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PUBLIC AFFAIRS PAMPHLETS

HOW GOOD ARE OUR COLLEGES?

BY GOODWIN WATSON

DO YOU KNOW THAT:

Prospective teachers rank below machinists in knowledge tests?

Only half of the brightest students enter college?

Many college freshmen know more than the average senior?

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No. 26 1938

How Good Are Our Colleges?*

AN increasing number of Americans are going to college. Twenty-five years ago, one youth in 24 of college age was in college. Today slightly more than one in every seven young people of college age is enrolled in a college or university. A single generation has multiplied by four the number of college students, friends of college students, parents and employers of college graduates who are getting first-hand reports on what college is like. Naturally, a good many questions are being raised. Is a college education worth the cost? Is one college pretty much as good as any other? What do college students learn? Who should go to college?

We ALL Pay for the Colleges

Those of us who do not go to college, and most of us still do not, are also concerned. For we all help pay the bill for college educations. The student and his family pay, on the average, only about a third of the costs of higher education. Another third is paid directly to the colleges, through local, state, and federal grants. We might add also federal contributions (through N.Y.A.) to some 100,000 college students. This money comes out of the pockets of the taxpayer,

* This pamphlet was prepared by Goodwin Watson on the basis of *Bulletin No. 29* of The Carnegie Foundation for the Advancement of Teaching, entitled *The Student and His Knowledge, A Report to the Carnegie Foundation on the Results of the High School and College Examinations of 1928, 1930, and 1932.* The study was made as a part of the Study of the Relations of Secondary and Higher Education in Pennsylvania, by Dr. William S. Learned of the Carnegie Foundation for the Advancement of Teaching, and Dr. Ben D. Wood, Director of Collegiate Educational Research, Columbia University.

whether he happens to be personally concerned with colleges or not. Even that third of college costs which comes from gifts and endowment is a matter of general concern. Public policies influence the accumulation of wealth, and the government encourages or discourages, by its policy on tax exemption, gifts to educational institutions. If the colleges are filled with students who do not benefit from their college experience, then public money is being wasted. The public loses not only what it costs to keep such students in school, but the useful work they might have been doing outside. Are there students in our colleges who would do better if they were working on farms or public highways instead of in libraries and laboratories?

We might also ask if there are young men and women now working in offices or factories who cannot afford to go to college, but who might, with a college training, become outstanding leaders. If so, we are losing enormously. Who can estimate what it might be worth to have additional great scientists, talented writers, superior physicians, or master teachers in the next generation? We now provide free tuition, free board and room and laundry for feebleminded and delinquent young people. Would it be wise to extend a similar opportunity to young people with first-rate minds who cannot, as things now are, afford college and graduate study?

Don't Guess; Measure!

It is easy to collect opinions about the worth of a college education, or about the merits of a particular college. Almost any loyal student or alumnus will tell what he believes to be the good points of his school, though representatives of rival schools may emphatically disagree. During the past thirty years a scientific movement has grown up in education. It has led to the development of many kinds of careful, objective measurements, replacing opinion by dependable facts.

Nearly all of the goals of education can be measured, but it is often extremely expensive in time and money to secure trustworthy yardsticks. Knowledge, which is certainly one

of the more important of these, can fortunately be measured rather easily. For that reason, when the Carnegie Foundation wished to make a ten-year study of the education of 45,000 students in high schools and colleges of Pennsylvania, it decided to test the intellectual mastery of important areas of knowledge.

In actual practice colleges place a great deal of stress on knowledge. Graduation, honors, promotion, and permission to participate in athletics, are made dependent upon "passing grades." These are supposed to indicate knowledge. Knowledge is rather a broad term. The "walking encyclopedia," who knows thousands of bits of useless information but who cannot win the respect of his fellows, has "knowledge" of a certain kind. The wise and thoughtful man, who has an unusual command of practical situations, has "knowledge" of another kind. The knowledge that counts, for any individual, is what he has really mastered, and has worked into his thinking as a ready aid in understanding.

Grading Is Notoriously Unsatisfactory

The marks which teachers give to students are supposed to show how much the student has learned. But they are not very trustworthy measures. Psychologists have tried giving an ordinary examination paper to 100 different teachers, to mark, and have found an amazing difference of judgment. Some teachers will mark as low as 40 per cent a paper which other teachers of the same subject will mark up in the 90's. It is common knowledge among students that some teachers are "easy markers," while other teachers only rarely give a student an "A." Some teachers try to take the personality and character of the student into account, while others ignore such factors in grading. One professor gave a very bright student a failing mark, because the student had told a lie. Clearly that mark did not represent a good measure of the student's actual knowledge; it was rather a kind of punishment. Some teachers will give pupils a good mark if the pupils have shown improvement, even though they have not

reached a very high level. Other teachers take no account of where pupils were when they began, and grade them only by their apparent mastery of the course. Often teacher grades are based on examinations of a few questions. A high grade or a low one may depend on whether the professor happens to ask the "right" questions.

The tests used in this study were designed to avoid these difficulties. The questions were short, so that pupils could answer not just three or four but hundreds. They had a definitely right and a wrong answer, so that any persons who scored the test could, by following the key, come out with exactly the same score for any one paper. No leeway was left for the teacher's judgment. The papers were scored by experts, who had no other contact with the students. The tests do not pretend to measure character, personality, ideals, social qualities, health, or any other desirable characteristics. They are simply measures of what students know about subjects supposed to be important in general, cultural education. As measures of knowledge they are carefully constructed, and carefully scored, so that comparisons can be made between one individual and another, one institution and another, and the same person at different times during his college course.

THE TESTS

THERE is room for a good deal of difference of opinion about the value and importance of the knowledge which these tests measure. Some illustrations from the different tests may help to give an idea of what they include.

Vocabulary (*100 words*)

Identify (by choosing the best of four suggested synonyms) the following words: inert, bassoon, lenient, buccaneer, twaddle, baffle, scarab, bedlam, obnoxious, mosaic, typhoon, divulge, parapet, etc.

Literature (*200 questions*)

1. Antony made a more effective speech than Brutus because he was:

   a. more logical
   b. more sincere
   c. more observant of his hearers
   d. more patriotic

2. The theme of Poe's *Raven* is:

   a. longing for death
   b. the fear of death
   c. reunion after death
   d. final separation by death

General Science (*292 questions*)

Mark the following true or false:

1. At high velocities electrons have greater mass than when at rest.
2. Tidal force is exerted by the earth on the moon as well as by the moon on the earth.
3. Cuvier developed the theory of mutations as a cause of evolution.
4. The dyne is a unit of electrical current.

Fine Arts (*251 questions*)

1. Egyptian painting excels in its treatment of perspective.
2. The Ionic column gives a more massive effect than the Doric.
3. Modulation to the dominant is one of the most common of all modulations in music.
4. The painting, *The Blue Boy,* was painted by Monet.
5. The effort to paint emotions and mental states was characteristic of synchronism.

6. An arpeggio is the harmonic formula by which a phrase or line is ended.

History and Social Studies (*346 questions*)

Multiple choice:

1. *The Book of the Dead* was a collection of:

   a. prayers and magical charms for the dead.
   b. biographies of famous dead Pharaohs.
   c. recipes for embalming the dead.
   d. imprecations addressed to Pharaoh's enemies.

2. The Treaty of Westphalia was signed in:

   a. 1588 c. 1648 e. 1861
   b. 1517 d. 1789

From a purely technical point of view the tests were well constructed. They were long enough (they took 12 hours to do) to give a broad sampling of items. They were "reliable." They could be used again under like circumstances, would give the same result. High reliability does not mean that the test necessarily measures what we want to measure. It does mean, however, that the measuring has been done with reasonable accuracy.

General Results of Tests

But what is it that the tests so reliably measure? Judged by their appearance, they measure such things as mental quickness, accurate information about a wide variety of facts, and, perhaps, general culture. It is interesting that the tests do not agree any too well with the marks given in school. The extent of agreement is only slightly better than sheer chance. Any one of these tests is only about 20 per cent better for predicting college grades, than would be prediction from names drawn in a lottery, or at random. Since the two meas-

ures do not agree very well, it is probable that they are not measuring the same quality. Still, the colleges which have the highest reputations for scholarship rate well up on the tests. In one college, where the faculty have a very close and careful acquaintance with students, all of the nine students elected to Phi Beta Kappa stand among the highest thirteen on the tests. Eighty-five per cent of the students improved their score between their sophomore and senior years. This is what we should expect if the test covered what the college is trying to teach. Every institution shows an average gain over this period. Every group majoring in a given subject, every group of students of like age, showed some gain. It speaks well for the range of difficulty of the tests that the gain from sophomore to senior year in the 10 colleges which made the highest scores on the first test was a little better than the gain made by the middle 10 or the lowest 10.

Strangely enough the gain in score on the intelligence test was about as large as on any of the other tests. Intelligence tests are supposed to contain questions which do not depend on schooling. They are supposed to be common-sense questions, which bright people can answer, whether they have had school privileges or not. Yet 2,830 students, tested twice, gained relatively more on the test of intelligence than on the test of mathematics, or punctuation, or spelling or grammar or general science. The results seem to support the modern theory that the I.Q. is not rigidly fixed, but increases to some extent with favorable opportunities.

A good deal of attention has been given to the tests, because our judgment of the results depends upon what we decide about the tests. If the tests are reliable and measure a very important result of education, then we may want to take the strengths and weaknesses which they reveal in our present college training very seriously. If, on the other hand, we conclude that the tests measure rather unimportant bits of odd information; if we want to judge a college education mainly by what it does for a young person's self-confidence, joy of living, ability to cooperate, and range of friendships, then the findings of this study will seem immaterial. It is

the assumption of the Pennsylvania study that the main purpose of a college is to increase the student's "stock of mature and available knowledge," and that, if this is well done, the other values of a college education will be added.

ARE THE RIGHT STUDENTS GOING TO COLLEGE?

TESTS were given in May, 1928, to some 27,000 seniors in the high schools and private schools of Pennsylvania. Most of them were followed up for the next two years, so it was possible to discover whether the "cream of the crop" went to college. The results are shown in Chart I. The sample was a wide one, and there is every reason to believe that similar results would have been obtained in any other state.

The most striking feature of Chart I is the range of scores for every occupation. Among the college group, the prospective teachers, as well as among the factory workers, clerks, and farmers, we find very low scores (10-15), and extremely high scores (70-75). The differences within each group are very much larger than the differences between one group and another. Half of the students who went to college scored 53 or more, but about one-fourth of the pupils who left school and went to work had academic ability (a pretty good name for what this test measures) higher than the typical college boy or girl. Or we might put the case the other way. About one-fourth of the college students showed less academic ability than the average student who left school and went to work. The scores of the students who went to the teachers' colleges were slightly below those of the students who went into the machine trades.

We might summarize Chart I in round numbers something like this: 6,000 graduates went to college, and 12,000 went to work, but the 6,000 who went to college were not, in tested ability, all above the 12,000. To get the highest levels of ability into college, it would be necessary to make up the 6,000 college entrants this way: Take the top half of the

present college group; that will give 3,000 students. Add the top quarter of the present work group, and there we get the other 3,000 students. If the students who ought to go on to college are those of highest academic ability, then the figures show that the colleges are now getting only about half of the high school graduates they ought to get. The other half now go directly into jobs and their places in the college are taken

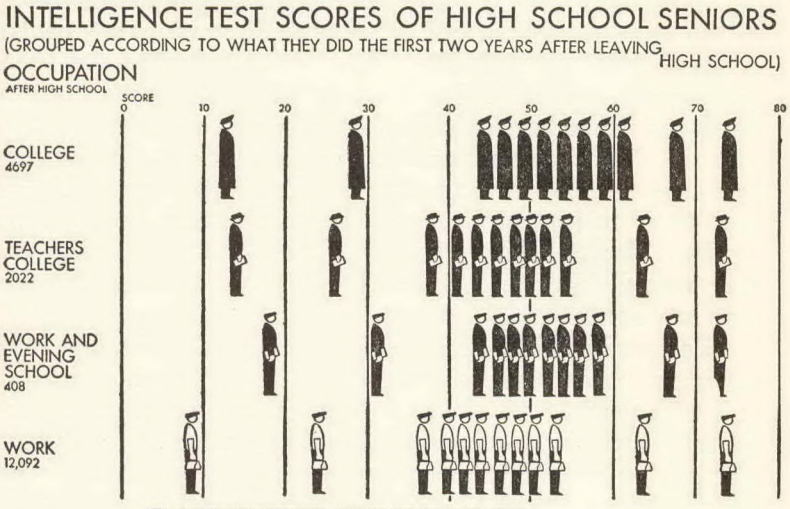


Chart I

by students with more money and less brains. In answer to the question, "If you do not intend to go to college, is it because (1) you lack funds? (2) family needs your support? (3) you are not interested?" a majority of those answering indicated that financial reasons were the barrier. The group who said financial handicaps would keep them from college did, as one might expect, somewhat better in their test than the ones who indicated a lack of interest in college.

High Schools vs. Private Schools

Not all high schools are equally apt to furnish good college material. Yet the intelligence test scores of 3,500 pupils

in 100 small high schools averaged 47, while those of 7,700 pupils in large city schools averaged 48. This suggests that the size of school does not make much difference. If, however, we take the results from 17 select private schools, tested by the Educational Records Bureau with the same tests given in Pennsylvania, the average rises to 57—which is a truly enormous difference. The American private schools were compared with four of the best English "public schools." The English "public schools" are old and very distinguished selective schools in which the leaders of Britain have been customarily educated. For pupils of like age there was no apparent difference in ability between the select private schools of America and these English institutions. One important difference lay in the fact that the British boys get ahead with their college and university years faster. If we gave our boys of equal ability the same chance that England gives, they would finish college about two years earlier than we now let them.

Comparisons between the select schools for the few, and our great public high schools are apt to be very misleading. It is true that the high-class private schools have fewer students of low ability, but these schools represent a small group after all. In 31 private schools of the Eastern seaboard, there were 860 seniors with high intelligence scores. The same year in the public high schools of the state of Pennsylvania there were more than 5,000 seniors with just as high intelligence scores. The high average recorded by these select schools should not confuse us. Most pupils go through our public high schools. Although the average necessarily remains only "average," an overwhelming majority of our gifted children are also graduated from these public schools. Those colleges which take their students primarily from select private schools will get some high-grade students, but not nearly as many as could be found among the graduates of public schools.

The same is true of differences between occupational groups. The average score of high school students whose parents were professional men or women was 52, and the

average score for those whose fathers were engaged in various types of labor (clerical, printing, machine trades, transportation, building trades, factory work, agriculture, mining, and common labor) was only 46. It would be easy to jump to the conclusion that colleges should draw mainly from the homes of the professional classes. It should be remembered, however, that there were only about 1,800 students in the group from such homes, or about 7 per cent of the high school seniors. More than 14,000, on the other hand, were from the homes of skilled or unskilled laborers. So it happens more students of high ability have working-class parents than parents from the professional classes. The proportion may be larger from the professional group, but the actual numbers are greater for the labor groups. About 600 students from homes of the professional class reached or surpassed an intelligence score of 56, while about 2,200 students from the labor groups reached that same level. The leaders of tomorrow are growing up in the homes of the working class, today.

All discussion based on averages ignores what is perhaps the most interesting fact of the whole investigation. That is the tremendous range within a given school or class. Of the total Pennsylvania high school senior group, 25 per cent had scores below 40 and 25 per cent scores above 54. In a typical class of 30 seniors, two would answer less than 32 right (out of 75 possible) and two others would answer more than 63 right. The same appears in scores in particular subjects. All high school pupils in Pennsylvania study English, but the scores obtained in their senior year ranged from 14 to 295! The admission of all high school graduates to college for the same kind of study seems an impossible venture. In algebra, for example, the average number of right answers by students who actually went on to college was 21, but 10 per cent answered 40 or more correctly, and the lowest 10 per cent succeeded with only 7 or 8 very simple problems.

American colleges have not yet decided how to provide for these extreme differences among high school graduates. Some are inclined to accept only selected groups of students, those who score highest on tests of intelligence and knowl-

edge, such as were used in this study. Such students are most likely to succeed with the traditional college curriculum.

The Problem of Popular Education

Other institutions take the view that in a democracy, colleges should serve a much larger proportion of the citizens. They argue that in the early days of our country, only the few who desired to be doctors, lawyers, or ministers went to college. The courses of study were prepared for these few. When we look at the numbers who today desire to go to college, and at their wide range of ability as shown in these tests, we can only conclude that no one pattern of required subjects will serve all types of college students. Some colleges, instead of restricting entrance, are enriching their course of studies. They recognize that relatively few students will profit much from the old classical subjects. And so they offer new courses that are designed to meet the health, vocational, recreational, and civic needs of each individual. They want colleges to educate students, not merely for the passing of tests in traditional fields, but for living more effectively in the modern world.

Both groups of colleges look at the same facts, but they draw fundamentally different conclusions. The American people, eventually, must decide what they want. Should our colleges select a few students of high competence in verbal learning, and give them an exceptionally fine training in scholarship? Or do we want our colleges to admit more and more of our people, adjusting their offering to the needs and interests of each individual?

However we may decide this issue, there is one fact brought out in the survey which distresses every intelligent citizen. Whatever our concept of what a college ought to be, it is clearly unfortunate that half of our students with real ability are not now getting a chance to go to college. A land that boasts of equality of opportunity dare not let financial difficulties stand in the way of education. We do not have really free education in the United States until young people

of ability can carry on their studies without handicap from lack of economic resources. This seems to point to subsidies for education, sufficient to cover not only tuition, but living expenses, and perhaps, in some cases, aid to dependents, so the student will not have to drop his education to go to work until he is fully prepared for the highest service he can render to society. America loses quite as much as the youth himself suffers whenever a potential scientist, artist, professional man, or civic leader must work at commonplace jobs, far below the level of his possible contribution.

HOW COLLEGES DIFFER

TWO colleges in the same state may both admit high school graduates, both give four years of courses, and both confer the same bachelor's degree, but be far apart in the knowledge which their students actually acquire. Colleges differ in education quite as much as they do in their football records.

In Chart II are shown the records of three colleges, one standing high on the list, one average, and one low. The scores are based on questions in fine arts, history, social studies, world literature, and natural science. In each case sophomores, working for the Bachelor of Arts degree, were tested. Note first the enormous range of scores. For the whole sophomore group the range was from 55 to 725. Both the man who answered only 55 items out of 1,222 correctly in a four-hour test, and the student who had 725 correct answers, ranked as college sophomores. Belonging in the same class obviously does not mean having the same amount of knowledge. Among the class as a whole 25 per cent scored more than 342 and 25 per cent less than 216.

The "high" college had no sophomore with a score on this test below 245. This was nearly up to the average for all sophomores. The average student in this "high" institution made a better score than 90 per cent of the students in other colleges. Indeed, more than three-quarters of the college seniors tested in the state fell below the average sophomore in this exceptional college.

At the other extreme is the "low" college. Three-fourths of its students fall below the average for sophomores in general. The highest individual score in this inferior college group was lower than the average for sophomores in the "high" college. Their scores must be compared, not with those of college seniors, but with those of high school seniors.

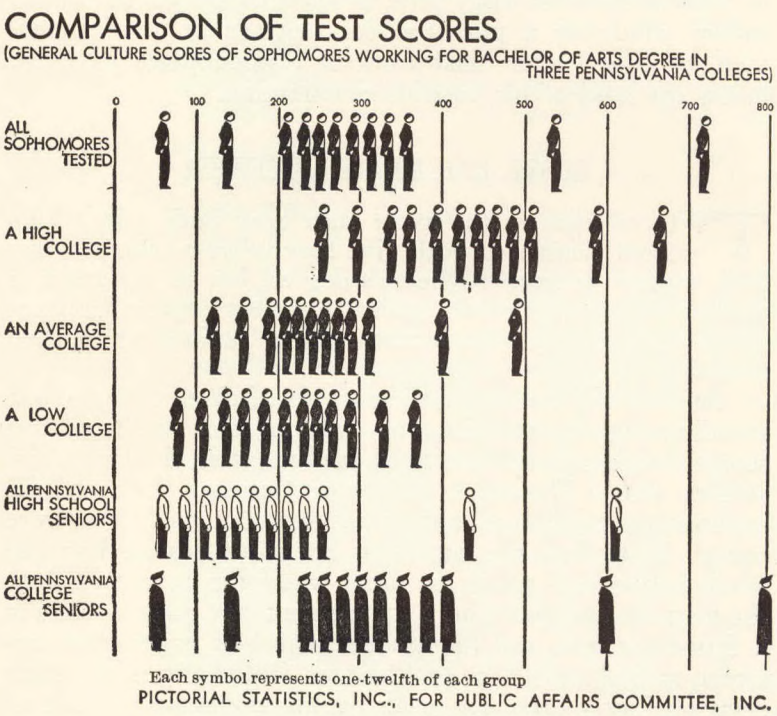


Chart II

The sophomores in the "low" college are only a trifle above the high school average. At least a third of the high school seniors surpass the average sophomore in this "low" college.

At present it is difficult for students choosing their own college, or for parents or teachers who advise students, to know whether the college they are considering is high, average, or low in the caliber of its student group. A college with superior publicity does not necessarily show up well in tests.

No Help in Picking Colleges

The report gives us very little information about the colleges which would help us pick our college. The size of a school is not an index. Some small schools rated high; others low. One difference is certainly in selection of students. On the intelligence test, the "high" college ranked first among all the Arts Colleges, both on tests in 1928 and again in 1930. Seventy-five per cent of the students of the "low" college were below the average high school senior in intelligence, and not one of its students reached the level of the most stupid sophomore in the "high" college. The dullest student in one college surpasses the brightest in another, but both institutions are "recognized" colleges!

But the difference is not all due to selection. One of the most interesting studies in the report shows what happens to students of equal ability when those students go to college. Consider, for example, 106 high school graduates who stood near the middle of their high school class on the 1928 tests. Thirty-four of these students went to colleges in the upper half of the list. Seventy-two went into colleges which were in the lower half of the Pennsylvania institutions. Now these two groups had exactly the same average score on their high school tests. Four years later, in 1932, they were tested again. This time the 34 students who went to the high-scoring colleges averaged 617, while their classmates in the less stimulating colleges averaged only 515. The difference, 102 points, is about the average gain from sophomore to senior year in the better colleges. So we might say that if two pupils of equal ability choose two colleges, one in the upper half and one in the lower half of available schools, the chances are that at the end of four years, the pupil who chose the poorer institution will be about where his classmate was at the end of only two years. If the kind of knowledge measured by these tests is the object of a college education, then it is about twice as expensive in time (and probably also in money) to go to the less efficient institutions. In the college with the more selective and more intelligent student body, these average

students undoubtedly had to work harder to keep up with the pace set by brilliant minds, but they learned in two years what would have taken them four years in the lower grade, slower paced colleges.

How Much Do Colleges Teach?

The fact that nearly 3,000 students were given identical tests at the end of their sophomore year and again near the end of their senior year, permits a study of how much was learned and remembered. Every institution showed a gain from sophomore average to senior average; gains were made, on the average, in every major field, and by every age level of students. But only 85 per cent of the individuals tested made a gain. What shall be said of the 15 per cent who made a lower score in the senior year than they had made in the sophomore year?

Some of the loss is probably due to the differences between college courses and the content of the tests. In some technical subjects, a student might make considerable progress in his specialized field, and yet forget some of the material in history, fine arts, or literature that he knew two years earlier. Thus students majoring in engineering stood high on the original test, and students majoring in business stood low on the original test, but these groups gained only about half as much as the students majoring in science, languages, or social studies.

Some of the failure to gain is probably due to individual accidental factors. Certain individuals may have been ill, or emotionally disturbed, or only half-hearted in their effort on the occasion of the second test. A single test, even of several hours duration, is not so fair to individual students as would be a series of such tests taken every few months, throughout the college career.

But after all allowance is made for different courses and for individual upsets, there remain important differences

between colleges. In College A, for example, 47 students of engineering were tested. All but one showed a gain, and the average gain was 7 points. In College B, 79 students of engineering were tested. Nearly a third showed a loss at the time of the re-test, two years later. The average gain was only 4 points. The authors of the report believe that the greater gain in College A is due to the fact that their engineering is more closely related to the arts college, while in College B the students are at a specialized engineering school, having little contact with other students.

Yet even in College B there were individuals who managed to get a broad and excellent fund of information. The young man who made the highest general culture score in the state was a student at College B. He was foreign born, and a fellow of keen intellectual ambition. His explanation of his high score was his careful study, entirely on his own initiative, of the Sunday edition of the New York Times! This revealing case helps to remind us that the prescribed courses and professors are not, after all, the essentials of learning.

SERVING TIME VERSUS LEARNING

SCHOOLS and colleges, like prisons, have dealt with their inmates largely on the basis of a required sentence of time to be served. A college education normally requires four years after high school. During those years a prescribed number of credits will be earned, and each of them requires so many hours spent in assigned classrooms, libraries, and laboratories. There are, of course, certain things required to "pass" the courses, but over and above those the only measure of education commonly used is time. However brilliant the student's performance, he usually must still serve his hours for each credit, and accumulate his credits over the required four-year span.

Time is of some importance in education. It takes some time for ideas and experience to mature. Four years of college give opportunity for friendships to ripen, and for the

exercise of increasing leadership in campus affairs. But so far as the acquisition of knowledge is concerned, the tests of the Pennsylvania survey make time appear a poor measure.

Consider the overlapping in scores by students who have spent varying periods in school. On tests in English, one-third of the freshmen in ten arts colleges, scored higher than half of the seniors. In general science, foreign literature, fine arts, history, and social studies, one senior in five falls below the freshman average. Most extraordinary were the results of the mathematics tests given to 2,800 students in the ten colleges. The juniors did better than the seniors, sophomores surpassed juniors, and the freshmen averaged higher than any other class. Only one-third of the seniors could reach the freshman average. When the majors in mathematics were selected, it was found that they did, indeed, improve from year to year, but even here differences between classes were small in comparison with the range within each class. The best mathematicians would include some freshmen, some sophomores, more juniors, and still more seniors. Poor scores could likewise be found in every college year. Among 1,000 English majors in liberal arts colleges, the average junior made a test score in English slightly below the average sophomore, and 29 per cent of the freshmen, just beginning their college work, already surpassed the average senior who was supposedly ready for his diploma with a major in this subject. In the single measure of vocabulary, the difference between best and poorest senior was *10 times* as great as the difference between average freshman and average senior. In general science, the difference between best and poorest senior was almost *20 times* as large as the difference between average freshman and average senior. Fairly expert knowledge of science was found in 300 seniors, 250 juniors, 300 sophomores, and 80 freshmen. Yet according to college administrative theory, the 80 freshmen who knew science as well as the best 300 seniors and better than 600 other seniors, must serve three years of time before they might rate as ripe for graduation.

Some College Seniors Know Less Than High School Students

Much the same situation is found when high school seniors and college students are compared. The report puts it in strong terms. "We have the spectacle of about one-fourth of our college seniors, unable, after spending four years in college, to command the general fields of knowledge which they have actually traversed, as well as these fields are understood by at least one-third of the seniors in the high school, an institution four years below them. In lieu of a progressive mastery of ideas, the college demands of the student merely his semester course-credits, reckoned solely on what he pours in at one end of his mind while his earlier injections unobtrusively disappear at the other—a singular testimonial to what has been termed the 'open-mindedness' of American education." An interesting and extreme illustration may be found in the case of three 16-year-old boys, who as high school seniors took the same tests given to college students. Women college seniors averaged a score of 613, and men college seniors averaged 658, but the three bright high school boys averaged 665. What is sound educational policy for these three boys and the 150 other high school seniors who surpassed the college senior average? Should they spend four years waiting for their fellows to learn what they already know? And what shall we say of the 350 college seniors, presumably ready for graduation, whose stock of knowledge, as judged by these inventories, fell below that of the average high school graduate in the state? What does their degree really mean?

There are certain subjects, like mathematics and foreign languages, where it is commonly assumed that learning is progressive, that second-year students all surpass students in their first year of work, and that no one should be eligible to enter the third year without having completed the second. Tests show that this is not necessarily the case. The top 25 per cent of Pennsylvania high school students who had had only one year of algebra surpassed on the same algebra test 40 per cent of the students who had had two years of algebra

and 30 per cent of a more select group who had finished five semesters of algebra. In French, the top quarter of the group who had studied French for only one year, made better test scores than a third of the students who had completed two years of French and surpassed one in ten of the students who had completed three years of French. The top 10 per cent of the students who had had one year of French was just about equal in knowledge of the language to the bottom ten per cent of those who had studied French for four years.

The scores in American history show one bright spot and two dark areas. The bright spot concerns a group of 1,500 who were permitted, by the use of some discretion on the part of the high school principal, to graduate with only one semester of American history. Their test scores in senior year were substantially above those of the group which had the standard two-semester course. One dark spot is the group of 500 unfortunates who had to repeat one or both semesters. Their knowledge, after three or four semesters, was still below that of the majority of their classmates who had only the two semesters of work. The other dark spot is the speed of forgetting. A year or two after the close of the course, only about one-fourth of the pupils can achieve the score which half reached at the time of their "final examination."

What If Diplomas Were Based On Knowledge?

Suppose the colleges were to shift from time-serving to knowledge as a basis for graduation. The authors of the survey readily admit that their tests do not include all of the factors which ought to be taken into account in determining fitness for a college degree, but propose to use the tests to illustrate the possibilities of standards other than time spent in courses. Take College X, for example. It graduated about 200 seniors in 1930. Those 200 seniors had spent their four years in courses. Suppose, however, the college had ignored time spent, and turned to tested knowledge as a measure of fitness for graduation. Suppose the college had said, "We will grant diplomas to the top 200 among our total student

body, according to the best available tests of their academic knowledge." Only one-fourth of that class would have been "seniors." The so-called "junior class" would supply 28 per cent, the sophomores 23 per cent, and the freshmen 24 per cent. These were the actual results in the college chosen for an illustration. The net result would have been graduates averaging about twenty years of age rather than twenty-two, and with an average knowledge score of 754 instead of the actual average of the seniors who did graduate, which was 592.

In a system like that there would be real incentive for study. One could graduate as soon as he had shown mastery of the knowledge. The bright young students would finish quickly, and be free to continue graduate courses, or to enter occupations. Perhaps this might be one answer to the charge that physicians and other professional groups are now spending too large a part of their lives in school.

The possibility of standards based on achievement instead of time served is attractive. The question remains, however, how well we can test the real objectives of our college education. If knowledge of facts were all we sought, then tests of the kind used so extensively in Pennsylvania would offer an excellent answer. New tests are now being developed by the Progressive Education Association, under the supervision of Ralph Tyler, Chairman of the Department of Education and Chief Examiner of the University of Chicago. These new tests are concerned not only with facts, but also with ability to carry on logical reasoning, to interpret and to apply known facts, and to see relationships, and with the development of desirable attitudes. Yet even knowledge tests alone will probably bring us nearer to our educational objectives than do the present standards of credit hours.

BETTER INDIVIDUAL GUIDANCE

THE good teacher knows not only his subject, but his students. Both types of knowledge require careful study. One of the most important values in the Pennsylvania survey

is the basis which it provides for better guidance of the individual.

The first tendency of colleges may be to use admission examinations to keep out students with dull minds and poor background. In consequence the college would get only students with ability. Then, even if the college teachers did only mediocre, routine work, the college record would undoubtedly look good. It is possible, with modern instruments, to select a student body, most of whom will educate themselves in spite of anything the faculty may or may not do. In some colleges test results may be used to set new standards for promotion and graduation, as has been suggested in the preceding section. In other schools, test results may be made the basis for grouping students in sections more homogeneous than the usual college classes.

None of these policies really meets the situation. The college can maintain a good record by refusing to admit a large part of the high school graduates, but what happens to them then? Does that in any way solve the problem of the students who were not admitted? The college may screen out only the best minds for degrees, but what of the students rejected by this process? The only constructive program is one which gives to each individual the best possible service toward meeting his educational needs.

The only colleges which should retain public favor in the light of the facts brought out by careful measurement are those which adjust their work to the need of each individual. Good college administration will involve frequent and thorough measurement of all available aspects of individual growth. Testing and clinical study of the individual are expensive, of course, but not so expensive as the wasted educational effort. The study of the individual should not be limited to his I.Q. or his score on tests of knowledge in various subject fields. His life history, his interests, his emotional needs, his character qualities, his social attitudes, and his plans for his own future, should all be brought into the picture. The American Council on Education has developed a Cumulative Record Blank which will record the important

facts about the individual throughout his whole period of schooling. In the light of all this evidence, an adviser can help the individual student select the projects which promise most for him. In this guidance process the student must be not merely an object but an active participant. Tests, case studies, cumulative records, and expert counsel are, after all, only sources of information which can be used by the individual student in planning his own living. The only true education is self-education, and there is no good guidance that is not self-determined.

INFLUENCE OF AGE, SEX, AND OCCUPATION ON TEST SCORES

As a by-product of its main work, the Carnegie Foundation study furnishes some interesting light on questions long and often disputed. Among these are questions of the significance of being younger or older than classmates; the question of differences in ability between men and women; and the question of the different levels of mental ability in the various occupations of our society.

The answer to the question about age, in our present school system, is quite clear. Bright students usually get into college younger than the average and make better records in all subjects. Those students who are retarded are a few years older than their classmates; hence older students on the average make lower scores on tests of intelligence and on tests of general knowledge. These intelligence test and knowledge scores tend to decrease as we move toward the older age groups.

Are Girls Brighter Than Boys?

So far as these tests are concerned, college men do somewhat better than college women. At each age level the intelligence test average for the men exceeds that for the women by from one to three points. Total knowledge scores for

the men run from two to six points in excess of comparable scores for women. Now this is an unusual finding that calls for special explanation. Most tests of large and representative groups show approximate equality for boys and girls, and between men and women. It cannot be that selection favors the men, because the women who go to college are fewer. How are we to account for the difference?

A clue to the answer may be found by comparing results in the various subjects. In mathematics the men led by a large margin. In tests of natural science also, although the results are not given in this pamphlet, the men surpassed the women. In history and social studies men showed some slight advantage. Women excelled in literature. There was not much difference on the vocabulary test. On the fine arts test the women again excelled, slightly. The conclusion seems to be that we are finding, here, differences due not so much to innate ability, as to the direction in which our culture has stimulated the work of men and of women. It is possible, of course, that men have a higher inborn aptitude for mathematics and science, but other facts make that unlikely. Rather, boys are encouraged by a variety of influences, in and out of school, to use the materials of mathematics and science, while girls are more often urged toward literature. Part of the urge in both cases may come from the subtle emotional factors which find more release for boys in mastery of the natural world, and for girls, in arts which reveal human relations.

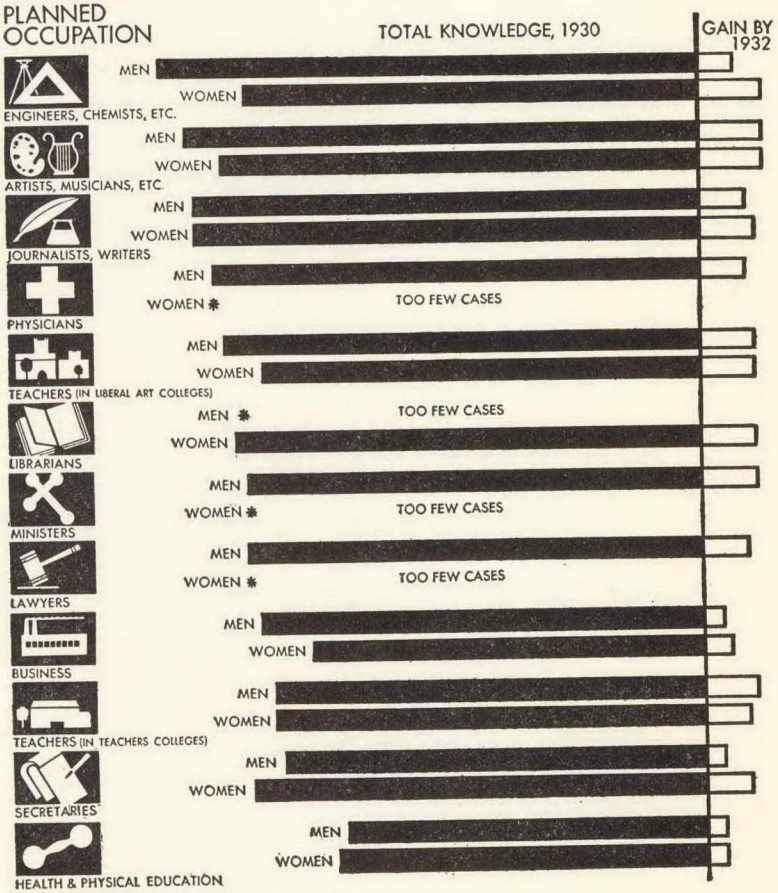
So far as progress during the college years is concerned, very little difference was found between men and women, or between the various age groups. Both sexes, in all four age groups, made gains which averaged between four and six points from their sophomore to senior years.

Occupational Differences

Some occupational differences were shown in Chart I, based on what high school graduates were doing, two years after graduation. While the average intelligence score of

pupils in one occupation might be as much as four or five points higher or lower than that of pupils in some other field, these differences were very small as compared with

TOTAL KNOWLEDGE AND GAIN BY PENNSYLVANIA COLLEGE STUDENTS



*Too few cases to be statistically significant.

PICTORIAL STATISTICS, INC., FOR PUBLIC AFFAIRS COMMITTEE, INC.

Chart III

the range within any given type of work. There were stenographers who scored as low as 10 right answers, and others who scored 75, the highest possible score, but the average stenographer differed from the average girl in housework or in managerial positions by only two or three points. This very important fact of the range of abilities within each occupation must be kept in mind in interpreting Chart III, which gives only averages.

The results, presented in Chart III, point to an average superiority of students looking forward to careers as engineers, chemists, technicians, journalists, writers, artists, musicians, and dramatists, over students who are preparing for business, secretarial work, or activity in the field of health and physical education. In each case, however, the range of scores is such that the best students, going into occupations which rate lower in the scale, would excel the poorer students who aspire to the occupations which rate high on the scale.

How High Should Teachers Score?

One of the facts which most disturbed the authors of the survey, was the consistently mediocre performance of prospective teachers. Back in Chart I we had some indication that the students who were going to teachers' colleges averaged below the students planning to enter other colleges. The teachers' college entrants averaged slightly below the high school seniors headed for jobs in the machine trades or in junior managerial work. We must remember that these are only averages, and that 25 per cent of the students going to teachers' colleges made scores above the average student entering other types of college. Still, there remains an important difference. Why is the teachers' college group low? Is it that many teachers' colleges have traditionally been only two-year schools, and have only recently taken on regular college degree work? Have they had to do the extra years of college training with much the same facilities in libraries, laboratories, and faculties which they had been granted for

the two-year courses? Is it that teachers' colleges are less renowned for scholarship, and hence do not attract the abler students? Is it that teachers' colleges are closer to home, and serve to care for young people from homes where there has been less financial opportunity and less cultural advantage? Is it that the students are largely young women, and

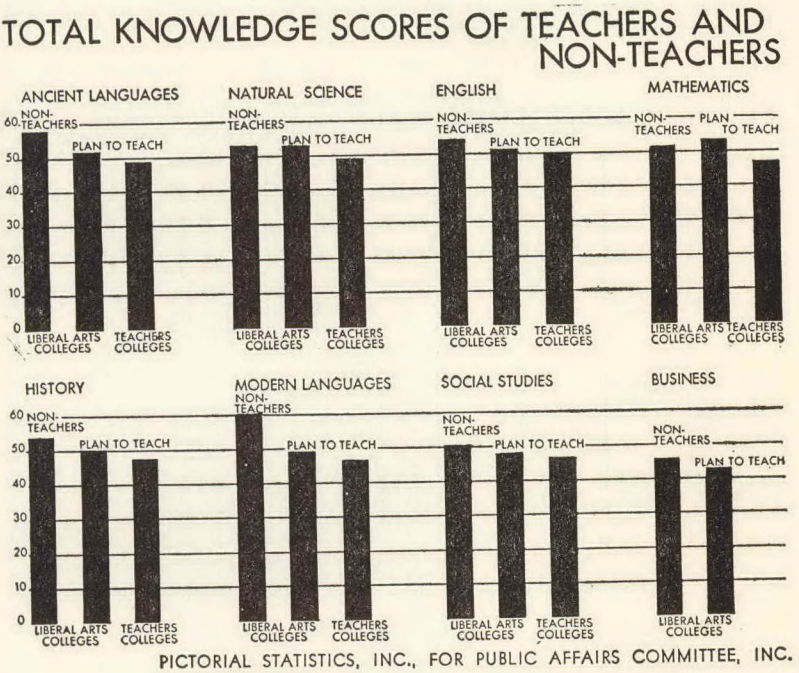


Chart IV

that women, as we have seen, were under some handicap in these tests?

Perhaps we may dispose of the last question first. The teachers' colleges are lowest in total score. They were low in social studies tests, and low in language and literature tests. They fell far below the colleges for women in the tests on which women commonly did very well. These con-

clusions apply, it should be remembered, only to the *average* teachers' college. One teachers' college, whose students averaged a total score of 715, outclassed any other coeducational school, university, or technical school in the knowledge tests.

The handicap would seem to be more a matter of selection of the students than of opportunity afforded by the college itself. On the progress tests, given to sophomores and repeated again in the senior year, the 12 teachers' colleges

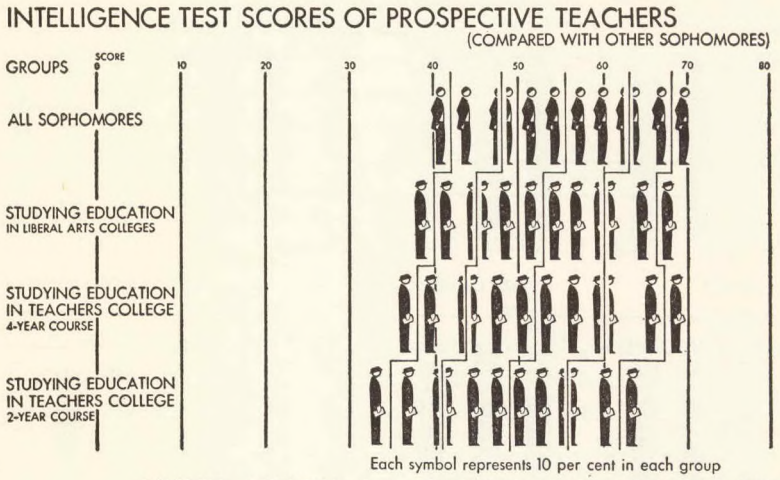


Chart V

of the state averaged just as much gain as did the 33 other colleges and technical schools. Students in the teachers' colleges gained more than the students of the university or of liberal arts colleges in mathematics, foreign literature, vocabulary, spelling, punctuation, grammar, literature, and science. In fine arts, general culture, history, and social studies, the arts college students made larger gains.

Students who went to universities or liberal arts colleges, and there specialized in education, seemed to be, on the

average, a somewhat abler group than the students who were drawn to the teachers' colleges. Perhaps the contact with students in other fields and the somewhat broader curricular offering may have helped them also.

College students who plan to teach do not all surpass the high school seniors whom some of them will be teaching. Above a score of 500, for example, we may find 78 per cent of the prospective teachers, but also 24 per cent of the high school seniors. It would seem that if 100 typical high school seniors are taught by five of these typical college graduate teachers, some 20 of the pupils will probably know more than does the least well-informed of the five teachers.

Naturally we suppose that teachers ought to know more than pupils, but it is possible to carry the emphasis on subject matter too far. The students who made the highest scores on these tests will not necessarily be the best teachers. Studies have shown very little relationship between academic scholarship and teaching success. Particularly in fields like health, recreation, homemaking, music, art, and vocational training, excellent book-students and test-passers may turn out to be very poor performers. We do not really know to what extent the best potential teachers are now going to the teachers' colleges and schools of education. We do know that the potential teachers are not as well-informed in many fields as we would want good teachers to be. It would be more encouraging for democracy if the teachers going into our junior high schools and high schools had a better foundation in economics, political science, and sociology. A program for the selection and education of more competent teachers to deal with the perplexing problems of modern civilization depends in part upon higher salaries in the teaching profession, to attract more of our ablest young people; in part upon changes in the course of study in teachers' colleges, to give more basic study to the social sciences; and in part upon changes in the public's vision of what a teacher should be and should do. Only mediocre minds will be interested in classroom routines, tests, marks, and the details of education. The first-class people will be attracted, if at all,

by a realization that teachers can be leaders in the creation, interpretation, and evaluation of the social policies in accord with which our whole society is being re-made.

Pennsylvania No Exception

The Carnegie Foundation Survey was confined largely to the schools and colleges of Pennsylvania. The general conclusions, however, would probably hold in every state. High school students, in every community, will be found to range widely in ability. Among the seniors, not all the ablest will go on to college. Indeed it is doubtful whether in any state the colleges get more than half of their entrants from the group that would score highest on tests of academic ability. Every state is facing the question whether to select the few for college training or to adapt college courses for the many.

Colleges would probably be found to differ in other states as widely as they do in this survey. Wherever colleges are studied, we may expect to find that there is a much greater range within the same college class, than between the averages for different college years. Every college commencement grants degrees to some seniors who, in their four years of study, have acquired less of available knowledge than some of its lower classmen could demonstrate. Graduation by knowledge tests, rather than by time credits, would have the immediate effect of reducing the time spent in school by the abler students.

Differences between men and women, such as that men do better on tests of science or mathematics and women better in languages and literature, would probably be widely found in our society today, but not necessarily in other cultures which expect different roles from boys and from girls. Differences within any one occupational group far overshadow the difference between the average ability in one line of work as compared with that in some other line of work.

The Pennsylvania teachers' colleges have had a rather unfortunate history of being political footballs, but this has also been true in other states. Probably teachers' colleges gen-

erally (except for a few which have instituted careful selection) draw a constituency closer to average ability levels than the liberal arts colleges. In every state, certainly, there is need for more teachers who see education in terms larger than texts and tests, and who are prepared to help pupils judge contemporary issues in the light of broad foundations of knowledge.

Promise of Tests for the Future

The study in Pennsylvania has already done much to further the movement toward better guidance of individuals. High schools and colleges may be expected increasingly to study the characteristics, abilities, achievements, interests, and problems of their individual students so that the services of the institution may be used to enhance the growth of each personality. The authors would be the first to claim that their study is only a beginning. The application of scientific methods to the study of students promises to raise the efficiency of educational institutions and, eventually, the quality of thinking among American citizens.

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PRINTED IN THE UNITED STATES OF AMERICA

First Edition, December, 1938
Second Printing, April, 1940

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Presbyterian Church of South Africa

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