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AUTHOR Brazziel, William
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ABSTRACT

Traditional predictor variables of SAT scores and high school grades seldom account for more than 16 percent of the variance in student performance in college and graduate school, and they account for even less in decisions of students to leave school. Three studies are presented that added nonintellective variables to the traditional combination and increased the statistical prediction capability. One study involved five graduating classes of a pre-college enrichment program, one considered three graduating classes of a community college medical technology program, and the third involved 625 administrators in 425 colleges and universities. (Author/MSE)

Non-Intellective Predictors of Student Persistence/Attrition and Performance: Implications for College and University Research and Planning

William Brazziel
Professor of Higher Education
University of Connecticut

This paper presents the design, methodology and findings of three studies representative of types of data institutional researchers might generate for college and university management information systems where predictors of student attrition and performance have value.

Nearly half of all American college students leave college before graduation and 85 percent do so for non-intellective reasons (Astin, 1976). Attrition increases program costs and decreases faculty productivity. Efforts to increase degreed stocks of women and minorities entail considerable investment in support and support services. Addressing the non-intellective factors impacting on students assumes a high priority in both of these instances. Administrators of expensive, high investment programs are also concerned that their graduates perform well on the labor market.

Traditional predictor variables of SAT scores and high school grades seldom account for more than 16 percent of the variance in student performance in college and they account for even less in decisions of students to leave school (Astin, 1971). The studies in this paper added non-intellective variables

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to this combination and increased the amount of variance accounted for significantly.

The studies presented here involved prediction of academic performance, persistence/attrition, and job performance of students in a health careers program, prediction of college enrollment and performance of students in a pre-college enrichment program; A paper presented at the International Forum of the Association for Institutional Research, Montreal, Canada, May 9, 1977.

Stepwise multiple regression analysis and two-way analysis of variance were the principal statistical analyses involved in the studies. Both are available to institutional researchers along with the data on student birth order, study habits and other non-intellective variables.

Enrollment and Performance Predictors: Pre-College Students

This analysis involved five successive graduating classes of a pre-college enrichment program designed to strengthen the likelihood of enrollment and the likelihood of average to high grades in college of students who might be able to benefit from such an experience. The students are identified at age 15 and receive a variety of on-campus experiences and counseling along with added work in their home schools. The program involves three years of work and has graduated 127 students. All were included in the sample of this study which was designed to develop predictors for the 15 year old applicants regarding likelihood of enrollment and predictors for the 18 year old graduates regarding the likelihood of average grades or better.

The final samples consisted of 16 students who completed the program but who elected to forego enrollment in college and 111 students who completed the program and enrolled in college.

Applications of analysis of variance, stepwise regression analysis and Chi-square were made to generate data on the ratios and their significance of enrollment of first and only children to other children in both the program and in college, data and their significance on the freshman and grade point averages of these two groups and data on the differences, if any, between ninth grade academic performance and overall high school grade point average. Also, the amount of variance in college freshman and sophmore grades of sex socioeconomic status, family size, birth order average, high school grades, SAT tests and staff ratings of study habits, attitudes and verbal and writing skills. These analyses were made singly and in multiple combinations designed to generate a multiple R which would accounted for more than the 16 percent of variance of the usual predictors of SAT tests and high school grades. First and only children were found to enroll in the program at a rate 2.6 time higher than their counterparts and to fail to forego enrollment in college at a rate 3 time lower than their counterparts. Birth order was thus deemed a good predictor for recruiters for such programs and for guidance of enrollees. The overall high school average was not significantly higher for the sample when compared to ninth grade averages. High school grades were a significant predictor of both freshman and sophomore grades when combined with other

variables. Ninth grade performance under the circumstances was deemed a good predictor.

SAT and high school grades predicted less than 15 percent of the variance in grades for the freshmen in the study. This dropped to 10 percent for the sophomores. This is consistent with past findings (Astin, 1971). When all of the predictors were combined, fully 31 percent of the grade variance was accounted for and when the data were disaggregated according to institutions which operate support services for students, fully 65 percent of the sophomore grade performance and a comparable high percent for freshmen was accounted for. Non-intellective variables were thus regarded as effective predictors when added in concert to traditional predictors. See Tables 1 and 2 for further data.

Persistence, Program and Job Performance for Medical Technology Students

Data are presently being analyzed for this study which has a design similar to that above. Graduates from three successive classes of medical technology program at a community college constituted the sample for the study. The sample consisted of 75 students who completed the program and found employment in hospitals and laboratories and 25 students who enrolled in the program but dropped out of college or transferred to other programs before completion.

Data analyses are being made on relationships of the non-intellective variables listed above and persistence in the program, freshman and sophomore grade point averages and ratings by supervisor on the job. Performance in life science

courses and in the intern program were added to the equations. First and only children are fewer in number here but preliminary data indicate that this will be a good predictor for both program persistence, grades and job ratings. Preliminary data also indicate that upwards of 67 percent of the variance will be accounted for by computations involving 10 readily available pieces of data on non-intellective and intellective student attributes.

Choosing Prospective Women Administrators

The sample for this study consisted of 625 administrators in 425 colleges and universities in the United States. The intent here was to use strong relationships of non-intellective attributes readily apparent at application to graduate programs to develop a set of predictors for recruiters and encouragers of prospective women administrators. The variables listed above with some variations were analyzed for the sample.

The data revealed that first and only children were five times more likely than other children and eight times more likely than last born children to become a college administrator (Table 3). Also, that study at an all-girls college was a significant factor as was the incidence of being neither too poor or too rich. The former could not afford the training, it was theorized, and the latter was far less likely to elect such a career.

Implications for Institutional Research

Useful, easily obtained data can be worked up for student populations of our college and universities. We shall probably

Table 1

Multiple Regression Coefficients:
9 Variables and Freshman Grades
N=111

Rank	Variable	R	R^2	R^2 Increase	F
1.	Staff ratings Eng.	.345	.12	---	12.80*
2.	HSQPA	.419	.17	.05	9.38*
3.	SAT-M	.479	.22	.05	8.64*
4.	SAT-V	.503	.25	.02	7.28*
5.	Birth Order	.521	.27	.02	6.34*
6.	Family Income	.528	.27	.00	5.43*
7.	Ratings: Attitude	.547	.30	.03	3.46*
8.	Ratings: Stdy. Hbts.	.556	.30	.00	2.92*
9.	Family Size	.562	.31	.01	2.50*

* F-ratios significant at .05 level of confidence

Table 2

Multiple Regression Coefficients:
9 Variables and Sophomore Grades
N=75

Rank	Variable	R	R^2	R^2 Increase	F
1.	HSQPA	.296	.08	---	5.51*
2.	Family Size	.344	.11	.03	3.77*
3.	Birth Order	.385	.14	.03	3.19*
4.	Family Income	.439	.19	.05	2.08*
5.	SAT-V	.448	.19	.00	1.85
6.	Ratings: Stdy Hbts.	.448	.201	.01	1.57
7.	SAT-M	.458	.21	.01	1.13
8.	Ratings: Attitude	.459	.21	.00	.92

* F-ratios significant at .05 level of confidence

Table 3

First Born Ratios and Predictor Variables for Program Enrollment, Completion, Job Advancement and College Grade Variance by Student Category

Variables	Student Category		
	Pre-College N=111	Med Tech N=75	Women Adm N=625
Ratios: First Born/Other			
Program Enrollment	2.4:1	2.3:1	3.0:1
Program Completion	3.0:1	2.8:1	3.5:1
Job Advancement	---	3.0:1	5.0:1
Grade Variance: 6 Variables*	Percent		
Freshman	21	23	---
Sophomore	30	32	---
Grade Variance: 6 Variables, SAT/HSQPA			
Freshman	33	36	---
Sophomore	25	26	---
Freshman at Supportive Colleges	54	56	---
Sophomore at Supportive Colleges	65	66	---

* Variables = Birth Order, family size, sex, study habits, family income and attitudes

Legend

Pre-College = Five successive classes of graduates of a college preparatory and enrichment program

Med-Tech = Three successive classes of a college medical technology program

Women Adm = Women administrators at 20 percent sample of four year colleges in U.S. (425 institutions)

see and increase in such studies in the future. Admissions and enrollment are already becoming a problem in some institutions and will become at least a concern in most in the next few years. The largest graduation class we are likely to ever see in America came from our high schools last year. We shall have a steady decline in this pool of applicants for the next three years and precipitous drops in 1979 and 1983. The pool of applicants will shrink by fully 25 percent by this time.

Control of student attrition will assume a higher priority on campus as officials attempt to maintain enrollment levels by keeping more of the students already enrolled. Traditionally every other freshman leaves school before receiving a degree and 85 percent of these do so non-intellective reasons. Studying students and applications of preventive programs and measures to those most prone to drop-out can lower this figure in many cases. As Table 3 shows, non-intellective predictors assume a high order of importance in the upper years of college.

Recruitment of older students, women and minorities will assume a higher priority on many campuses as the traditional applicant pool shrinks. Offices of institutional research can perform yeomans service in this effort by studying students and prospective students to identify determinants of enrollment, persistence and attrition. Again, traditional predictors of SAT scores and high school grades have seldom accounted for more than 16 percent of the variance for all college students' grades and for these atypical populations, they will probably predict less accurately, especially for sophomores and at

colleges with strong support programs.

Better student selection for more expensive programs will assume a higher priority on campus, as inflation pressures coupled with enrollment problems generate concerns for added productivity in programs. This means more juniors and seniors enrolled in upper division courses and thus a demand for better prediction of persistence in the program for the freshman applicants. Offices of Institutional Research can do yeomans service here in providing useful predictors to academic program directors to assure selection for persistence in their programs. Again as Table 3 and Table 2 show, non-intellective factors displace others in rankings of importance in the regression equations.

References

Astin, Alexander; Predicting Academic Success in College, New York: Free Press 1971

Astin, Alexander; Preventing College Drop-Outs, San Francisco: Jossey Bass, 1976

Note: For a thorough analysis of operation of birth order in talent development, see Robert Nichols, Origin of Talent; Evanston, Illinois: National Merit Scholarship Corporation, 1974