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The Conservation of Intellectual Talent

The reasons why some able students do not attend college and the uses of scholarships are assessed.

Donald L. Thistlethwaite

Estimates of the number of highly talented students who fail to go to college are alarming. Even if we take the most conservative of the available estimates (*1*), about 34,000, or 28 percent, of the highest-ranking tenth of the nation's high school graduates do not enter college as full-time students. For students in the highest 30 percent in respect to ability, the estimated number not going to college increases fourfold. In 1955 one study (*2*) reported that some 150,000 students in the top 30 percent of ability failed to go to college, but would have gone if scholarships had been available.

These figures suggest the need for more financial aid. Certainly existing funds are small compared with available estimates of the number of drop-outs among students of high ability, and who could be induced to go to college by financial aid. Fortunately, a national scholarship competition has features which tend to reduce the number of students who drop out after high school (*3*). Public recognition of the excellent performance of high-scoring students seems to motivate both the students and scholarship donors. Holland and Stalnaker (*4*) report that 98.7 percent of a group of near winners in the first National Merit Scholarship program went to college, and that approximately 65 percent of these students obtained scholarships from other sources. Students who rank high in any nationwide testing program become highly visible; as a consequence, they are stimulated to go to college and they frequently attract offers of scholarships from colleges and other sources. Thus loss is reduced.

Previous appraisals of talent loss were made before the initiation of the large-scale Merit Scholarship program. Under present conditions, the number of drop-outs among students of high ability is only half as large as the lowest figure estimated in earlier studies. The second annual Merit Scholarship program included a greatly enlarged sample of very able students. Over 166,500 high-school seniors in some 12,500 secondary schools took the initial qualifying test, and the top-scoring 15,000 students from this group were surveyed in respect to their college-going behavior. This population provides the best available means for appraising the current talent loss and for identifying the social and psychological factors which contribute to it (*5*).

In the present study, the amount of talent loss which occurs under existing conditions was estimated from the number of near winners in the 1957 program who failed to enroll in college. The study also sought to estimate the number of drop-outs who might attend college if additional scholarships were available.

Students ranking in the top 5 or 10 percent of the nation's youth cannot be expected to make full use of their talents without further specialized training. The loss of these students to higher education is an undeniable waste of the nation's intellectual talent. To throw light

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on the factors underlying this waste, the present sample was studied to ascertain those attributes which differentiate drop-outs from college-attenders. A knowledge of the environmental and personal factors contributing to withdrawal from higher education is necessary if we are to devise effective methods for reducing talent loss.

Sample

The results reported in this study are based on a survey of a stratified random sample of 14,945 top-scoring students who took the qualifying test (Scholastic Qualifying Test) in the 1957 Merit program (*6*). The total group was composed of three classes of students: 7690 high-ranking students who received a letter of commendation; 6428 finalists, who received a Certificate of Merit; and 827 Merit Scholars, who received monetary stipends. These groups are mutually exclusive. The designated stratum samples included 47 percent of the commended group, and 100 percent of the finalists and Scholar groups. Returns were received from 80, 80, and 94 percent, respectively, of the designated stratum samples. Though some bias resulting from nonresponse can be expected, no exact estimate of it can be made since a follow-up survey among nonrespondents has not been attempted.

It is important to note that the population of 15,000 students surveyed here represents the students scoring highest within each of the states and territories. Students from each state were ranked on the basis of their scores in the scholastic Qualifying Test, and the number designated for recognition in each state was arbitrarily made proportionate to the number of seniors in the public high schools of that state. A national scholarship program designed to help students throughout the nation must almost of necessity distribute recognition and awards to students in proportion to the state's population of high-school seniors. This feature of the program makes it difficult to estimate the number of recoverable drop-outs from test score distributions which disregard state differences. On the other hand, the present sample is admirably suited for estimating the number of talented students salvageable under conditions likely to obtain in any federal scholarship program.

Despite the variations introduced by the principle of identifying excellence within each state, it is estimated that over 97 percent of the population of 15,000 students are in the top 6 percent of the nation's high-school seniors in respect to verbal ability. The group is less highly selected in respect to mathematical ability, since the test scores used to rank students were composites which weighted verbal scores twice as heavily as mathematical scores. Nevertheless, it is estimated that about three-quarters of this population of very able students fall in the top 9 percent, by mathematical ability, of the nation's high-school seniors.

Table 1. Estimates of talent loss among students of high ability.

Source	Population	Date of graduation from high school	Estimated percentage not attending college
National Merit Scholarship program	Merit scholars ($N = 827$)	1957	0.2*
	Finalists ($N = 6428$)	1957	3.1
	Semifinalists ($N = 7690$)	1957	5.1
	Total ($N = 14,945$)	1957	3.9
Terman and Oden (*9*)	Highest 1 or 2 percent, by IQ, in California schools	1928	12
Phearman (*10*)	Highest 2 percent, by achievement tests, among Iowa high-school graduates	1947	8
Wolfle (*11*)	Highest 2.8 percent of high-school graduates on intelligence test	1953	39
Phearman (*10*)	Highest 9 percent of Iowa's high-school graduates	1947	36
Iffert (*1*)	Highest 10 percent in high-school graduating class	1950	28
Corcoran and Keller (*12*)	Highest 15 percent by IQ, of Minnesota high-school seniors	1950	33†
Wolfle (*11*)	Highest 8.8 percent of high-school graduates	1953	45
Educational Testing Service (*2*)	Highest 10 percent, by aptitude test, of public high-school seniors	1955	30
Iffert (*1*)	Highest 30 percent in high-school graduating class	1950	30
Wolfle (*11*)	Highest 31 percent of high-school graduates	1953	53
Educational Testing Service (*2*)	Highest scoring 30 percent of public high-school seniors	1955	47

* Two students awarded scholarships are having their scholarships held for 1 year.
† Percentage attending college within 4 years of graduation.

Estimates of Talent Loss

Table 1 presents estimates of talent loss among students of high ability. The first estimates in the table are those of drop-out rates for winners and near winners in the 1957 Merit program; the other estimates in the table are previous estimates of talent loss, which were based upon knowledge of the college-going behavior of students not participating in a national scholarship competition. The previous estimates vary considerably: for the top 2 or 3 percent, estimates of the drop-out rate vary from 8 to 39 percent; for the top tenth of the nation's high-school graduates, it has been estimated that between 28 and 45 percent do not go to college.

Most noteworthy is the fact that the drop-out rate of approximately 4 percent among the 15,000 very able students in the Merit program is half the figure given in the most conservative previous estimate. Among boys the estimated drop-out rate is 3.5 percent; among girls, 4.8 percent. In the present study a student was considered a drop-out if he failed to enroll as a full-time student in an accredited college in the quarter or semester immediately following high school graduation. About 66 percent of the drop-outs plan to get at least a bachelor's degree, so that if we were to follow these students for a longer period after their graduation from high school, we would find that the talent loss is even smaller.

It is believed that the extremely low drop-out rate among these students is a consequence of the public recognition that the near winners attain through

Table 2. Estimated percentage, by state, of 14,118 near-winners in the 1957 Merit program who did not enroll in college immediately.

Percent	State*	Percent	State*
0	District of Columbia (6.5)	4	Mississippi (49.0)
0	New Hampshire (1.0)	4	Oregon (19.0)
0	Nevada (23.0)	4	Pennsylvania (12.5)
1	New Jersey (6.5)	4	Texas (40.5)
2	Alabama (46.0)	4	Vermont (30.5)
2	Massachusetts (2.5)	4	Virginia (37.0)
2	Missouri (27.5)	5	California (17.0)
2	Montana (27.5)	5	Connecticut (2.5)
2	New York (5.0)	5	Georgia (43.5)
2	North Carolina (40.5)	5	Idaho (33.5)
2	North Dakota (30.5)	5	Iowa (12.5)
2	Rhode Island (30.5)	5	New Mexico (35.5)
2	Tennessee (38.5)	5	Oklahoma (38.5)
2	Territories (Alaska,	6	Indiana (12.5)
	Hawaii, Puerta Rico,	6	Kansas (25.5)
	Canal Zone)	6	Michigan (8.5)
3	Colorado (20.5)	6	West Virginia (45.0)
3	Nebraska (25.5)	8	Arizona (23.0)
3	Ohio (17.0)	8	South Dakota (30.5)
3	South Carolina (48.0)	9	Minnesota (4.0)
3	Wisconsin (8.5)	9	Utah (33.5)
4	Florida (35.5)	11	Arkansas (47.0)
4	Illinois (17.0)	11	Washington (12.5)
4	Kentucky (43.5)	14	Maine (12.5)
4	Louisiana (42.0)	15	Delaware (12.5)
4	Maryland (23.0)	17	Wyoming (20.5)

* Numbers in parentheses represent order of rank in regard to talent supply. The states and the District of Columbia were ranked 1 to 49, according to the percentage of registrants scoring 70 or above on the Selective Service Qualification Test given May through July, 1951 (*13*). A low number indicates a relatively high supply of talent.

their participation in the Merit program. An estimated 58 percent of the near winners who enrolled in college immediately held freshman scholarships with an average stipend of $602. Furthermore, it is estimated that 70 percent of the 14,118 near winners received at least one offer of scholarship aid from other sources. In a previous survey (*4*), about 30 percent of the 1956 near winners reported that they either received direct offers of scholarships or were aided in securing scholarships on their own initiative because of recognition received in the Merit program. In addition, some 11 percent of this group indicated that the recognition provided them with considerable emotional support; in many cases the students believed the honorary award had stimulated them to attend college. It is expected that any national scholarship program will similarly affect near winners. Runners-up who receive recognition will not only be more highly motivated to go to college, but they will also tend to attract offers of scholarships from private scholarship donors.

Table 2 shows that the drop-out rate varies considerably from state to state. The District of Columbia, New Hampshire, and Nevada are at one extreme, with an estimated zero percent of near winners dropping out, while at the other extreme are Maine, Delaware, and Wyoming, with an estimated 14 to 17 percent drop-out rate among near winners. The relatively high drop-out rates for Delaware, Maine, Washington, and Minnesota are of special interest since students in these states tend to rank high in ability level.

Role of Scholarships in Reducing Talent Loss

Most drop-outs indicate that the problem of financing a college education was a major factor in their decision not to enter college immediately. Over half (52 percent) of the near winners who did not go to college mentioned as one of their most important reasons, "It would cost more than my family could afford." Eighty percent replied "Yes" to the question, "Would you go to college if you had more money?" Some 84 percent of the drop-outs say they would certainly or probably accept a scholarship paying all their college expenses.

Although finances are a problem for these students, very few have resolved *not* to enter college. It is estimated that 84 percent of the drop-outs plan to do at least some college work. Sixteen percent plan to get Ph.D. or M.D. degrees, and an additional 20 percent plan to do at least one year of graduate work. It appears that the majority of the drop-outs have delayed, rather than definitely decided against, entering college.

In other words, of an estimated 600 drop-outs among the top 15,000 students in the 1957 Merit program, some 500 would have gone to college immediately if scholarships had been available. But 500 of these students who are now without prospects of scholarship assistance say that they are still planning to do at least some college work. To be sure, the delay between high school and college will be critical for some, who will never actually enroll. In 1955 an Educational Testing Service follow-up (*2*) of the top-scoring 10 percent of a sample of high-school seniors showed that of some 530 students planning to go to college, 15 percent failed to enroll the following fall. But even if we assume that of the 500 drop-outs now planning to attend college a quarter will not go, the drop-out rate would be only about one percent of the near winners.

Considerably more than 500 scholarships would have been required to send all the drop-outs who want further education to college immediately. This paradox arises because at present it is not possible to differentiate between the student who will not enroll immediately if he does not get a scholarship and the student with comparable financial resources who will manage to go to college without assistance. If it were possible to differentiate these two groups of students in the selection stage, scholarship funds could be used more efficiently to forestall delay in entering college.

The chief contribution of an augmented scholarship program for the present population of students of high ability, it appears, would be to hasten, rather than increase, college enrollment. On the other hand, new scholarship funds could materially reduce talent loss if awards were offered to *less* highly talented students. The most important reservoir of wasted talent is found among students who rank between the 70th and 95th percentile in the distribution of ability. Above this level the loss is, as we have seen, relatively small. The 70th percentile in ability is suggested because various authorities have estimated that students above this level of ability are the students who profit most from a college education.

Factors Contributing to Talent Loss

Table 3 compares drop-outs and college-attenders with respect to 17 attributes which previous research had found to differentiate drop-outs at lower ability levels. The most striking differences are found in the vocational and educational aspirations of the different classes of near-winners. Only about a third of the drop-outs plan to do postgraduate study, whereas about two-thirds of the college-attenders plan such study. About a third of the students not enrolling in college immediately have selected vocations which do not require the bachelor's degree; only 10 percent of the college-attenders have selected such vocations. Contrary to expectations, drop-outs are no more undecided in their vocational choices than are college-attenders.

The second feature which stands out in Table 3 is the difference in cultural stimulation between the homes of drop-outs and the homes of college-attenders. For the most part, the parents of drop-outs have not attended college and have fewer books in the home. The fathers of students not going to college tend to be employed in middle- or low-income occupations.

Talent loss among the near-winners does not appear to be the result of a lack of counseling or guidance in the schools. Drop-outs report receiving relatively more encouragement from their teachers and guidance counselors than do college-attenders. On the other hand, the parents of drop-outs—who presumably must assume the financial burdens—encouraged college attendance less frequently than did the parents of college-goers. Drop-outs also tend to have more close friends who are not going to college. In general, however, nine out of every ten drop-outs among the near winners received some encouragement to attend college.

As might be expected, drop-outs tend to have slightly lower aptitude test scores than do the near-winners who enrolled in college with scholarships. On the other hand, the large proportion of drop-outs whose aptitude test scores place them in the top two percent of the national ability continuum attests to the seriousness of losing such promising students.

At least part of the talent loss may be attributed to lack of initiative among drop-outs. Only 44 percent of the drop-outs made two or more applications for scholarships, whereas 74 percent of the near-winners enrolling with scholarships made this many applications. Mollenkopf and Dear (*7*) have previously shown that the likelihood of receiving a scholarship offer increases rather dramatically with the number of applications made.

The results confirm previous findings (*2*) that the drop-out rate is higher for girls than boys, and that drop-outs tend to have had less mathematics in high school. However, very few, if any, lack the prerequisites for college. Eighty-four percent of the drop-outs took high-school courses preparing them for college.

Discussion

Although the present analysis demonstrates that the current loss of talent among the top 5 percent of the high-school-senior population is less than previous studies have estimated, these results do not justify complacence. There is clearly a need for the continuation of all current scholarship programs and for additional financial aid. True, the need probably will not be critical among students who receive recognition in existing scholarship programs, provided such programs are continued. Most of these students will go to college, many of them with scholarships. But there remains a large number of talented students who drop out of school because of their inability to finance a college education. There is particularly a need for additional funds to recover those students who rank between the 70th and 95th percentiles on the ability continuum. Talented drop-outs who are only "second best" are at present the most promising population in which governmental financial aid programs can effect a reduction in talent loss. Special effort may be required to dispel the notion that only the valedictorian deserves assistance. Particularly deserving of consideration are those needy students who are

Table 3. Differences between drop-outs and near-winners who attended college, among 14,118 participants in the 1957 Merit program.

Attribute	Estimated percent of near-winners having indicated attribute		
	Enrolled in college without scholarship	Enrolled in college with scholarship	Drop-out
Cultural stimulation			
200 or more books in home	69	58	51
Mother had at least some college	62	52	33
Father had at least some college	71	57	38
Father in professional or managerial occupation	72	54	37
Encouragement to attend college			
Mother encouraged student to attend	99	98	89
Father encouraged student to attend	99	97	85
Teachers gave "quite a lot" of encouragement	76	80	88
All of student's closely associated peers going to college	48	38	21
Scholastic Qualifying Test score			
Verbal score in top 2 percent of national senior norms	76	79	72
Quantitative score in top 2 percent of national senior norms	45	52	44
High school preparation			
Took college preparatory curriculum	93	92	84
Took 8 or more semesters of mathematics	61	61	46
Vocational and educational aspirations			
Planning to enter vocation requiring bachelor's degree	86	90	66
Student's vocational plans are tentative or undecided	60	56	56
Planning to do at least 1 year of postcollege graduate study	61	69	36
Personal characteristics			
Male	64	66	56
Applied for two or more scholarships (exclusive of NMS program)	41	74	44

highly motivated to pursue higher education but who rank slightly below the top decile on the usual measures of college aptitude. Scholarship funds for the large number of potential drop-outs among the "second best" are in short supply.

Further research is also required. What impact, if any, does a national scholarship competition have upon students who compete but fail to win recognition? Are these students stimulated to develop their talents, or are they diverted into occupations less commensurate with their ability level? How can we devise better methods for identifying the potential drop-out while he is still in high school? What resources can be marshaled to lessen the talent loss arising from parental attitudes and cultural deficits? (*8*).

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News of Science

NASA Absorbs NACA

On 30 September the personnel, facilities, and research activities of the 43-year-old National Advisory Committee for Aeronautics were incorporated into the National Aeronautics and Space Administration. With this action, NASA is effectively "in business."

The action came nearly a month sooner than the statutory requirement that the transfer, by proclamation in the Federal Register, be made not later than 90 days after the date of enactment of the Space Act (President Eisenhower signed it 20 July). T. Keith Glennan, administrator of NASA, said he would soon announce details of the NASA organizational structure.

The three main NACA laboratories will be renamed in the change-over to NASA. The Langley Aeronautical Laboratory at Langley Field, Va., will be renamed the Langley Research Center. The name of Ames Aeronautical Laboratory, Moffett Field, Calif., will be changed to Ames Research Center, and the Lewis Flight Propulsion Laboratory, in Cleveland, Ohio, to the Lewis Research Center. No change of name is pending for the High Speed Flight Station, Edwards, Calif.; Pilotless Aircraft Research Station, Wallops Island, Va., or the Plum Brook Research Reactor Facility, Sandusky, Ohio. NASA took over NACA headquarters in Washington.

Cooperative Education

The first nationwide study of cooperative education in American colleges and universities has been announced by Ralph W. Tyler, chairman of the Study Committee on Cooperative Education, and director of the Center for Advanced Study in the Behavioral Sciences, Palo Alto, Calif. The project is supported by a grant of $95,000 from the Fund for the Advancement of Education, a subsidiary of the Ford Foundation.

Approximately 60 colleges and universities now have programs of cooperative education for some or all of their students. Under the cooperative plan, students alternate periods of work in school and in industry as a regular part of their degree programs.

The cooperative plan was inaugurated in 1906 at the University of Cincinnati by the late Herman Schneider, dean of engineering. It has become a well-established type of engineering education and has been adopted in programs of business administration, education, science, and the liberal arts. Much of the growth of the plan has come since World War II.

The principal aim of the new study is to examine the educational merits of the work-study plan for college students. The investigation group hopes to learn something about the kinds of young people attracted to cooperative programs rather than to traditional programs, something about the kinds of students for whom the cooperative experience is particularly meaningful, and something about the outcome in terms of readiness for permanent employment and readiness for effective participation in civic and community affairs.

The study also proposes to examine the economic values of cooperative education for students and for institutions operating the plan, and to examine the role of industry and business. Results of the study will be useful to officials of higher education, parents, high-school guidance counsellors, and industry.

Charles F. Kettering, inventor and former director of research for General Motors, serves as honorary chairman of the Study of Cooperative Education. The professional staff of the study lists James W. Wilson, coordinator of educational research at the Rochester Institute of Technology, as executive director and Edward H. Lyons, Industrial Coordinator at the University of Detroit, as associate director.