

The Teaching Profession — Forty Years of Change

Today, America is more alert to the values and problems of education than ever before in our history. As a nation we have always been devoted to education — but today the concern for more and better education permeates every aspect of our national life

by Lee A. DuBridge

During the past 40 years, the problems facing the American educational system have multiplied at a dizzy rate and have grown vastly more complex. Every time we think we have conquered one problem, we discover that a dozen new ones have appeared in its place. We are not even in the relatively happy position of the Red Queen in *Alice in Wonderland* who, by running very fast, could stay in the same place. In education, we seem to run twice as fast and still be going backward.

In the year 1925 there were about 750,000 students in colleges. Today there are 5,000,000. A good-sized state university might then boast of having 6,000 or 7,000 students, while today the same institutions would have 25,000. Nevertheless, I remem-

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ber very vividly that for a young instructor in such an institution, which was small and cozy by modern standards, there was no nonsense about any eight-hour day or five-day week. I faced students in the classroom or laboratory for 20 to 22 clock hours each week, and graded papers and lab reports for maybe 150 to 200 different students. And *my* teaching load was fairly light because, between classes, and in the evenings and on Saturday afternoons, I was supposed to be carrying on some research — which, indeed, I did.

I am glad to say that at most major universities those days of excessive teaching burdens have passed. And yet, thereby hangs a tale which causes confusion and trouble to this very day.

In 1925 it was already painfully evident that the typical American university was no great shakes as a center of basic scientific or scholarly research. The tradition of teaching without research, and the

tradition that the little research a university professor had time to do ought to be manageable on a budget of a couple of hundred dollars a year, had effectively prevented American universities from becoming the great fountainheads of new knowledge which the British, German, and French universities had become.

World War I had dramatically revealed this weakness, and by 1925 the winds of change were beginning to blow. The great American foundations (principally, then, Rockefeller and Carnegie) began making research grants and awarding research fellowships. Teaching loads were being lightened for those with interests and talents in basic research. And the spirit of scholarship was beginning to permeate the American university. The university was now *becoming* a university.

This was most fortunate, for, by the time of World War II, America had become a great scientific center, and our scientific talents proved a decisive element in winning that struggle. That very fact, in turn, stimulated the further encouragement of research and scholarship. Government funds became available in increasing amounts, until today they largely support our very expensive and extensive scientific research activities. Private and state funds for research have also increased greatly. Today the great American universities lead the world in the discovery of new knowledge in many fields and have at the same time become far more lively centers of learning.

A flight from teaching?

And here is where the confusion arises. The expansion of research and of graduate study has meant that the typical university professor no longer carries the formerly impossible burden of undergraduate teaching. As a result, many prominent writers and critics who long for the "good old days" have charged that there has been a "flight from teaching," that the undergraduate student is being neglected, that "publish or perish" is the universal motto of American universities.

I grant that in these years of rapid change some evils of this type have arisen, and in some cases the move from teaching to research may have gone too far. In some institutions the "weighing" of published papers has been used as an easy substitute for careful judgment of the quality of a young professor's total scholarly and teaching achievements. In some places trivial or useless research and publication will be found.

But, granting such abuses, it is grossly false to assert that the quality of undergraduate instruction in

our great universities has declined in recent years. And the repetition of this charge by eminent persons who should know better has been sadly damaging to American higher education.

Actually, the reverse is true. The quality, liveliness, and freshness of undergraduate education (in the sciences, at least) in American universities has vastly improved in the past 40 years — and especially in the past 10 years. Heavy teaching loads led to bad teaching. The professor who had no time to participate in the advance of science, or even to keep informed about it, was teaching his students obsolete science. No matter how beautifully his lectures were delivered, the out-of-date professor was plainly a bad teacher. Furthermore, today some of the finest, most exciting, and most stimulating elementary science courses in our great universities are being taught by some of the nation's top research scientists. These men are willingly and gladly giving devoted attention to the challenge of bringing the best of modern science into the undergraduate classroom and laboratory.

Great teaching ability at any level is a very rare commodity. Far too few great teachers can be found. But to say that they are *only* found among those who do not, or cannot, carry on research or scholarly activities, is a gross misrepresentation. A healthy research program improves teaching — and not the reverse.

I do not believe in the "publish-or-perish, teaching-be-damned" theory. And I do not know of any other administrator in any university worthy of the name who believes this either. The *total* quality of a faculty member's contribution to the academic community is what we are always seeking to evaluate. True, we make some mistakes. True, our judgment of total quality may not agree with judgments reached by others — by students, for example. But when I see the devoted attention which faculty committees, deans, and presidents give to the undergraduate problem, and when I see the devoted attention which representative faculty members give to the improvement of undergraduate teaching, then I get pretty disgusted with those critics who decry the alleged decline of teaching, and who ask cynically, "Is there a *teacher* on your faculty?"

Graduate education

Let me add one more important factor. We often speak as though it is only the undergraduate who deserves to be taught. But please recall that in the last 40 years graduate enrollments have increased four times as fast as undergraduate enrollments. There are nearly as many graduate students today

as there were undergraduates in 1920. Graduate teaching has thus become a major responsibility of a modern American university. And no one can pretend that graduate teaching can be done without a lively atmosphere of research. The number of PhD's now being produced in America is 23 times that of 1925, and the quality of their training is so far ahead of what it was when I took my PhD that those who long for the "good old days" would, if they knew the facts, hang their heads in shame. And it is a good thing for America and for the world that this vast change in this aspect of the teaching profession has taken place, because these young PhD's are the college and university teachers of tomorrow; the backbone of America's future scientific and scholarly leadership; a stimulus to our economy, our progress, and our intellectual excellence.

Changes in high schools

Great changes have been taking place in American high schools, too. In 1900 only 6 percent of American 17-year-olds were graduating from high school, and yet 70 percent of them were going on to college. In other words, the American high school of the late 19th century was a highly selective institution and was largely a college preparatory school. Curricula were substantially devoted to Latin, rhetoric, mathematics, and "natural philosophy" — or science.

By 1930 the situation had greatly changed. At that time 30 percent of our 17-year-olds were graduating from high school, but only 36 percent of these were entering college. A high school education had become a "must" for a larger fraction of our young people — but two-thirds of them had no intention of going to college. It was inevitable that the high schools should recognize this fact. Great curriculum changes took place — sometimes too slowly; often too rapidly. Since the academic subjects were of interest to a smaller fraction of the students, more attention was given to the "preparation for life" which the others required.

The American high school became a very different sort of institution than it had been a decade or so earlier. And the task of the teacher changed, too. The high school declared its independence of the college, which was in many ways a good thing. But where college preparatory curricula were neglected entirely, the results were bad.

For along came the 1950's and 1960's, again bringing vast changes — partly due to World War II, and partly due to the population explosion, but mostly due to a vast new interest in education. Today we find that nearly all of our young people are in high

school and some 50 or even 75 percent of the graduates are going on to college. Forty-four percent of all our college-age young people are now in college.

Surely, the high school, and the teachers, now face the greatest challenge of all. College preparatory work has had to be brought back and improved. The gifted children and the average children are nearly all headed for college. Yet the below-average child and the disadvantaged child, who must still earn a living in a modern technological society, must also be taken care of in the same school or school system.

How can we possibly cope with this whole spectrum of problems, at a time when the population explosion is straining our school facilities, our tax funds, and our supply of qualified teachers to the very limit? Add to all this our long-delayed awakening to the civil rights problem in the schools, and the picture is complete. We are in deep trouble. It spills out all over: Teachers' strikes; student civil disobedience on the campus of a great university; utter confusion about the conflicting aims of life preparation and college preparation; a field day for the more intemperate critics of American education. We are expecting too much of our schools, too fast; and we blame the schools for problems for which they are not responsible.

Student unrest

Take the problem of student unrest on our university campuses. Why does unrest exist?

Partly it may be because universities are often too big, too impersonal, too inflexible. Also students are more sensitive about their independence and their "rights." However, most student revolt is a social phenomenon — a reflection of the troubles of society: the civil rights struggle; the relaxing of family ties and family discipline; a changing attitude toward certain moral codes on the part of adults as well as children; the uncertainty and fear, and the spirit of revolt which is found all over the world. And if revolt against authority is acceptable in the world of adults, why not also in the world of the student? If adults cheat, and apparently get by with it, why shouldn't the students?

But let us not get the idea that the picture is all black. A few students in open revolt can make more headlines than a million students who are quietly and earnestly going on with their studies.

Yes, some students cheat — and not only at Colorado Springs. The pressure to survive at any cost is very great. Yet, most students do not cheat, for they know that in so doing they are only cheating them-

selves. Is an honor system no longer possible? The answer is: *Yes, it is!* We have one at Caltech that has been working for 55 years and is now stronger and finer than ever — built by students, upheld by students, enforced by students, and heartily and thankfully supported by the faculty. What makes an honor system work? It works only when students themselves recognize its importance and pledge themselves not to violate it or to tolerate violations by others. It works best in small institutions where there can be a wholehearted commitment to integrity as a way of life. Maybe it works best in science, where integrity is a prime essential.

Yes, in the midst of confusion and turmoil there are many bright spots, where students and teachers are working together to improve our educational system.

Improving the curriculum

I have already noted that in recent years university scholars have taken a renewed interest in undergraduate teaching. A far more important thing has taken place. University scholars have been cooperating with *school* teachers to improve the quality of the curriculum and of teaching in elementary and secondary schools, too.

Everyone knows that there cannot be much research and scholarly work in a high school or in many small colleges. Possibly it was not surprising that high school and college courses in science were, by 1950, out of step with modern scientific advance. The student entering a university was wholly unprepared for what his teachers were talking about.

By 1950 it had become painfully evident that most high school and many college courses in mathematics, science, and other fields had stagnated during the previous 25 years. Textbooks in physics were being written and rewritten, but the only thing that was changed was the size of the type, the number of pictures, and maybe a new final chapter on atoms and electrons. There was no suggestion that atoms and electrons were at the very heart of science, not an appendix to it.

Someone was bound to do something about this, and they did. Many people participated, but the Physical Science Study at MIT brought the new movement into focus, and prepared a wholly new type of high school physics course, complete with textbooks, outside reading, new laboratory experiments, and teaching aids, such as films and demonstration equipment. And, through the National Science Foundation, thousands of high school teachers have been trained in this new approach and in the

use of the new materials. This movement then spread to mathematics, to chemistry, to biology — and now to nonscience fields as well. About half of the high school students of physics in the country are getting real modern science — not just the pulleys and levers of the 1920's. This development, along with the concurrent expansion of advanced placement courses for college-bound students, has vastly improved the preparation of the freshmen we have been admitting in recent years.

This movement is not complete. It has only begun. To carry it on is, in fact, a never-ending task, for science changes every day, and ideas for better ways of presenting it to young people change also. The new courses and the advanced placement courses will be substantially changed and improved.

But the essential part of the new movement is this: For the first time in the past 50 years or more, the high school teacher, the college teacher, and the university scholar are working together on the problems of teaching and curriculum improvement — to the vast benefit of all teachers, and to the spectacular benefit of the American student.

A second important development has resulted from the improvement of high school courses. The better prepared high school graduates have produced a great stir in the colleges. The college freshmen of today demand more of their college teachers and their college courses. Hence, all over the country one finds a new spirit in undergraduate courses in science. They are vastly different and vastly better, and vastly more in tune with the times than they were even five or ten years ago. Again, the university research scholar, who is not supposed to be interested in teaching, *is* teaching and working with other teachers to improve what is offered to students.

The revolution in course content which is going on in high schools, colleges, and universities is spreading inevitably to the elementary schools. The best evidence of this is that all over the country parents are loudly complaining that they can no longer help their children with their homework! It is, I know, a pretty distressing experience for a parent to find he has become suddenly obsolete. But he should rejoice that the schools of today are moving ahead and not teaching the same material in the same way they taught it when he was young.

Learning aids

There has also, in recent years, been a rapid development of new teaching aids, or new *learning* aids, as I prefer to call them. Films, records, tape recorders, and educational television have provided

a whole new array of tools to help the teacher do a better job. We are only beginning to learn how to use these tools effectively. They are too often regarded as devices to replace the teacher — a wholly false concept. A hammer and saw do not replace the carpenter; a typewriter does not replace a secretary. A new tool is a new opportunity for doing a better job, provided that we learn how to use it.

I have a special interest in educational television. I believe it can be the most powerful aid to learning since the invention of printing. We are barely learning to use it. We do not even know yet how to finance it adequately. But we shall learn, and the teacher, the student, and all Americans will benefit.

All of this, of course, means change. And rapid change means a certain amount of confusion and turmoil. And the turmoil, as I have said, is painfully evident. The task of the teacher, however, is not to resist change, but to promote it and guide it into the most effective channels. This makes the teacher's life exciting. Never again, I believe, will the task of the earnest and conscientious teacher be wholly dull and routine — though routine duties are, of course, always with us. The challenge and excitement of teaching today are greater than they have ever been before.

The concern for better education

Today, America is more alert to the values and problems of education than ever before in our history. As a nation we have always been devoted to education, far more so than most countries. But today, more than ever before, the concern for more and better education permeates every aspect of our national life. This is partly because we have more children; partly because our educational system is now very expensive (and Americans are always concerned about their pocketbooks); partly because education today is not only "nice" — it is essential. We now admit that the education of the gifted and the talented is necessary to our national welfare. But the education of everyone to the limits and in the direction of his abilities is also now an essential national goal. Masses of uneducated citizens are a drag on our society which we can no longer tolerate. We must have educated workers and educated voters.

The child in school is not only an important person in his own right; he is also a national asset. As President Johnson has recently reminded us, education is our most potent weapon against poverty, hopelessness, and racial discrimination. Education is, therefore, an overriding national concern. The total budget for all education in America will soon

exceed our budget for national defense. In a few years we will have one-third of *all* Americans enrolled in our schools and colleges, and many of the others continuing their education at home.

There are many paradoxes in this enhanced national interest in education. We insist that every child be in school, but we do not build enough classrooms or employ enough teachers to take care of them all. We insist on high standards; but we don't want any dropouts. We insist on basic education; but we must, of course, have "practical" courses, vocational courses, driver training, and many other things. We know that children come to school with a wide range of abilities and talents and cultural backgrounds, but we often insist on treating them all alike — moving them all from grade to grade at the same speed and in the same array of subjects. We want local control of schools, yet we are a mobile people and, as parents, we complain loudly if the seventh grade in Poughkeepsie (where we have just moved) is not at the same level as the seventh grade in Fresno. We recognize the importance of teachers, but often pay them so poorly that they have to do "moonlighting" to maintain proper living standards for their families. We are in favor of equal educational opportunity for all, but we are only now beginning to recognize that *all* really means everybody — black or white, in slum or suburb. On this point Congress has now taken some action.

But every paradox is also a challenge. And the encouraging thing about these paradoxes is that they result not from indifference to education, but from a vast public commitment to it. We criticize our schools. Why? Because we are desperately anxious to make them better. We criticize the teachers, too. Why? Because we know they are such desperately important people. Because we know that the future of America lies in their hands and it is terribly important to us that they be competent and well-trained hands.

A supremely important profession

That was not true 40 years ago. Then, the teacher was commonly regarded as a person who could do nothing else. We forgot that there was nothing else he *wanted* to do. But, today, we congratulate, rather than feel sorry for, the able young person who chooses teaching as a career. And well we might — and well we must. Teaching has become a recognized, supremely important profession. And for anyone who has a spark of interest in being of service to his fellowman, teaching can be the most challenging of all careers.