

DEC 28 1964

The College Sophomore and some Correlates of Academic Achievement

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The Comprehensive College Tests, a new battery of college-level achievement tests in the basic liberal arts, were administered to a nationally representative sample of sophomores at 180 United States colleges and universities.

Academic achievement was found related to the following variables: the amount of high school and college course work in the area, the amount of time spent in out-of-class study, high school rank in class, and the student's stated reason for attending college. The effect of paid employment upon academic achievement was inconclusive.

Although most student personnel administrators would maintain that they are vitally concerned with the intellectual accomplishment of the student, recent analyses of the profession claim that the failure of faculty colleagues to recognize the potential contribution of the personnel worker in this area has presented a major barrier to his acceptance as a full partner in the educational enterprise, (Kauffman, 1964; Williamson, 1964; Darley, 1956; Pepinsky, 1956). Various remedies for this state of affairs have been suggested, but certainly further research identifying the correlates of academic achievement should prove valuable to personnel administrators. This report describes a major effort to measure the academic achievement of a maximally representative cross-section of American college sophomores and to study the relationship of certain student characteristics and activities to this measure.

THE TESTS

The General Examinations of the Comprehensive College Tests are new tests which were released by Educational Testing Service in April 1964 after three years of development and experimental study. They are intended to provide a comprehensive measure of undergraduate achievement in the five basic areas of the liberal arts--

English Composition, Humanities, Mathematics, Natural Sciences, and Social Sciences-History. The tests do not attempt to measure advanced training relevant to specialization in a discipline, but rather to assess the student's knowledge of fundamental facts and concepts, his ability to perceive relationships, and his understanding of the basic principles of the subject. In content, the General Examinations sample the student's grasp of those subjects ordinarily included in the general education requirements for the first two years of college. The English Composition Test is 60 minutes in length; all others are 75-minute tests.

The tests are developed in conjunction with examining committees of faculty members from colleges and universities. Committee members define the topics to be covered, review the test specifications, suggest and review test questions, and approve the final test. To date, fifty-seven college deans and faculty have participated in the development of the tests.

Test reliabilities for the 1963 sophomore norming sample computed by the Kuder-Richardson formula (20) adapted for use with formula scoring (Rights minus $\frac{1}{4}$ Wrongs) were:

English Composition	.92
Humanities	.91
Mathematics	.91
Natural Sciences	.91
Social Sciences-History	.92

METHOD

In the spring of 1963, the General Examinations and a twenty-item questionnaire were administered to a sample of 2,582 students representative of full-time students completing their second year of study at 180 United States colleges and universities. Multi-stage sampling was used, and institutions were stratified by region and selected with probability proportional to size, a procedure which gave each student rather than each college an equal chance of being included in the sample. Of the 251 colleges

invited, 180 agreed to test a random sample of sixteen full-time second-term sophomores. The number actually tested varied somewhat from college to college.

Each student took the English examination and one of the other four tests, randomly assigned. In addition, each student completed a twenty-item questionnaire consisting of the following variables: age, sex, year of high school graduation, standing in high school class expressed in fourths, the number of years in high school study in five areas, the emphasis in course study in the first two years of college, the number of hours spent in study per week, the number of hours spent in paid employment in a typical week, the chief reason for attending college, future plans including college major, intention to attend graduate or professional school, and plans for a career in teaching.

RESULTS AND DISCUSSION

Academic Preparation

High School Preparation and College Course Selection

Students tend to select an area of academic specialization in high school and to continue selecting courses in this area during the first two years of college. The data in Table 1 illustrate that most college sophomores (88%) have had four years of English in high school, but that there is considerable variation in some of the other subject areas. Seventy-two percent of the students who took more college courses in mathematics than in anything else during their first two years of college had at least four years of high school mathematics whereas only 32% of the college students emphasizing courses in the humanities and 27% of the social scientists had taken four years of high school mathematics. The differences are not as pronounced in the social sciences and foreign language areas, but the tendency of students to select an academic concentration early and to stay with it is still obvious.

The implications of these observations for guidance are several: it may be that students recognize their strengths and interests at an early age and stay happily with

that choice. On the other hand, it is quite possible that the student who failed to take four years of high school mathematics, for example, feels himself inadequately prepared for college courses in mathematics and science. While in many cases, the door is not shut as tightly as it appears, nevertheless, one sympathizes with the student who sticks with the subjects he knows rather than venture into unknown courses with untried abilities. Thus it may well be that the reason we find academic areas staked out so early in the lives of students is more a practical matter of the elimination of subjects in which he has inadequate experience than a free selection of courses at the college level.

(Insert Table 1)

High School Preparation and Academic Achievement

Academic achievement as measured by the Comprehensive College Tests is clearly related to the amount of course background in the area. Table 2 illustrates the influence of high school ^{academic} preparation upon test performance. Without exception, there is a steady improvement in test score with increased study in the area. Data were not collected for Humanities since few high school students have an opportunity to study broadly in this area.

Table 2

Mean Test Scores by Years of High School
Instruction in the Area

	<u>English</u> <u>Composition</u>			<u>Mathematics</u>			<u>Natural</u> <u>Sciences</u>			<u>Social Sciences-</u> <u>History</u>		
	<u>N</u>	<u>M</u>	<u>✓</u>	<u>N</u>	<u>M</u>	<u>✓</u>	<u>N</u>	<u>M</u>	<u>✓</u>	<u>N</u>	<u>M</u>	<u>✓</u>
4 yrs. or more	2255	504	99	250	571	93	163	558	97	194	517	106
3 or 3 1/2 yrs.	263	455	92	212	483	75	170	516	99	192	507	99
2 or 2 1/2 yrs.	48*	439*	86*	157	428	56	196	460	75	183	473	88
1 or 1 1/2 yrs.				33	408	55	94	440	76	31	471	83

*Because of the small N, all students with less than three years of English were combined for these figures

College Preparation and Academic Achievement

Since college sophomores tend, during their first two years of college, to take the most courses in the area of their intended major, the influence of instruction, including college courses, upon achievement test scores may be observed in Table 3.

(Insert Table 3)

In every instance, the intended majors in the area make a significantly higher score ($P < .01$, using the conventional t test) on the Comprehensive College Tests for their area than any other group of majors. Although there would appear to be nothing surprising about this finding, in the light of other research evidence it should be heartening to both teachers and test-makers. It is a well-established fact that the various fields of study differ in the caliber of students which they attract, with the science majors in the lead on both aptitude test scores and high school grades, (Wolfle, 1954). In the present study too, science majors tended to have been better students across the broad range of high school subjects than social science and humanities majors.² Had teaching in specialized fields been ineffective or had the tests measured aptitude instead of achievement, we might have expected the superior academic ability of the potential scientist to eclipse the course preparation of the social science and humanities majors.

Clearly, using the number of courses as a measure of academic preparation gives no consideration to either the quality of instruction or the ability of the student. The demonstrated relationships between test scores and related study in the area indicates that, other things being equal or presumed random, exposure to the subject through course work results in a better grasp of the subject matter as it is defined by the faculty committees determining the measuring instrument.

²Sixty-seven percent of the intended science majors came from the top quarter of their high school classes compared with 56% of the humanities majors and 50% of the social science majors.

Rank in High School Class

(Insert Table 4)

Table 4 reveals some interesting and to some extent unexpected findings. It is not especially surprising to find the students who reported that they graduated in the top quarter of their high school classes doing significantly better on all five examinations ($P < .001$) than students in the second quarter. What is surprising is that on three of the five tests, the nearest rival of the top quarter student is the fourth quarter student. Only 2% ($N=60$) of this sample of college sophomores ranked in the lowest quarter of their high school classes and it may be that their admissions folders presented other information, such as high test scores and/or graduation from an outstanding secondary school, that convinced admissions officers they were a good risk. Furthermore, it should be remembered that these are the fourth-quarter students who survived the first two years of college. Wolfle's 1954 data show that 17% of the lowest fifth of high school graduating classes enter college, and only 4% of this group graduate.

Apparently, however, a few selected fourth quarter students become very good college students. The fact that there is also evidence that the students with low academic aptitude who persist until graduation show better general adjustment and morale in their later careers than high ability students (Pace, 1941, p 54), would suggest the need for caution in setting arbitrary "cut-offs" in determining who will succeed in college.

The Relationship between Achievement Test Scores and Certain Student Characteristics Amount of time Spent Studying

On the whole, students who study more learn more. Test scores were compared with questionnaire responses to an item asking the number of hours spent studying during a typical week. Table 5 presents the data for all candidates on all five of the examinations.

(Insert Table 5)

The difference in men's and women's reports of study time were very small. Thirty percent of each reported that they spent from 10-14 hours studying during a typical week; approximately 40% claimed they spent from 15-24 hours; 15% of both men and women spent either less than 10 hours per week or more than twenty-five. Students studying fifteen hours or more per week made significantly higher ($P < .001$) test scores in all areas than those studying less than fifteen hours. On the average, the longest study hours are spent by those students planning to major in mathematics and the sciences whereas education and business majors report averaging the least study time in a typical week.³

Studies involving the achievement of the superior student (Holland and Astin, 1962; Brown and Dubois, 1964) have noted the effectiveness of biographical and study habits data as predictors when compared with the more subtle personality scales. Thus, they have suggested that, "...for purposes of prediction, we could abandon our efforts to construct sophisticated inventories..." (Holland and Astin, p 143). There are, of course, as these authors recognize, other obvious reasons to continue work on more "sophisticated inventories," but the significance of the difference between the groups in this sample studying more than and less than fifteen hours a week certainly indicates a rather dramatic relationship between study and achievement test scores over a broad range of student abilities when students report their study time in an unthreatening situation.

Amount of Time Spent in Paid Employment

Forty-seven percent of the students stated that they spent more than one hour in paid employment during a typical week. Men were somewhat more likely to work than women (51% to 44%) and to work longer hours; 21% of the men worked seventeen hours or more per week compared with 8% of the women. Business majors spend more time in paid

³By intended major the following percentages reported studying fifteen hours a week or more--Mathematics, engineering and physical sciences 64%, biological sciences 61%, social sciences 59%, humanities 57%, education 49% and business 43%.

employment than any other group--26% work seventeen hours or more during a typical week compared with 15% for the total sample.

Wise (1958) was unable to locate any studies which suggested that earning part of one's college expenses is related to achievement. The results of the present study suggest areas for further research, but are inconclusive regarding the effect of employment upon academic achievement. It is interesting to note that students working a little, from 1-7 hours per week, scored higher on all five examinations than did students working less than one hour per week. The differences are not large, however, and only the English and Natural Sciences tests showed significantly higher scores for those who worked a moderate amount over those who worked less than one hour a week ($P < .01$ and $P < .05$ respectively). If the mean test scores are analyzed for differences between students working sixteen hours or less and more than sixteen hours per week, only the English and Humanities means are lower for those working longer hours. Table 6 shows mean test scores on the examinations as a function of the number of hours spent in paid employment during a typical week.

(Insert Table 6)

Reason for Attending College

Almost half of the college sophomores stated that their chief reason for attending college was to obtain the degree that was necessary for the profession they had chosen. The second most frequent reason (24%) was to prepare for a better paying job. The desire for knowledge came in a rather poor third with 18% of all candidates giving this as their chief reason for attending college. These stated aims would appear to lend support to such generalizations as, "The sociologist points out that students rarely come to American colleges because they hunger for knowledge. For the average student, 'education' means eligibility for business and professional careers." (Toby, 1957, p 319). Schwartz (1957) converts such cold statistics into poetry:

Oh, mute managerial Muses,
Sitting stiff-lipped in Committee,
We don't ask to be
Battered or fired,
Seasoned or inspired;
We don't seek Wisdom's warmth;
We just want,
Each of us,
A good job

Men and women tended to give the same reasons for attending college, with one notable exception; men were more interested in better paying jobs and women more interested in increasing their general knowledge. Thirty percent of the men and 16% of the women checked the better-pay response whereas 12% of the men and 26% of the women were interested in increasing general knowledge. Women, however, were just as interested in the degree for a future profession as were the men--51% of the women to 47% of the men.

Only 1% of the sample (22 students) said that their chief reason for attending college was to make social contacts and develop social skills, and those students scored lower than any other group on all five examinations. Top scores on all five tests were the students who were in college to increase their general knowledge; those who sought the degree for a profession scored consistently higher than those preparing for a better paying job.

(Insert Table 7)

CONCLUSION

The results of this study, conducted over a broad range of colleges and students, indicate that academic achievement operates in close conjunction with a number of student characteristics and activities which have been of traditional concern to the student personnel worker. It is hoped that future research will aid in the further identification of noncognitive correlates of academic growth and achievement, and that such information will aid student personnel workers in their concern with the education of the student.

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Table 1

High School Preparation of Sophomores Who Took Most College Courses in Each of Five Subject Areas

College Emphasis (most courses in)	<u>English</u>		<u>Mathematics</u>		<u>Natural Sciences</u>		<u>Social Sciences- History</u>		<u>Foreign Languages</u>	
	<u>N</u> 4 years or more	<u>%</u>	<u>N</u> 4 years or more	<u>%</u>	<u>N</u> 4 years or more	<u>%</u>	<u>N</u> 4 years or more	<u>%</u>	<u>N</u> 4 years or more	<u>%</u>
English	700	91%	209	27%	142	19%	279	36%	180	23%
Natural Sciences	603	89	353	52	285	42	222	33	164	24
Mathematics	350	86	291	72	165	41	120	30	71	17
Humanities	739	91	257	32	144	18	298	37	280	35
Social Sciences-History	628	87	193	27	147	20	321	45	166	23

Table 3

Mean Test Scores as a function of Intended College Major

	<u>English Composition</u>			<u>Humanities</u>			<u>Mathematics</u>			<u>Natural Sciences</u>			<u>Social Sciences- History</u>		
	<u>N</u>	<u>M</u>	<u>S</u>	<u>N</u>	<u>M</u>	<u>S</u>	<u>N</u>	<u>M</u>	<u>S</u>	<u>N</u>	<u>M</u>	<u>S</u>	<u>N</u>	<u>M</u>	<u>S</u>
<u>Intended Major</u>															
Biological Sciences	269	505	94	73	486	85	64	511	84	79	568	93	53	515	80
Engineering, Mathematics Physical Sciences	402	511	101	88	487	89	129	609	83	91	562	94	94	507	103
Humanities and Fine Arts	392	548	94	108	570	107	92	483	84	99	490	84	93	517	92
Social Sciences	406	514	98	123	531	101	94	476	82	93	484	90	96	560	101

Table 4

Mean Test Scores with Quartile Rank in High School Graduating Class

	<u>English Composition</u>			<u>Humanities</u>			<u>Mathematics</u>			<u>Natural Sciences</u>			<u>Social Sciences- History</u>		
	<u>N</u>	<u>M</u>	<u>A</u>	<u>N</u>	<u>M</u>	<u>A</u>	<u>N</u>	<u>M</u>	<u>A</u>	<u>N</u>	<u>M</u>	<u>A</u>	<u>N</u>	<u>M</u>	<u>A</u>
Top Quartile	1317	537	92	319	531	100	348	532	100	334	529	96	316	527	98
2nd Quartile	796	470	88	224	479	94	206	467	85	188	469	88	177	473	86
3rd Quartile	394	434	87	112	451	78	94	446	73	91	443	89	97	447	93
4th Quartile	60	432	80	19	475	83	10	475	78	17	471	82	14	496	97

Table 5

Mean Test Scores with Hours of Study per Week

	<u>English Composition</u>			<u>Humanities</u>			<u>Mathematics</u>			<u>Natural Sciences</u>			<u>Social Sciences- History</u>		
	<u>N</u>	<u>M</u>	<u>S</u>	<u>N</u>	<u>M</u>	<u>S</u>	<u>N</u>	<u>M</u>	<u>S</u>	<u>N</u>	<u>M</u>	<u>S</u>	<u>N</u>	<u>M</u>	<u>S</u>
Less than 15 hours	1174	480	96	309	483	94	302	478	87	279	487	95	283	479	93
15 hours or more	1393	513	100	365	513	102	356	516	105	351	506	101	321	515	102

Table 6

Mean Test Scores with Number of Hours Spent in Paid Employment During a Typical Week

	<u>English Composition</u>			<u>Humanities</u>			<u>Mathematics</u>			<u>Natural Sciences</u>			<u>Social Sciences- History</u>		
	<u>N</u>	<u>M</u>	<u>S</u>	<u>N</u>	<u>M</u>	<u>S</u>	<u>N</u>	<u>M</u>	<u>S</u>	<u>N</u>	<u>M</u>	<u>S</u>	<u>N</u>	<u>M</u>	<u>S</u>
Less than 1 hour	1352	503	100	336	506	102	362	493	105	322	496	100	331	499	99
1 to 7 hours	337	514	100	88	509	103	78	506	90	98	523	99	73	507	101
8 to 16 hours	470	493	99	130	494	101	123	510	90	108	489	96	109	499	102
17 to 24 hours	242	482	94	72	472	83	60	495	93	62	508	95	48	497	95
25 hours or more	154	459	90	46	481	78	33	502	86	34	457	86	41	472	93

Table 7

Mean Test Scores and Reason for Attending College

	<u>English Composition</u>			<u>Humanities</u>			<u>Mathematics</u>			<u>Natural Sciences</u>			<u>Social Sciences- History</u>		
	<u>N</u>	<u>M</u>	<u>σ</u>	<u>N</u>	<u>M</u>	<u>σ</u>	<u>N</u>	<u>M</u>	<u>σ</u>	<u>N</u>	<u>M</u>	<u>σ</u>	<u>N</u>	<u>M</u>	<u>σ</u>
Social--make social contacts and develop social skills	22	418	101	6	431	90	2	382	21	10	452	76	4	435	94
Prepare for a better paying job	609	470	92	144	455	81	158	496	102	152	471	100	155	483	96
Must have degree for future profession	1248	499	94	343	501	94	327	502	97	301	508	97	276	496	98
Increase general knowledge	471	537	106	127	544	113	120	507	95	116	509	96	108	521	103
Have opportunity to discover type of work most interested in	215	490	102	54	504	87	51	469	100	50	495	101	60	506	100