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ABSTRACT

The findings and conclusions of an inquiry into the use and value of college academic records as a primary basis for predicting later occupational success are summarized. The inquiry revealed a wide variation in the meaning of grades from school to school. The quality of students accepted by different colleges varies widely. This variation is modified, but not eliminated, by college experiences so that there remain large differences in quality among college graduates. These great differences are masked by the apparent uniformity existing in grading systems among colleges, when in fact grading systems vary widely both between and within colleges. The recent phenomenon of grade inflation has only intensified this masking effect. Because grades vary widely from school to school, grade point average may be of little value in predicting success either in specific occupations or in other adult accomplishments. Although technical inadequacies of much research in this area make conclusions difficult to draw, much empirical evidence implies that grade point average is a poor predictor of later vocational achievement. At the very least, the evidence suggests that no single measure of college achievement should be used alone as a basis for selection decisions. (Author)

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UNDERGRADUATE ACADEMIC ACHIEVEMENT IN COLLEGE AS AN INDICATOR OF OCCUPATIONAL SUCCESS

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ABSTRACT

This report summarizes the findings and conclusions of an inquiry into the use and value of college academic records as a primary basis for predicting later occupational success.

The inquiry revealed a wide variation in the meaning of grades from school to school. The quality of students accepted by different colleges varies widely. This variation is modified, but not eliminated, by college experiences so that there remain large differences in quality among college graduates. These great differences are masked by the apparent uniformity existing in grading systems among colleges, when in fact grading systems vary widely both between and within colleges. The recent phenomenon of grade inflation has only intensified this masking effect.

Because grades vary widely from school to school, grade point average may be of little value in predicting success either in specific occupations or in other adult accomplishments. Although technical inadequacies of much research in this area make conclusions difficult to draw, much empirical evidence implies that grade point average is a poor predictor of later vocational achievement. At the very least, the evidence suggests that no single measure of college achievement should be used alone as a basis for selection decisions.

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INTRODUCTION

This report is based primarily on a review of available published literature. It also reflects information gathered by personal contacts with professional research representatives of the Department of Health, Education, and Welfare; the Educational Testing Service; the American Council on Education; and the American Telephone and Telegraph Company. The latter business representative was included to clarify and update reports from that company as to the significance of academic achievement in employment.

The report is divided into three sections, the first two of which concern the unpredictable nature of grades themselves. The third section reviews empirical findings concerning the relationship between grades and later vocational success.

DO GRADES FROM DIFFERENT INSTITUTIONS HAVE THE SAME MEANING?

A serious impediment to the prediction of later vocational success by academic achievement is the wide variation in the implicit meaning of grades from institution to institution. As Clark (1965) observed, "All institutions are not equal...they are remarkably unequal in student body, faculty, and quality of instruction" (p.116). Indeed, the many different influences and conditions which make up the college experience vary widely from school to school. In addition to these variations in the total college experience, there are also wide differences in the overall quality of students enrolled at and graduating from different institutions. Finally, the grading practices followed are not uniform among colleges and universities.

Institutional Variables

Colleges vary widely in such characteristics as types of curricula (e.g., teacher education vs. research science), sex ratio of student body, religious affiliation, research and scholarship funds, variety of courses offered, size of library, and achievements of graduates (Astin, 1965). If, ideally, grades are a measure of the student's successful exposure to the college experience, interpretation of the grade must take into account the goals and other influencing characteristics of each school.

Dramatic variation among institutions has been observed in testing programs affecting upperclassmen and graduates, such as the Selective Service College Qualification Test (Statistical Studies, 1955) which shows large systematic differences among colleges and among departments. Such variation, whether caused by differences among schools in academic orientation, grading practices, student body quality, or other variables cannot be ignored in evaluating grade point average (GPA).

The Student

In addition to a school's academic orientation, grades are often dependent upon each student's proficiency compared to classmates. Moreover, the content and quality of the educational material made available is influenced by the abilities, needs and expectations of the student body, which may vary widely from school to school.

Fricke (1975) points out that "While there is very little difference in grades given to freshmen enrolled in various institutional types (e.g., university and two-year college), there are often substantial differences in the academic quality of students enrolled in them " (pp. 94-95).

To elaborate his position, Fricke presents an academic history of three students of differing academic abilities, discussing their probable success or failure at colleges of differing selectivity. Fricke's discussion of his prognosis for one hypothetical student, Bill, provides an example of the types of prediction he felt were possible.

"If Bill were to attend the University of Michigan chances are that his grades would be about straight C. Bill's academic indicators (which rank him higher than about 80 per cent of the 1965 high school graduates) put him at a percentile rank of about 17 on U-M freshman norms; in 1965 the average SAT score of Michigan freshmen was about 600. If Bill were to attend Providence College in Rhode Island his grades could well be half B's and C's; if Ferris State College in Michigan, perhaps straight B or better; and if Albany State College in Georgia, perhaps straight A " (p. 18).

Support for such generalization is found in the following three representative sources:

1. The Educational Testing Service has published a Manual of Freshman Class Profiles 1967-69 (College Entrance Examination Board, 1965). This manual reports the college board scores of entering freshmen and other high school data, by college. The profiles show very real differences in the tested scholastic ability of entering freshmen at various colleges. Indeed, the median SAT score ranges among different colleges from less than 300 to more than 700. The differences are so great that in some schools the upper group of freshmen score below the lowest group of freshmen from other schools.

2. The College Handbook (Dillenbeck and Wetzel, 1972), a later publication of Educational Testing Service, contains more recent charts showing College Board Scores for enrolled freshmen compiled school by school. These profiles show large differences in SAT scores and a range of scores as great as that in the earlier profiles. Table 1, which compares median SAT scores of

TABLE 1

Median SAT-V and SAT-M Scores of Freshmen
Enrolled at Selected Schools

School	Median SAT Score	
	SAT-V	SAT-M
Albany State College	275	317
Amherst College	629	677
California Institute of Technology	677	762
Catawba College	441	463
Stillman College	267	306
University of Georgia	501	526
University of Michigan	553	600

Data Source: The College Handbook (Dillenbeck & Wetzel, 1972)

enrolled freshmen at selected schools, illustrates the extent of interschool differences shown in this publication.

3. In comparative studies of institutional differences in student body dimensions, Astin (1965) reported wide differences in many freshman class characteristics. This variation goes beyond test scores and covers many other indices of achievement, activities and contributions in high school.

To further confound the interpretation of grades, the interaction of student quality and educational experience at each school intensifies and complicates the differences in overall student quality during the period between freshman and senior years. On the one hand, it would be expected that the dropouts of freshmen and sophomores would act to narrow the range of ability by graduation. On the other hand, in most learning situations, while all students may learn, the brighter students accelerate faster than the less able, so that by the completion of training, individual differences may be even greater. The facts are that among college graduates wide differences in abilities have been measured which may or may not be reflected in their grades.

Over the years, the Graduate Record Examination has reflected wide differences among graduates from different colleges both in general abilities and achievement in specific major fields of preparation. In addition, the experience of major private employers and their behavior in recruiting reflects their recognition of the wide and complex differences in the quality of college graduates.

College Achievement and Progress in Management (1962), the American Telephone and Telegraph Company's report of its findings concerning the relationship between grade point average and occupational success in the Bell System, offers an example of the complexity of the moderating effect of institutional variables.

Data on which the report is based "clearly support the supposition that rank in graduating class does not mean the same thing from college to college, that is, a man with a particular rank in a more demanding school is more likely to be successful in business than the man with the same rank in a less demanding institution. This is especially true for the above average colleges as compared to the average colleges; the latter have only

a small advantage over the below average colleges. These results, however, do not support the notion that college recruiting should emphasize above average colleges. Top third men from below average colleges are better bets than bottom third men from above average colleges" (pp. 8-9). To further emphasize the difficulty of grade interpretation it should be noted that AT & T ranked colleges on the basis of published materials and discussions with college deans and placement directors. Such a ranking system is subjective in nature and may not be expected to remain static from year to year.

Different Grading Practices

While, by and large, grades reflect a student's performance relative to others with respect to the school's academic goals, the actual grade received may be influenced by many other factors. Grading practices, despite their apparent similarities (that is, A B C D vs. 1 2 3 4 systems), actually have a number of variations.

Grading practices and standards may vary widely not only between institutions, but within institutions and even within departments of the same institution (Hoyt, 1965). Chansky (1964) discussed the literature concerning variables which influence the assigning of grades, pointing out studies which listed such diverse items as final attainment, attitude toward work, degree of interest, student ability to apply logical criticism, effort and writing skill. One study discussed by Chansky (Battle, 1954) revealed that in fact a sizeable portion of a student's mark may be explained in terms of congruence of the student's values with those of the teacher. Added to these confounding influences is the tendency for some teachers to inflate the value of a mark, others to deflate it. The conclusion of Chansky was that the GPA is often based upon capricious judgments and volatile criteria.

Grade Inflation

As noted by Chansky, a factor still further complicating the interpretation of undergraduate grade point average is the recent problem of grade inflation which misrepresents student achievement by severely limiting the range of grades received. The description of the grade inflation problem at the University of Michigan by Benno G. Fricke (1975) makes clear the problems involved.

"Probably of most concern to some faculty members at Michigan is the fact that GPA's have continued to increase beyond 1970-71, the last year before the sharp decline in student quality. The fall and winter term GPA's for 1973-74, ... are 2.82 and 2.83, the highest ever, and obtained by a freshman class that is the weakest in more than two decades. Clearly the meaning of a Michigan GPA of 2.50 in 1973 or 1974 is not the same as it was in 1959 or 1960.

Judging from the published literature and other sources it seems that the problem of grade inflation is becoming about as serious as the problem of student quality deterioration" (pp. 102-103).

Because grade inflation limits the range of grades received and may vary in degree both among and within schools, it only compounds the interpretation problems stemming from student and institutional variation.

In summary, grades which appear to be uniform across and within institutions may, in fact, be masking a wide range of academic proficiency. It follows, then, that the comparison of GPA's earned at different institutions (or even different departments within the same institution) is a complex matter. Not only is it important to consider the different influences and student body compositions of different schools but it is also important to take into account the varied and possibly unpredictable bases for the assignment of each grade. When grades are inflated and large proportions of A's and B's are given, this masking effect becomes even more pronounced. The grades then allow little range on which to compare student achievement.

Given all the influences upon a student's undergraduate grade point average it is a very difficult rask indeed to interpret accurately what achievement grades reflect and it is almost impossible to equate grades or ranks in class across departments or across institutions. As Clark (1965) points out, both upper and lower quality institutions "have an upper quarter and an upper tenth, a lower quarter, and lower half...it is absolutely absurd to equate the two. It is also a too simple formula and tends to lull one into a sense of security." It also follows that manipulating statistically the marks given by different institutions is indefensible.

ARE ACADEMIC RECORDS A DEPENDABLE SOURCE OF INFORMATION?

In addition to the interpretation problems inherent in assessing the meaning behind academic records, the records themselves contain many sources of unreliability. First, there is a measureable amount of inaccuracy in self-reports (American Telephone and Telegraph Company, 1962; Davidson, 1963) and to some extent in transcripts. The major errors of interpretation occur when transcripts are translated to numerical systems. Changes to "pass-fail" or systems other than "1 2 3 4" or "A B C D" further complicate the interpretation of college grades.

Pooling Across Departments and Colleges Within a University

Often records must be pooled from different departments and colleges within a larger university to obtain a total grade point average. Error is introduced when this is done. In the case of students who have transferred from school to school marks must be pooled from different schools. When data from different colleges are merged to arrive at some order of merit, the outcome is the result of so many confounding happenings that to place credence in it is unfounded.

Usefulness of Grades in Student Comparison

Ebel (1965) discussed many shortcomings of grades, and concluded that: (1) There is no generally accepted definition of what the various marks should mean, hence marks tend to be unreliable, and (2) there is a lack of objective evidence as a basis for assigning marks. Hence marks "tend to vary from instructor to instructor, from course to course, from department to department, and from school to school " (pp.401-402).

The ambiguous nature of individual grades coupled with the additional sources of error introduced when grades are averaged together makes the accurate comparison of student GPA's almost impossible. Moreover, a consideration of these sources of unreliability in academic records makes it clear that to make fine distinctions among students on the basis of GPA is indefensible.

DOES GRADE POINT AVERAGE CORRELATE WITH OCCUPATIONAL SUCCESS?

In light of the preceding evidence, the difficulty of linking grade point average to later occupational success is quite clear. The empirical relationship between the two variables, however, must still be considered. Studies in this area imply that grade point average seems to be of little use in prediction of later occupational success. It must be pointed out, nevertheless, that results have often been contradictory. Moreover, direct comparison is difficult due to the many theoretical, experimental, measurement and statistical difficulties present in the studies.

A very basic problem in interpretation of much research in this area is that of criterion selection. Most studies have used a sole criterion of salary or salary level, although a few have treated occupational success as having more than one dimension. There are several reasons why salary may be an inadequate criterion of success, a most basic one being the ambiguous relationship between salary level and vocational achievement. Different organizations and occupations may have widely differing pay structures which may or may not be handled in a public manner. Within these structures individual salary levels may be based upon criteria which may not be directly related to achievement. Indeed, the relationship between salary and real vocational achievement may be as ambiguous as that between grades and college achievement.

Such ambiguity in the meaning of salaries hinders the comparison of success in different occupations or different organizations. The problem of this criterion is obvious in studies where occupations or organizations are lumped together. A second problem concerning the use of salary as a criterion is that it oversimplifies the concept of occupational success, ignoring other definitions of success such as job proficiency. Finally, the relationship between college grade point average and later salary level may be a contaminated one. Many employers may be willing to offer higher starting salaries to students with more impressive undergraduate grades and this advantage may continue throughout the person's career.

Any review of studies concerning the relationship of GPA to later success is complicated by the question of when to assess adult accomplishment. While an immediate follow-up of success as a student may afford participants insufficient time to establish a reliable record of accomplishment, a greater lapse of time may allow factors unrelated to college

experience to affect accomplishment in a vocational area. Studies varied in their treatment of this factor.

Another factor complicating the analysis of empirical findings was the restriction in range of academic achievement caused by the exclusive use of college graduates in studies relating college achievement to later success since students with very poor academic records would have left school before graduation. The amount of restriction varied from study to study, organizations differing in their use of academic records in making selection decisions. Still further difficulties in interpretation and comparison were introduced by variation among firms in their salary and advancement opportunities and differences among colleges in their grading practices and academic abilities of their student bodies. Adding to this difficulty was the combination of participants from different firms or different colleges in some studies.

The material in this section presents a summary of two literature reviews (Calhoon and Reddy, 1965; Hoyt, 1965) plus a separate treatment of three individual studies (American Telephone and Telegraph Company, 1962; Ginzberg, 1965; United States Civil Service Commission, 1975). The study done by AT & T is the only significant recent study showing a positive relationship between GPA and later success in business. The other two studies individually covered in this section were not included in either the Hoyt review or that by Calhoon and Reddy. Moreover, the study done by the U.S. Civil Service Commission was included because it contains the most recent available data in the area and also because it employs several measures of job proficiency as its criteria of vocational success.

Hoyt

Donald P. Hoyt (1965) analyzed a total of 46 studies concerning the relationship between college grades and adult achievement, grouping the studies into eight categories according to area of achievement: business, teaching, engineering, medicine, scientific research, miscellaneous occupations, studies of eminence and non-vocational accomplishments. Because Hoyt's review was complicated by the problems inherent in studies in this area, it was often difficult for him to make a direct comparison of study findings. The evidence, however, did lead him to conclude that "college grades have no more than a very modest correlation with adult success no matter how defined " (p.45). The following material presents

a brief summary of Hoyt's review.

Hoyt reviewed seven studies concerning the relationship between college grades and achievement in business (Bridgman, 1930; Gambrill, 1922; Jepsen, 1951; Kunkel, 1917; Pallett, 1965; Walters and Bray, 1963; Williams, 1959). Of the seven, only two companion studies done by the American Telephone and Telegraph Company (Bridgman; Walters and Bray) supported the hypothesis that college grades predict future success in business. The remaining studies in this group suggested no relationship between the two. It must, however, be pointed out that the evidence is not unequivocal. The studies by Kunkel and Gambrill are primarily of historical interest, due to changes in education and business in the past 50 to 60 years. In the Jepsen and Williams studies, there was a possibility that technical problems may have obscured possible relationships between academic record and occupational success. Nevertheless, one study stands out in this group. The study done by Pallett was considered by Hoyt as "in many respects the most dependable in this section" (p.10). In this investigation, junior and senior year college GPA was correlated with ratings in eight areas: persuasiveness, drive, creativity, leadership, problem-solving ability, oral communication, identification with the business world, and identification with the company. GPA was also correlated with an overall progress and potential measure. All participants were graduates of the University of Iowa who were currently employed in non-technical jobs in business. All had been out of college for five to ten years. None of the correlations was statistically significant.

It is possible that correlations may have been attenuated by restricting participation to only persons who were both college graduates and employed at the time of the study. Nevertheless, of the 10 correlations computed, six were in the negative direction. Correcting for attenuation would only make the direction of these correlations more pronounced.

Hoyt reviewed 12 studies of the relationship between college grades and later success in the teaching profession (Cole, 1961; Erickson, 1954; Gambrill, 1922; Jepsen, 1951; Jones, 1946; Jones, 1956; Kunkel, 1917, Lins, 1946; Massey and Vineyard, 1958; Payne, 1918; Schick, 1957; Stuit, 1937). In only four of the studies were there significant positive relationships between college GPA and success in teaching. Two of

these studies are essentially of historical interest, having been done very early (Kunkel, 1917; Payne, 1918). A much later study by Stuit (1937) found a significant difference in undergraduate grades between a group of good teachers and one of poor teachers. In this study, however, the omission of intermediately successful teachers may have overestimated the relationship. A fourth study (Jones, 1956) found significant correlation between principals' ratings and both "professional GPA" and "GPA in the major teaching field."

The remaining eight studies in this group found either mixed or non-significant relationships between GPA and criteria of teaching success. Indeed, the highest correlation found in the entire group was that between personality data collected in college and a later rating of teaching proficiency. Here the correlation was .65 with a sample size of 140 (Cole, 1961).

Five studies in the area of engineering were reviewed (Beatty and Cleeton, 1928; Gambrill, 1922; Martin and Pacheres, 1962; Pierson, 1947; Rice, 1913). Four of the five studies used salary as a criterion of occupational success and their findings suggested that it is unrelated to college grades. Martin and Pacheres, in Hoyt's opinion the best designed of the studies, found no relationship between salary and grades even after adjusting for the differences in reputation among colleges. A fifth study (Pierson) did find a relatively high correlation (.43) between GPA and ratings of occupational success by engineering school faculty members. In this study, however, criterion ratings may have been made by the same faculty members who had earlier assigned grades to the study participants. Therefore predictor and criterion contamination cannot be dismissed in evaluating the relationship obtained in this study.

Hoyt reviewed eight studies in the area of medicine (Gambrill, 1922; Kunkel, 1917; Peterson, Andrews, Spain, and Greenberg, 1956; Price, Taylor Richards and Jacobsen, 1964; Richards, Taylor and Price, 1962; Richards, Taylor, Price and Jacobsen, 1965; Taylor, Price, Richards and Jacobsen, 1965; Taylor, Price, Richards, and Jacobsen, 1966). Here Hoyt concluded that medical school grades seemed to bear a positive relationship to the early success of physicians, but that these grades were not predictive of physician performance after the first few years of practice. The evidence also suggested that undergraduate grades were unrelated to success in medical practice.

Hoyt reviewed five studies relating grades received in college to later achievement in scientific research (Chambers, 1965; Harmon, 1963; Taylor, 1963; Taylor, Smith, and Ghiselen, 1963; Taylor, Smith, Ghiselin and Ellison, 1961). In this group, college grades seemed to have no more than very modest relationships to measures of research performance. On the whole, college grades were unrelated to later performance but occasionally low positive relationships were reported (Chambers: Taylor, Smith, Ghiselin and Ellison). Modest correlations were primarily shown in the area of scientific creativity. Here, it is possible that area of interest and level in the hierarchy may have had a moderating effect on the correlation.

Five studies made up Hoyt's category of "miscellaneous occupations" (Havemann and West, 1952; Husband, 1957; Jepsen, 1951; Kunkel, 1917; Twedt, 1948). Occupations covered by the studies were lawyers, ministers, journalists, "professions", "business","high professional", "low professional", and "government." Little relationship was shown between college grades and salary.

Ten studies of eminent men were included in Hoyt's review (Bevier, 1917; Dexter, 1902; Foster, 1910; Knapp, 1966; Knox, 1947; Langlie and Eldridge, 1931; Nicolson, 1915; Phi Delta Kappan, 1965; Poffenberger, 1925; Walters, 1921). These studies were all done in the early part of the century and dealt with samples primarily drawn from private men's colleges in the Northeastern part of the country. The studies do suggest a relationship between eminent scholarly work and eminence in adult affairs.

The final two studies reviewed by Hoyt concerned adult accomplishments in non-vocational areas (Mann, 1959; Plasse, 1951). The only significant relationship found was between total GPA and the amount of additional higher education obtained. No relationship was found between college success and the pursuit of citizenship activities or cultural interests.

Calhoon and Reddy

Calhoon and Reddy (1968) reviewed 19 studies concerning the relationship of success in business to several phases of college performance, including grades, extracurricular activities, athletics, working while in school, and college curricula.

Their review was based on the hypothesis that a college affords a number of measurements of performance that can be correlated with criteria of success. Fifteen of the studies contained information concerning the relationship between grade point average and later occupational success as measured by salary level. Seven of these fifteen studies are the same ones reviewed by Hoyt in his section concerning business studies, although eight had not been covered in Hoyt's review. Two of these eight studies (Brown University, 1967; Husband, 1957) reported significant differences in salary between "A" and "B" students as compared to students earning lower grades. Four of the studies (Havemann and West, 1952; North Carolina, University of, Placement Service, 1965; Rosenow, 1936; Simonds, 1962) demonstrated some slight relationship between GPA and later earnings. Two studies (Mason, 1965; Jersey Affiliate, 1967) found no relationship.

In interpreting the findings of their review, Calhoon and Reddy emphasized the conflicting results and inconclusive nature of the studies in this area, pointing out the inadequacies of the criterion, salary level, and other technical flaws which weakened study results. Their summarizing comment was "as the evidence stands, although there is some seeming relation between grades and salary in business, it is noticeable more at the extremes ("A", "B", vs. "D") than in intermediate stages. Moreover, the findings are far from clear-cut. For example, the AT & T study (reviewed by Hoyt), which shows the most definite correlation between level of income and grades, finds 26 per cent of the bottom third of their class in the top third as to salary and 21 per cent of the top third in their graduating class in the bottom third in salary."

Despite their reservations concerning the technical adequacy and conflicting findings of the available studies, Calhoon and Reddy did make the following recommendations concerning the use of grades for recruiting and placement:

1. Despite conflicting results, the predictors most worth examining seem to be grades, grades plus extracurricular activities, and real achievement in extracurricular activities.

2. In making placement decisions, a single criterion such as grades or participation in extracurricular activities may be indicative of how college graduates will perform but should be regarded as a clue which becomes useful if supported by other clues. Moreover, it is safer to examine a number of criteria

and to see what they mean with respect to the individual. For example, to some extent college grades may indicate intellectual capacity, a need to learn, a mature sense of responsibility, a need for achievement, and stability shown by persistence in overcoming obstacles. High grades can also indicate negative factors such as extreme introversion, compensation for social or athletic deficiencies, and intenseness. Then, too, a spongelike absorption of knowledge from textbooks and lectures is not the same as learning in an organizational setting; e.g., from experiences, from others, from sensitivity to the requirements of a particular environment. Therefore, it is very important to consider the real meaning behind performance whether it occurs in college or elsewhere.

American Telephone and Telegraph Company

The only significant recent major study in which a useful relationship is reported is that of the American Telephone and Telegraph Company (1962) which investigated the relationship between performance in college and later occupational success. Here the criterion of success was "annual salary earned by a man as compared to that earned by others with the same length of service in the company." Corrections were introduced to adjust for differences in salary levels in different parts of the country and between different departments of AT & T. The study group consisted of 17,000 Bell System employees all of whom were males who had graduated from college before 1950. Information that was available and reported covered their rank in class, the college quality, extracurricular activities, and degree of self-support in college. The salary distribution was divided into thirds so it was possible to say whether a graduate fell into the top, middle, or bottom salary third of all the college graduates having the same length of service. Men were also classified as to the third of the class in which they graduated with an additional classification of those who were in the top tenth of their graduating class. The scholarship breakdowns were then compared to the salary thirds. Results of this comparison showed "a decided relationship" between rank in graduating class and progress in the Bell System.

In order to study the effect of college quality on the relationship between grade point average and success in the

System, AT & T used a classification of colleges based on published materials and discussions with college deans and placement directors. Colleges were then classified as "above average", "average" and "below-average." Taking the college quality into account did make a difference in that members of each third of the class in "above average" colleges did better than graduates in respective levels of "average" and "below-average" schools. The same comparison held true for "average" schools compared to "below-average" schools. However, scholarship was a more important characteristic than college quality. The top third men from below-average schools did better in business than the lowest third men from top quality schools. Extracurricular activity was somewhat compensatory for lower rank in class but taken alone is not as strong a predictor of later occupational success as is rank in class. Degree of self-support while in college showed almost no relationship to later salary level.

In summary, this study showed that of the various predictors taken separately, scholastic aptitude was the best of the group. The report, however, does not make clear whether or not new employees having higher grade point averages were offered higher starting salaries. If such a practice were in effect at AT & T, it would certainly tend to raise the relationship between undergraduate grade point average and later salary level. In addition, the grades used in the AT & T study were earned before 1950. The tendency for students to receive inflated grades during the 1960's and 1970's would have to be considered in generalizing the results of this study to selection decisions made at the present time.

Although AT & T's research has found a positive relationship between academic achievement and occupational success, it may not be accurate to assume that AT & T bases its selection decisions solely on the basis of academic records. Indeed, in their book, Formative Years in Business (1974), Douglas Bray, Richard Campbell, and Donald Grant of AT & T have stated that "The evaluation of...intellectual ability, can be readily accomplished simply by administering a standardized paper-and-pencil test. Only a minority of business organizations, however, actually include this technique in their college employment procedures. When no test is given, inferences about mental ability are sometimes made from grade point average, rank in graduating class, and quality of college

attended. Although these indirect clues are, of course, correlated with measured mental ability, they are by no means an adequate substitute for testing" (pp. 189-190).

Ginzberg

Ginzberg (1965), in a study of the career development of students who were awarded graduate fellowships during the early post-World War II years and a companion study of talented women concluded: "We did not find that college grades or college honors, extracurricular activities, or—for that matter—any other facets which we were able to elicit about their college experience, had any differential significance for their later performance." Outstanding grades in graduate school did, however, indicate later superior performance.

Ginzberg sought an explanation of his findings in the meaning behind the grades which students received. Although his explanation may appear simplistic it does emphasize the point that it is the behaviors behind marks which are important in their use as a predictor of later success. "If we speculate about why election to Phi Beta Kappa at college did not predict later success, and an A average in graduate school appeared to, we could offer the following gloss. To do very well academically in one's undergraduate years means that one is outstanding across the board, and only a true genius is that; or that one is willing to work for marks—many apparently are. But outstanding performance in graduate school reflects specialized aptitudes and skills. And a society with a highly differentiated occupational structure such as ours pays for specialized competence" (p. 28).

United States Civil Service Commission

Data collected in the course of a large scale research program allowed the Civil Service Commission to calculate correlations between final undergraduate grade point average and several measures of occupational proficiency for a group of social insurance claims authorizers. Claims authorizers evaluate the legitimacy of initial claims for retirement insurance and calculate the amount of benefits to be paid, using and interpreting legal and quasi-legal materials such as birth certificates and evidences of citizenship, marriage, and death. They review only claims involving either complex

determinations or unusual circumstances, less complicated claims being handled at a lower level. All participants were working at the same salary level and were considered by their agency to be fully qualified claims authorizers. All were performing essentially the same tasks. Data were collected in the fall of 1974.

For each research participant, several criterion measures of job proficiency were obtained. The criteria included a work sample and a content valid job information test both of which had been specially designed to measure proficiency in the occupation. In addition, each participant had been both rated and ranked by the first line supervisor in important job duties. These instruments, too, had been specially constructed to measure proficiency in that occupation. Routine performance ratings were also available. Undergraduate grade point averages were obtained from background information questionnaires completed by each participant.

Pearson product-moment correlations between GPA and the criteria ranged from .00 for performance ratings to .14 with both work sample total score and special supervisory ranking. None of the coefficients was statistically significant at the .05 level of confidence. Sample size ranged from 112-115. Table 2 presents a summary of the correlations.

The non-significant correlations computed in this study are particularly interesting because several objective measures of job proficiency were used as criteria of occupational success in lieu of the more common criterion of salary level. It should be noted that error may have been introduced by the use of self-reported GPA's. Restriction in the range of job proficiency may have occurred as a result of using only journeyman-level employees as research participants. Despite these limitations, the zero order correlation coefficients do not support use of GPA in selection for the occupation studied.

TABLE 2

Correlations of Undergraduate Grade Point Average with Criterion Measures of Claims Authorizer Proficiency

Criterion Measures	r	N
Work Sample— evaluation of evidence & making determinations	.12	115
Work Sample— total score	.14	115
Job Information Test— score	.07	115
Special Supervisory Rating of duty performance	.11	112
Special Supervisory Ranking of duty performance	.14	112
Routine Rating of overall job proficiency	.00	114

CONCLUSION

Studies concerning the prediction of occupational success by measures of academic achievement face many inherent technical problems leading to inconsistent results. One conclusion does, however, seem clear: a simple and direct application of grade point average, class standing, or similar academic achievement measures has little merit in valid and job-related selection systems.

Both the difficulties involved in studying the relationship between academic achievement and job success and the complexity of the relationship itself are illustrated in the AT & T study. This inquiry is the only significant recent major study which has found a useful relationship between academic achievement in college and later vocational success. Here, the relationship was moderated by school quality which AT & T ranked on the basis of information from published materials and discussions with college deans and placement directors. It must, however, be noted that the moderating effect was not a simple one. On one hand, school quality did have an important influence in that each third of the class in above-average colleges did better in business than graduates in respective thirds of the class in average and below-average schools. On the other hand, however, scholarship was still a stronger predictor than school quality since the top third from below-average schools were more successful than the lowest third men from above-average schools. Another system of assessing the quality of different schools might have found different moderating effects.

AT & T used salary level as its criterion of success and it is possible that initial salaries in the Bell System may have been higher for graduates having more impressive college grades. Such an initial advantage may have carried over to salary levels earned at a later date. Furthermore, the criterion of salary level may have excluded other facets of occupational success from consideration.

Examples of studies using criteria other than salary or salary level were the Pallett study and that by the United States Civil Service Commission, both of which correlated GPA with several dimensions of occupational success besides salary. The Pallett study used ratings on several elements of job success while the study by the United States Civil Service Commission employed ratings, a job information test

and a work sample. None of the correlations computed in these two studies was significant.

Both the Hoyt and the Calhoon and Reddy reviews found some instances of relationships between undergraduate academic achievement and later success. Hoyt, after reviewing 46 studies, concluded that college grades had no more than a modest relationship with later success. Calhoon and Reddy had based their review on the supposition that a college affords a number of measurements of performance that can be correlated with criteria of success. After completing their review, they concluded that the relationship between GPA and success in business is more noticeable at the extremes of GPA ("A", "B", vs. "D") than in the intermediate stages, but findings were not clear cut. They advised that a single predictor such as grades may be somewhat indicative of how college graduates will perform but it should be regarded as a clue, needing support from other clues. They also caution that it is very important to consider the real meaning behind performance in college or elsewhere.

Ginzberg, in discussing the results of his study, also pointed out that it is the meaning behind grades which affects their ability to predict later success. The results of his study had shown that outstanding grades in graduate school did predict later superior performance while outstanding undergraduate grades did not. Ginzberg's explanation of his paradoxical findings was that graduate school grades provided information of specialized areas of proficiency while undergraduate grades provided much less specific information and so were in need of more thorough interpretation.

As shown in the studies covered in this report, the relationship between academic achievement and later vocational success appears to be a complex one, the interpretation of which requires a consideration of the meaning behind individual grades. Indeed, both individual grades and grade point average are highly ambiguous in nature. Because schools differ in many dimensions such as quality of student body and fields of academic emphasis, the actual academic achievement reflected by grades varies from school to school. The specific behaviors which underlie student achievement must also be taken into account. While high grades in college may imply behaviors important to later success on the job, it is also possible that the behavior underlying grades may not be job related.

In light of the ambiguous nature of grades, it would be unfair to make fine comparisons of the academic achievement of college graduates based solely on their grades. The reported research literature does not support use of academic achievement measures in predicting occupational success.

REFERENCES

Astin. A. W., Who goes where to college. Chicago, Illinois: Science Research Associates, Inc., 1965.

Beatty, J. D. & Cleeton, G. U. Predicting achievement in college and after graduation. Personnel Journal, 1928, 6, 344-351.

Bevier, L. College grades and success in life. Educational Review, 1917, 54, 325-333.

Bray, D. W., Campbell, R. J. & Grant, D. L. Formative Years in business: a long-term AT & T study of managerial lives. New York: John Wiley & Sons, 1974.

Bridgman, D. S. Success in college and business. Personnel Journal, 1930, 9, 1-19.

Brown University, Alumni Association. Class of 1942, 25th anniversary questionnaire, 1967.

Calhoon, R. P. and Reddy, A. C. The frantic search for predictors of success—50 years of confusion and contradiction. Journal of College Placement, October-November, 1965, 54-66.

Chambers, J. A. Relating personality and biographical factors to scientific creativity. Psychological Monographs, 1964, 78 (584).

Chansky, N. M. A note on the grade point average in research. Educational and Psychological Measurement, 1964, 24 (1), 95-99.

Clark, A. Capsule comment—the upper-half-of-the-class-formula—too simple and often meaningless. Journal of College Placement, October-November, 1965, 116.

Cole, D. L. The prediction of teaching performance. Journal of Educational Research, 1961, 54, 345-348.

College achievement and progress in management. Personnel Research Section, American Telephone and Telegraph Company, March, 1962.

College Entrance Examination Board. Manual of Freshman Class Profiles, 1965- 1967. New York: College Entrance Examination Board, 1965.

Davidson, O. M. Reliability of self-reported high school grades. Iowa City, Iowa: Unpublished Research Report, Research and Development Division, American College Testing Program, 1963.

Dexter, E. G. High grade men in college and out. Popular Science Monthly, 1902, 62, 429-435.

Dillenbeck, D. D. and Wetzel, S. (Eds.). The college handbook. New York: College Entrance Examination Board, 1972.

Ebel, R. Measuring educational achievement. Englewood Cliffs, New Jersey: Prentice-Hall Inc., 1964.

Erickson, H. E. A factorial study of teaching ability. Journal of Experimental Education, 1954, 23, 1-39.

Foster. Relation between college studies and success in life. Administration of the college curriculum, 1910. Cited by Bessie L. Gambrill, College achievement and vocational efficiency. New York: Teachers College, Columbia University, 1922, p. 7.

Fricke, B. G. Grading, testing, standards, and all that. Ann Arbor, Michigan: Evaluation and Examinations Office, The University of Michigan, 1975.

Gambrill, Bessie L. College achievement and vocational efficiency. New York: Teachers College, Columbia University, 1922.

Ginzberg, E. The conservation of talent—lessons for management. Journal of College Placement, October-November, 1965, pp. 26-29.

Harmon, L. R. The development of a criterion of scientific competence. In C. W. Taylor & F. Barron (Eds.) Scientific creativity: its recognition and development. New York: Wiley & Sons, 1963. pp. 44-52.

Havemann, E. & West, Patricia S. They went to college. New York: Harcourt, Brace & Co., 1952.

Hoyt, D. P. The relationship between college grades and adult achievement. A review of the literature. Iowa City, Iowa: Research and Development Division, American College Testing Program, September 1965, No. 7.

Husband, R. W. What do college grades predict? Fortune, 1957, 55, 157-158.

Jepsen, V. L. Scholastic proficiency and vocational success. Educational and Psychological Measurement, 1951, 11, 616-628.

Jersey affiliate study, Esso Standard Eastern, Inc. Letter from employee relations department. September 18, 1967.

Jones, M. L. Analysis of certain aspects of teaching ability. Journal of Experimental Education, 1956, 25, 153-180.

Jones, R. D. The prediction of teaching efficiency from objective measures. Journal of Experimental Education, 1946, 15, 85-99.

Knapp, R. M. The man who led his class in college—and others. Harvard Graduate Magazine, 1916, 24, 597-600.

Knox, J. B. Scholastic standing and prominence. School and Society, 1947, 65, 194-195.

Kunkel, B. W. Standing of undergraduates and alumni. School and Society, 1917, 5, 549-555.

Langlie, T. A. & Eldredge, A. Achievement in college and in later life. Personnel Journal, 1931, 9, 450-454.

Lins, L. J. The prediction of teaching efficiency. Journal of Experimental Education, 1946, 15, 2-60.

Mann, Sister M. Jacinta. Relationship among certain variables associated with college and post-college success. Unpublished doctoral dissertation, University of Wisconsin, 1958.

Martin, R. A. & Pacheres, J. Good scholars not always best, cited in research section of Business Week, 1962, February 24, pp. 77-78.

Mason, Robert D. Grades + activities = financial success? Journal of College Placement, April 1965, pp. 26-27; 104-116.

Massey, H W. & Vineyard, E. E. Relationship between scholarship and first year teaching success. Journal of Teacher Education, 1958, 9, 297-301.

Nicolson, F. W. Success in college and after. School and Society, 1915, 2, 229-232.

North Carolina, University of, Placement Service, Unpublished study, 1965.

Pallett, J. E. Definition and prediction of success in the business world. Unpublished doctoral dissertation, University of Iowa, 1965.

Payne, G. E. Scholarship and success in teaching. Journal of Educational Psychology, 1918, 9, 217-219.

Peterson, O. L., Andrews, L. P., Spain, R. S. & Greenberg, B. G. An analytical study of North Carolina general practice. Journal of Medical Education, 1956, 31 (12), 165 pp.

Phi Delta Kappan, Majority in Who's Who not top students. 1965, 46, 441.

Pierson, G. A. School marks and success in engineering. Educational and Psychological Measurement, 1947, 7, 612-617.

Plasse, W. Comparison of factors in achievement in college and adult life. Unpublished doctoral dissertation, Syracuse University, 1951.

Poffenberger, A. T. School achievement and success in life. Journal of Applied Psychology, 1925, 9, 22-28.

Price, P. B., Taylor, C. W., Richards, J. M. Jr. & Jacobsen, T. L. Performance Measures of Physicians. Final Technical report to the Office of Education on Cooperative Research Contract No. OE-2-10-093, August, 1963.

Rice, D. E. A study of incomes of technically trained men. Scientific American, 1913, 109, 116-117.

Richards, J. M. Jr., Taylor, C. W. & Price, P. B. The prediction of medical intern performance. Journal of Applied Psychology, 1962, 46, 142-146.

Richards, J. M. Jr., Taylor, C. W., Price, P. B. & Jacobsen, T. L. An investigation of the criterion problem for one group of medical specialists. Journal of Applied Psychology, 1965, 49, 79-90.

Rosenow, L. B. Relationship between school attainment and life attainment. Psychological Abstracts, 10, 1936.

Schick, G. L. The predictive value of a Teacher Judgment Test. Unpublished doctoral dissertation, University of Wisconsin, 1957.

Simonds, Rollins H. College majors vs. business success, Business Topics, Autumn 1962.

Statistical Studies of Selective Service Testing, 1951-1953. Educational Testing Service, Princeton, New Jersey, November, 1955.

Stuit, D. B. Scholarship as a factor in teaching success. School and Society, 1937, 46, 382-384.

Taylor, C. W., Price, P. B., Richards, J. M., Jr. & Jacobsen, T. L. An investigation of the criterion problem for a medical school faculty. Journal of Applied Psychology, 1964, 48, 294-301.

Taylor, C. W., Price, P. B., Richards, J. M., Jr. & Jacobsen, T. L. A study of the criterion problem for a group of medical general practitioners. Journal of Applied Psychology, 1965, 49 (6), 399-406.

Taylor, C. W., Smith, W. R. & Ghiselin, B. The creative and other contributions of one sample of research scientist. In C. W. Taylor and F. Barron (Eds.), Scientific creativity: its recognition and development. New York: Wiley & Sons, 1963. pp. 53-76.

Taylor, C. W., Smith, W. R., Ghiselin, B., & Ellison, R. Explorations in the measurement and prediction of contributions of one sample of scientists. Report ASD-TR-61-96, Aeronautical Systems Division, Personnel Laboratory, Lackland Air Force Base, Texas, 1961.

Taylor, D. W. Variables related to creativity and productivity among men in two research laboratories. In C. W. Taylor & F. Barron (Eds.), Scientific creativity: its recognition and development. New York: Wiley & Sons, 1963. pp. 228-250.

The admission test for graduate study in business. Educational Testing Service, 1966.

Twedt, D. W. Study of 350 Medill School of Journalism graduates. Evaston, Illinois, 1948 (Mimeographed).

Walters, R. W. Scholastic training of eminent American engineers. School and Society, 1921, 13, 322-329.

Walters, R. W. & Bray, D. W. Today's search for tomorrow's leaders. Journal of College Placement, 1963, 24, 22-23.

Williams. F. J. Predicting success in business. Unpublished doctoral dissertation, Stanford University, 1959.

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