matter of the government's reimbursement of costs involved in this tremendous research activity at the present time in our country. We have to make a distinction, I think, between contract research and grant research. As a matter of fact, one of the military departments is in

trouble right this minute with the University of Pennsylvania on this. I don't know whether you followed that story or not; it just broke into the Press during the past week. But in any event, under contract research, government departments - and it's mostly the military, although it's also the Atomic Energy Commission which have contracts with universities - the general practice is to reimburse a university for all costs including overhead costs that are involved in the performance of research under contract.

When it comes to grants - and the grants primarily flow today into higher education through the National Institutes of Health and the biological sciences - in the National Science Foundation and the physical sciences - when it comes to grants; but there are also grants made by the military departments, fortunately. Where grants are involved, the granting agency ordinarily undertakes to meet the direct costs of research, and then only a percentage - a proportion - of the overhead costs. The university must undertake to raise the rest of the costs as necessary.

I have a certain sympathy, in contrast with my colleagues in university administration. All of them scream about the fact that grant research isn't large enough; that is, that the amount of reimbursement of costs is not sufficient. My own feeling is that there is good justification for the 20% limit that is put by Congress on overhead. This always does get me - I say this often - in Dutch with my colleagues. But I say this for this reason; it seems to be the one method of deciding what universities - and I mentioned the high degree of concentration a minute ago - it seems to be one way of deciding what universities shall receive government grants; it's those universities that are sufficiently strong in endowment, gift-power, or state legisla-

tive support to bear the other costs that are entailed. And if the university isn't strong enough to have these other sources of support, then they ought to cut down on the volume of research they are willing to undertake. This is my point of view and by no means must you consider this to be a representative point of view on this particular subject.

From the point of view of the institutions I want to emphasize fact because I think it's not commonly understood in America, but in most part, the tremendous effort now going on by higher education in the field of research has been made possible by federal government funds. Federal government support of higher education is actually primarily in this field of research and not in any other field. And the government investment here - very heavy indeed - one billion dollars this year; this government investment is what has made research on the present scale possible by higher education.

Let me give you, just by way of contrast, one figure. I find from some studies made several years ago that in 1940, on the eve of World War II, the total expenditures for research by all universities in America was \$27 million. This year it's one billion two hundred million. This is what has happened in just a 20-year period, in higher education in this country. But this great change - and it is a tremendous change - has been made possible only by the substantial federal government investment in this field of research.

I hope all of you have had an opportunity to see this little report that was issued by the Office of the Secretary of Defense in June 1962, called "The Changing Patterns of Defense Procurement." I don't there has been any document that has had such an

impact upon higher education in recent years as this little mimeographed document. I got this particular copy from ~~my~~ Senator from Ohio, Senator Lausche, who's not happy about this report. I trust you read about his unhappiness. But, in any event, what this little report shows is a great change in geographical distribution, of Defense prime contracts as well as in the objects of procurement. As you would expect, the great increases have been in the field of missile procurement and in the field of electronic equipment. The result of this is in the volume of Defense procurement is so large in our economy today, the result has been that the changing pattern of objects of procurement and geographical areas in which the procurement has taken place has had a substantial impact upon the economy of many states, especially states in the Middle West.

In the Middle West we are quite worried - in Ohio, Michigan, Illinois and Indiana - every one of these states is very much concerned about the statistics which are shown in these figures. And we're coming to realize that maybe one of the explanations is the relationship between higher education and Defense procurement; between research done by our universities and the support provided our universities from private sources and state sources in what's taking place today in Defense procurement.

I saw a statement just the other day by Jim Webb of NASA in which he said, "No state and no area of this country today can afford not to invest heavily in the research activities of its colleges and universities." And I suspect there's a great deal of truth in this. I'm sure this little study which came out of Mr. Gilpatric's Office last June, is going to be quoted a great deal in the next Congress and it's

going to be reflected in the legislative halls of our state General Assemblies when next January rolls around.

I've tried here, then, briefly to suggest to you the inter-relationships between higher education in particular and national strength. The inter-relationships are substantial, indeed. And they are relationships which I'm convinced will increase and become more important rather than less important in the years ahead. You cannot today analyze our Defense procurement operation; you cannot study our economic strength; you cannot analyze our manpower, resources and requirements without giving the most careful attention to the role of education and to the particular role of higher education in this circumstance. The strength of higher education more than ever before is going to have a great deal to do with the strength of our economy and of our nation in the years ahead.

Thank you.

QUESTION: Doctor, the United States has apparently strong emphasis on the actual humanities, whereas in Russia there has been a total disregard for these subjects with emphasis on engineering, mathematics and the physical sciences. Would you comment, sir, on the advantages or disadvantages to our national strength of these differences in attitude?

DR. MILLETT: Well, I think this difference in attitude - and it's a very real one; you're reporting the facts correctly - is a fundamental indication of the differences between our two societies. The Russians don't want any attention paid to those particular subjects that emphasize the role of the individual. And our work

in the humanities in this country, to some extent or a lesser degree, the work we do in the social sciences, are all geared primarily to emphasizing the importance of the individual in society and suggesting the basic proposition which I assume is a tenet of our culture that the individual exists not for the benefit of society, but for his own self-realization, and that society owes an obligation to help the individual in this effort of his. Now, this idea is entirely contrary to the social, political philosophy of the Russians.

If you read, for example - and I've never seen it published anyplace in this country except in the back of a little Penguin book brought over from London, called "Khrushchev's Russia," by a British journalist - Cruikshank, I believe - in the back of that book you'll read or find there the official explanation given in Russia why Pasternak's novel, Dr. Zhivago, was not published but rejected in Russia. If you want to see a vivid illustration of the differences between our society and the Russian society, I've never found them more clearly and more beautifully set forth than in that statement. And as I say, you'll find it in the back of this little Penguin book called "Khrushchev's Russia."

QUESTION: Sir, would you give us the reaction of the educators to Admiral Rickover's comment on American education?

DR. MILLETT: I'll be careful. Yes; I would say this; that getting away from extremists on both sides - we have them in education just as you have them in any other profession or walk of life - getting away from the extremists on both sides I would say the general reaction to Admiral Rickover's criticisms would be this. We recognize that a part of what he has had to say is a legitimate constructive criticism

of American education at all levels. On the other hand, we think that the Admiral has misunderstood an important difference between American education and education in other countries. And I mean Western European countries like England, France, Germany, Italy and elsewhere. We have undertaken to educate a larger proportion of our youth at a longer age range than any other society in the world. We have done this, I guess, primarily because we fortunately have enjoyed the economic resources that make it possible.

The university world, for example in England, embraces about 6% of the university age population. In our country our university world embraces at the university age group of between 25% and 30% of the age group. If Admiral Rickover would compare in quality the education given to the top 6% of our university students in terms of ability with the kind of education given to the whole university world which only goes to 6% of the youth of England or Germany or France, then he would be comparing like endeavors, and I believe he would find that our efforts do not compare unfavorably with the English. As a matter of fact, I'll go a step farther. I believe he or any of us would find that our education for the top 6% of our young people in terms of intellectual ability is superior to the education provided in the university world anyplace else. Now, maybe this is just American chauvinism, but I really believe this.

I've seen educational systems all over the world. I've studied them; I've had a chance to participate in them; I once spent a year in a British university. I think I know something of what I am talking about. And this would be my judgment. Now, when you compare the rank and file of 30% of our youth who vary substantially in

intellectual ability, and if you go to talk about the lower 6% of this 30%, let's say, of our youth in universities they would compare very unfavorably. But I don't think you can compare the proportion of our population in our universities, who are never permitted to go to a university in England - with the English group - this is where we part company in the educational world from Admiral Rickover.

Now, we can do a better job. None of us is satisfied with our American system of education at any level. It needs to be improved. It needs to be improved a great deal. We can do still more. There isn't anything wrong with American education at any level that several million dollars more wouldn't cure.

QUESTION: George Sokolsky who is a syndicated columnist recently wrote a very critical article concerning our educational system. His chief complaint was that professors, he said, spend too much time writing and researching rather than teaching, and that they leave the job of teaching undergraduates to the graduate assistants. Would you comment on the validity of this charge?

DR. MILLETT: Oh my. I suppose this issue is as much debated in colleges and universities today as any other single issue. There isn't any question about the fact that our top talent in our best universities is devoting its time primarily to research. I don't think there is anything wrong with this. Research, as I tried to suggest in my remarks a few minutes ago, is a matter of grave national concern in all areas; not just the physical and biological sciences, but the social sciences and humanities as well. I think there's a great deal to be done here. Remember that the results of research and published, are diffused throughout the entire educational system, whereas the teaching efforts of an individual man will go only to the students

of that particular institution.

I made fun a few moments ago of Seymour Harris. I'm very fond of Mr. Harris. We're very good friends even if we don't agree on a great many different things. But Mr. Harris' teaching load at Harvard shocks me. It could only be true at a place like Harvard with the wealth of Harvard. I remember being at a meeting a couple of summers ago - in 1959 - a little group out on Long Island, with Mr. Harris, and I couldn't help but have a little fun. I said, "Seymour, just how much teaching are you doing anyway?" Well, he was teaching three hours. I said, "That's wonderful; three hours a week. Someday I want to go back to being a professor; it's the only decent job in America."

But, the benefits of Seymour's writings and thought are diffused to all of us and available to all of us. The same thing would be true in physics or any one of these other fields. I'm a social scientist myself; I'm not competent to say very much about the physical sciences or the biological sciences. But I remember an experience that made a great impression upon me in my last year at Columbia. I was serving on a university committee and one of my colleagues was from the Physics Department. He has a marvelous name. The only way in a great university like Columbia that you ever get acquainted with anybody from another department is to have to serve on a university committee. You gripe like hell because they get you involved with a committee, but then you do meet some interesting people; that's the only thing I can say for committees.

Anyway, I served on this university committee and I met this gentleman from the Physics Department with the delightful name of Polycarp Kush. I got quite well

acquainted. In fact, we became very good friends. At the end of the year of work - and it turned out to be also my last year at Columbia - he mentioned to me that he was not going to do any teaching the following year. And, as a matter of fact, for two years he didn't expect to see a single student at Columbia. He was going to spend all of his time in his laboratory, thanks to support from the federal government, for research that he was interested in. And I couldn't help but make the usual sour remark of a social scientist that it must be wonderful, indeed, to be a physicist these days in a university community. And I shall continue to make that sour remark, I'm sure, for some time to come.

But, in any event, this is what happened. But five years later I read in the newspapers that Polycarp Kush has been awarded the Nobel Prize for physics. Now, this is what the concentration upon research makes possible. In our smaller colleges there is a concentration on teaching; even in some of our middle-size institutions - and I would put Miami in the middle-size category today. - there is a greater concentration upon teaching than upon research. And, by the nature of our student body, the nature of our resources, the nature of our staff, this is the necessary emphasis.

But, our teaching wouldn't amount to a thing if we weren't able to draw upon the great research results that are coming from the places where there is concentration on research. So, I think Mr. Sokolsky is wrong in criticizing.

Sure, I can see from the point of view of the Harvard Freshman who gripes because - and these are very, very bright freshmen, I might add, the brightest in the country. There's only one place more highly selective today than the Harvard Fresh-

man Class and that's the CalTech Freshman Class. There they all score 800 on the College Entrance Examination. I asked the Admissions Officer of CalTech the other day if he had any below 800 this year. He said 3. I don't think he was kidding. I'm kidding. But - sure, the student is disappointed in the fact that the professor comes in sometimes in a kind of lackdaisical or even distant way; his thoughts not on the lecture. He may repeat some notes from last year or the year before; you're lucky if they don't go back any farther than that; and the professor obviously indicates he is glad when the lecture period is over.

Yet, don't ever underestimate what most of these men are contributing to the advancement of knowledge in our country. This is a major challenge of our time.

QUESTION: Dr. Millett, I'd like to explore a little bit further your reference to the relationship between the university and the economic strength. You referred to the Mid-West area and that they're worried at this time. Now, shortly before I left that area I was exposed to the statistic that within a 250-mile radius of Dayton or Oxford there were given more technical degrees last year than in the entire States of Massachusetts and California combined. Now, if this be true, what other relationships may exist? Presumably these graduates are moving out of those areas. What other comparisons can exist between the educational institutions and economic experience? What would that lead to?

DR. MILLETT: I'm very glad you mentioned this because this is an important point and a very important point; one that is frequently overlooked. Just the educational system as such is not enough, I think, in terms of economic development that is talked about in Mr. Gilpatric's report. There have to be the research facilities

and resources, and an inter-relationship between these research resources and industrial development if you're going to have economic growth in some of these areas today. What is happening in Ohio - and the figures that you mentioned are correct - what's happening in Ohio is that such graduates as we have produced - and it's happening in Michigan, it's happening in Illinois, it's happening in Wisconsin - and the graduates we produce, let's say at Ohio State, in physics and chemistry, will, for the most part, I think, compare favorably with graduates in these fields from almost any other university in America. They're being hired away to California or Massachusetts because there are the research facilities, both university and industrial, which are closely geared to the exotic industries of our day. I don't know whether "exotic" is a good word or not. At least I see it in the newspapers these days all the time so I'll use it. Exotic, I guess, means missiles and electronics. I don't know what else it means. It does not mean "belly-dancers."

QUESTION: Sir, in view of the fact that the universities apparently are not turning out as many of the people that we need for industry, would it be useful for the federal government to give aid in counselling, or can the universities do a better job of counselling?

DR. MILLETT: I wouldn't accept your basic proposition that we are not, in higher education, turning out the people that our society, including industry and government, needs. We may not be turning them out in the numbers that would be highly desirable. If we are not - and there is some evidence which may suggest our numbers are deficient - if we're not turning people out in sufficient numbers, it's again partly because of a lack of economic resources made available to the

higher educational enterprise.

As far as counselling is concerned, at the college and university level I don't believe there are any substantial deficiencies here. There have been some deficiencies and are continuing to be some deficiencies in counselling at the elementary and secondary school level; deficiencies in this sense; that some of our brightest talent is not being encouraged through counselling to continue in education and encouraged to go on to colleges and universities. But I don't believe that this particular difficulty is present so much at the college and university level. The work we do in counselling may not be as good as it ought to be, but there certainly is a lot of it being done and for the most part our best talent is being encouraged to go on to graduate work.

I met the night before last with a little group of high school students, at their request, in my home community. I was very amused that they should want me to meet with them. This was a group of top seniors and juniors in our local high school, in Oxford, a group of about 40 youngsters. They asked me, among other questions, this one. They said, "What is the difference in opportunity between medicine and science in this country at the present time?" And they included, or at least we decided to include engineering in our definition of science. I had to make this statement to them as a reflection of facts as I understand them. That is, that any student with a good record in college today in physics, mathematics, chemistry, or any one of the biological sciences, can have a graduate fellowship to any graduate school - any quality graduate school - in this country.

We are now providing substantial help to individual students to begin graduate

study. Moreover, as I just mentioned here a moment ago, in our big universities we are using graduate students for more and more instructional tasks. And so, if they don't have a fellowship they have a graduate assistant-ship which, in many ways, is even more interesting and more challenging than a straight fellowship. So that, for any student of ability with the least little bit of motivation the opportunities now in this country to go on to engineering for a Ph.D. in engineering, or a Ph.D. in the physical or biological sciences, these opportunities are almost unlimited. And I'm sure this will continue for some time to come.

On the other hand, in medicine it's a long, hard grind. And one reason why the numbers of candidates for medical schools in this country is showing a precipitate decline is the expense of medical education and the absence of student fellowships in this field. The federal government is providing substantial fellowships in science and engineering. But the federal government provides not a single fellowship in medicine. Moreover, other resources - corporate and foundation resources in medicine, for fellowships, for student aid, are almost non-existent. Now, there's a reason for this. I don't know how we're going to lick it in this country. The medical student, from 22 years of age to 32 or 34 years of age in this country, works harder than any other student in the American educational system, and starves to death in the period.

I know what I'm talking about because my second son who graduates this year from college is going on to medical school. And I must look forward to providing ten years of economic support to him to become a doctor. Now, I'm glad to do this. I just hope my financial resources will be equal to the challenge. I've postponed

some automobile purchases and other things to help him go through medical school. Now, after 35 years of age we pay the medical profession in this country higher than any other profession. It's because of the earning power of the medical profession after 35 years of age that our Congressmen and others say, "To hell with providing them with any support between 22 and 32; let them starve." And I don't know how we're going to lick that problem. But that is the problem in medicine today. You see. When you go into medicine you have four years of medical school after a college degree. You have one year of internship. You have two years of military service. You then have from two to five years of residency to pass your American boards under whatever your field of specialization is. Then you're qualified, presumably, to start practicing.

As an intern I think you get \$100 a month. I've heard of a few hospitals that have now increased that to \$150. I don't think it's very much. And, as a resident - and this they never mention on Ben Casey - as a resident I believe the going rate today is either about \$200 or \$250 a month.

QUESTION: Would you comment on the expansion that will be required in the future and where it will probably take place?

DR. MILLETT: In higher education?

QUESTION: Yes sir.

DR. MILLETT: Well, of course, the simple fact that all of us realize, although the full impact hasn't yet occurred, is that the number of young people of college age in our population is about to undergo a terrific expansion. The increase in birth rates in this country after World War II was large - almost doubled - and it is, of

course, now going to result in almost doubling the college-age population in our society. The first youngsters of this so-called "Tidal Wave" will reach our colleges starting in September 1964. These will be the youngsters who were born in 1946.

And then from that time on these numbers will go up until we have a very substantial number, indeed, of college-age students in our society. It will be roughly something like 12 to 15 million youth of college age compared with something like 7 or 8 million of college age today.

Another thing that's happening, which my statistics were intended to suggest a few minutes ago having to do with occupational demands in our country, a larger proportion of our youth are going to college. In 1900 only 4% of our age group - college age group - were in higher education. That number passed 6% only at the end of World War I. It was up to 20% on the eve of World War II. Today about 1/3 of all high school graduates are going to a four-year college in this country, and it's an even larger percent in some states than in others. If you include junior colleges here and other forms of education beyond high school, as many as a third of our total age group is now going to some kind of educational institution after high school.

Now, if this proportion should increase to 45% we have both a larger number at a constant proportion simply because of the larger age group, and we'd have a larger number because of the increasing proportion of the age group going to college. It is generally expected that college enrollments in 1970 will be about 2/3 to 3/4 larger than in 1950, and 1960 even. Frankly, I'm not sure that this is going to occur in our country, because I don't see yet the availability of the resources for such an expansion in our education. To be sure, we've had great expansion since the end of World

War II - very great expansion.

We have this year about 4 million youngsters - older people too; all age groups - enrolled in colleges and universities in this country; a little over 4 million. I haven't seen the official figure yet for October 1st, but I know it will be about 4 million. In 1940 the corresponding figure was about 2 million. So, you see, we've had a doubling of our college enrollments in 22 years in this country.

Now, this is a great expansion. Actually, I doubt if any of us is really qualified to take care of the 4 million students we have now. We have not caught up in physical plant, in quality of instruction, with the student body we now have. I'm not at all certain that we can double this 4 million to 8 million within the next ten years between now and 1972. And if we do I'm afraid we may have a serious deterioration in quality. It depends again upon the resources that our society is going to be willing to make available for higher education. But this is the magnitude of the burden that faces us and I don't know what the response is likely to be.

QUESTION: Dr. Millett, would you give us your views on the value of the junior college in our higher educational system?

DR. MILLETT: Yes; I'll try to do so, rather quickly. The junior college serves two very useful purposes. One purpose is economic. It provides educational opportunity near at home and reduces the cost to the student, of going away to college or university. And with more and more cost of higher education tending to fall upon the student, this is a real economic advantage. And has a corresponding social advantage in terms of social mobility of educational opportunity that I mentioned earlier.

The second advantage to the junior college is a kind of weeding out function which it performs. Our four-year institutions are going to become more and more selective in the years ahead because the numbers they can take care of are limited. The point I'd like to make is this: I don't care how selective you are, there is no selection system known to higher education which does not make mistakes. And while I am a great believer in selection I am an equal believer in the fact that we must at the same time provide an opportunity for young people to demonstrate in practice whether they are qualified to do college-grade work.

I happen to be Chairman of the Board of Trustees of the Educational Testing Service. I think I know something, as an amateur - purely an amateur - about the testing movement in this country. I know that the greatest fault is the misuse of tests and the attempt to use them for purposes they were never designed to fill. None of us who are interested in tests feels that this can ever be a reliable single instrument of selection. It is not; it's a guide, an aid, a necessary assistant; but it's purely that. It's a single tool. And anybody who uses it as a sole tool is just crazy and doesn't know anything about testing. And I'm talking now about ability testing and achievement testing; I'm not talking about psychological testing. Please bear that in mind. The Educational Testing Service does not do psychological testing, so help me.

In any event, we know that in achievement testing, in an attempt to test and identify academic - so-called academic ability - we are right in about seven out of ten cases. And our batting average is not higher than that. I think an opportunity must be provided the other three to demonstrate that our test judgment was wrong. And

the junior college is one of our greatest instruments for doing just this.

QUESTION: Sir, would you comment briefly on the prospects of a second career as a teacher for retired Army, Navy and Air Force personnel?

DR. MILLETT: I'm very glad you raised this question because I think the opportunities are substantial. Now, at the same time we expect faculty members to go ahead and acquire advanced degrees. Maybe some of you have had occasion to find out already about the Purdue program in mathematics. What's it called; the "Retread Program"? It's a good program. We have on our faculty at the present time two or three persons whom we've acquired. One is a former Marine Colonel and I guess the other two were Navy Captains. They are teaching mathematics on our staff. All three men are doing a very fine job. Now, they obtained a Masters Degree at Purdue.

These men, if they want to go beyond teaching freshman and sophomore mathematics, ought to go ahead with further advance graduate study. I think the opportunities for such advance study in other fields, not just mathematics, is very substantial. We're going to need a great expansion of our staffs in the next ten years. As I said, the real need for expansion is just now beginning to come up on us and we're going to have to expand greatly. In the next ten years we're going to want to use more people out of industry on a part-time basis. We're going to want to use more people out of government service on a part-time basis. But we're also going to want to find more people who are retired, who have the ability to teach, and I can't imagine anybody with a greater ability to teach than men from the Armed Forces. After all, most of your experiences have been in the field of teaching.

Officer personnel, after all, this is your job. I very much in favor of this and I think that other educational administrators are too. I'm hoping we can have a very rich resource for future staffing needs from the officer personnel of the Armed Forces.

CAPTAIN HYDE: Well, Dr. Millett, we certainly appreciate your very kindly remark at the end. We appreciate also the benefit of your experience, knowledge, and your excellent coverage of this very broad field. Thank you very much.