Agriculture are included among the worthy activities which could be undertaken or expanded.

In 1969, NACTA members agreed that agricultural and agriculturally-related companies should be solicited for Sustaining Membership in the Association. Article III., Section 6 of the NACTA Constitution reads, "The Sustaining Membership shall consist of individuals, businesses, and others interested in furthering the objectives of NACTA, (1) by promoting superior instruction in Agriculture, and (2) through substantial financial support of the organization." Sustaining Memberships usually begin at $100.00.

I am convinced that Sustaining Memberships in NACTA can best be obtained by personal contacts with key personnel in the various businesses and industries.

As we participate in local, regional, or national meetings we could "woo" representatives from companies attending the same functions, with the idea of impressing upon them the advantages of supporting NACTA. They do have a vested interest in our product; our graduates.

As a member of NACTA, will each of you promote Sustaining Memberships in your educational and business contacts? If you have any suggestions as to whom I might personally write to about Sustaining Memberships, please give me the name, address, and particulars.

Sustaining Memberships should be mailed to Dr. Gordon A. Stewart, Treasurer of NACTA. When the Sustaining Members are obtained, I would be happy to receive that information from you.

I am convinced Sustaining Memberships are vital to the increased growth of NACTA. I urge each of you to help our organization in this way. If there are any questions or suggestions, please write me.

DETERMINANTS OF ACADEMIC PERFORMANCE: A CASE STUDY*

Joe B. Stevens and Thomas J. Herburger **

What factors affect a student's grade point average, and to what extent? The junior author was motivated by curiosity to pursue this question as a Senior Research topic; the senior author found it of interest because of his past record of poor predictions. The outcome was a survey of the undergraduate students in the Department of Agricultural Economics at OSU and subsequent exploration of statistical models designed to predict cumulative grade point averages (GPA). These models are described and evaluated below.

No pretense is made that these models are adequate to replace advisors and/or admissions officers. On the other hand, the results have allowed us to advance several hypotheses. The results also allow us to question the utility (at least for certain purposes) of widely-known tests designed as indicators of scholastic performanc, i.e., the Scholastic Aptitude Tests (SAT's).

Characteristics of the Students

Our survey of students was accomplished during May, 1969. Sixty-four of the seventy-seven undergraduates in the department responded to our mail questionnaire. The profile of these students is probably quite typical of many that could be generated within other departments and Schools of Agriculture. Nearly all of the students earn at least one-third of the college expenses; half of them earn over two-thirds. Two-thirds are from towns of less than 10,000 population; more than half have farm backgrounds. A high proportion are unmarried; relatively few have heavy work or social commitments during the school year. One-third of their fathers did not complete high school, forty percent completed at least some college work.

One characteristic which might differentiate our students, however, is that only a few attended small high schools. The average size of the graduating class among our students was 232; only 11 percent were in graduating classes of less than 50 students. If one accepts Dr. James Conant's proposition that a graduating class of 100 students serves as a proxy for a minimum acceptable quality level in secondary education, two-thirds of our students were well prepared for college. It was encouraging to note that school consolidation has upgraded rural education opportunities in the past fifteen years; all but one of the sixty-four graduated from a larger high school than did the senior author.

Methodology

Our first attempt to evaluate factors affecting cumulative GPA might be described as naive empiricism, but we first attempted to sort out the crucial variables from a large number of potential influences. Twenty independent variables were inserted into a step-wise linear regression program. As might be expected, a few variables explained most of that portion of total variance which was ultimately explained (R^2 = .71), while the majority of the variables added very little to the predictive capability of the model. Accordingly, it was possible to eliminate these variables from consideration (Table 1). We recognize, of course, that our particular forms of measurement may not have allowed some variables to exert their true influence.

Among those variables which were not statistically helpful were the Scholastic Aptitude Test (SAT) scores. The correlation matrix indicated that most of the influence of these variables was implicit in the high school GPA, a variable which accounted for half of the total explained variance of college GPA's. While the SAT-Math score "out-performed" the SAT-Verbal score, the standard errors were considerably larger than the regression coefficients for both variables. An interesting sidelight occurred when the questionnaire number, erroneously programmed in as an independent variable in an early attempt at estimation, entered the step-wise solution prior to the SAT-Verbal score!

This exploratory regression was used to identify those variables which were most instrumental in explaining the variance in college GPA's. Another multiple regression equation (Model I) was fitted (to the same data) using only these variables in order to (a) provide a prediction equation, (b) allow for comparison of actual and predicted GPA values, and (c) provide hypotheses for future testing with other data. For purposes of comparison, three other models were also fitted to the data. These included SAT scores with (Model II) and without (Model III) high school GPA's and a simple regression of college GPA's on high school GPA's (Model IV).

Analysis of Results

A conclusion which is immediately obvious from Tables 2 and 3 is that variables derived from the student's personal background and attributes adds considerably to the predictive capability of models based solely on high school performance

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and/or SAT scores. High school performance explained 38 percent of the total variation in college GPA's, while the SAT's added only marginally to the reduction in unexplained variance. The more detailed model (I), on the other hand, increased the R^2 to .603, and succeeded in explaining about one-third of that portion of total variance not explained by high school performance.

Although two-fifths of total variance is left unexplained by Model I, a comparison of actual and predicted GPA's (Table 3) shows that the predicted GPA was within one quarter of a grade point of actual GPA for over half of the students and within half a grade point for 90 percent of the students. The degree of precision was considerably less for the simpler models.

The variables which were important in reducing the unexplained variance are of interest in their own right. While our own academic training has not provided us the theory by which one might best interpret these relationships, it is of interest to note recent literature in psychology which attempts to identify relevant "motivational" variables.[1/] We would suggest that two of our variables express some motivational content, i.e., the number of older brothers and sisters graduating from college (X_1) and father's education (X_2). The coefficient on X_1 is surprisingly large; each older sibling graduated added .18 to the GPA.

While the magnitude of the X_2 coefficient is quite small (−0.03 per year), the negative relationship between GPA and father's education was not consistent with our expectations. On the other hand, once a student has been sufficiently motivated and prepared to enroll in and attend a public university such as OSU, an educational "deficiency" in his family might lend additional incentive for academic performance in college. Each year class was represented in about equal proportions in our sample; thus, about three-quarters of our observations were on students who had successfully completed one or more years of college. With the attrition factor largely eliminated by the nature of our sample, the negative sign is perhaps not unexpected.

Two other variables ostensibly relate to the quality of the student's educational and cultural background. These are the size of the home town (X_3) and the size of the graduating class (X_4). They do so, however, in a seemingly inconsistent way in that the size of home town is positively related to GPA, while size of graduating class is negatively related to GPA. Although neither coefficient is significantly different from zero at conventional levels, each is considerably larger than its standard error ($t = 1.35$ and -1.46 for X_3 and X_4, respectively). Thus, they should not be dismissed as totally lacking significance.

The most appropriate interpretation of these results is not obvious. One possibility is that larger home towns and larger schools may open up additional facets of cultural development for young people, but a point of diminshing return may exist unless these facets can be taken advantage of in a formal academic setting. The distinction here with respect to size is between necessary and sufficient conditions for cultivating educational achievement. This argument is, of course, a hypotheses, not observed fact. As such, it joins a goodly number of other untested hypotheses in the subject matter of "educational quality".

The only remaining relationship of real interest is between the share of expenses earned by the student (X_5) and college GPA. Although this is popularly viewed as a curvilinear relationship, the results of our linear estimation indicate that grades and income are somewhat competitive for most students.

Applications of Models to Test Data

Although the hypotheses advanced above can be tested with similar data only to a very minor degree, it is interesting to note how the prediction models fare when applied to a different set of students in the same department. The outcome of this analysis for 27 students is also shown in Table 3. This group includes 10 transfer students, 4 non-respondents to the original questionnaire, and 13 entering freshmen. As for the survey data, Model I (which included background data) resulted in a higher percentage of "close" predictions (less than .25 absolute deviation) than either Model II (high school GPA and SAT scores) or Model III (SAT scores only). Model I also resulted in the smallest average deviation (0.29).

Summary

This study has indicated that personal attributes and backgrounds of students are of considerable value in predictions on academic success. Even the more detailed Model I, however, leaves unexplained 40 percent of the variation in GPA. This seems to reflect what most advisors would argue – that much depends on individual drive and initiative. In spite of this, the model may be useful in identifying students with potential academic deficiencies.

In that the study group was relatively homogeneous, little can be claimed in the way of generality. It would be interesting, however, to see how well the model predicts for students in other agricultural departments and in other universities. Efforts of this nature are hereby solicited.

Table 1. Variables With No Significant Influence on College GPA

Family:
- Father's Occupation (index)
- Mother's Occupation (index)
- College drop-out rate among older brothers and sisters
- Mother's education (years)
- Marital status of student

Employment:
- Number of summers worked off-farm
- Hours worked per week during school year

Campus Activities:
- Hours per week devoted to campus or living group activities
- Type of living group (index)
- Participation in intramural athletics (index)

Scholastic Aptitude Tests:
- Math portion
- Verbal portion

Table 2. Regression Coefficients for Alternative GPA Prediction Models [1/] [2/]

Model	Constant Term	Sibling Success (X_1)	Father's Education (X_2)	Size of Home Town (X_3)	Size of Grad. Class (X_4)	Share of Expenses (X_5)	High School GPA (X_6)	Year (X_7)	SAT Verbal (X_8)	SAT Math (X_9)	R^2
I	0.70	+0.18**	−0.03√	+0.06#	−0.05#	−0.09#	+0.63**	+0.14**			.603
II	−0.25						+0.67**		+0.0003	+0.0010#	.405
III	0.73								+0.0009	+0.0026**	.241
IV	−0.04						+0.82**				.382

[1/] ** indicates significance at .01 level
√ indicates significance at .10 level
# indicates significance at .20 level

2/ Definition of Variables:

X_1 = Number of older brothers and sisters who have graduated from college
X_2 = Father's education (Years)
X_3 = Size of home town (0 to 1,000) = 1; 1,000 to 2,500 = 2; 2,500 to 10,000 = 3; 10,000 to 25,000 = 4; 25,000 to 100,000 = 5; over 100,000 = 6)
X_4 = Number in high school graduating class (in hundreds of students)
X_5 = Share of college expenses earned by student (less than one-third = 1; one-third to two-thirds = 2, over two-thirds = 3)
X_6 = High School GPA
X_7 = Year in college
X_8 = Scholastic Aptitude Test: Verbal
X_9 = Scholastic Aptitude Test: Math

Table 3. Comparisons of Actual and Predicted GPA's

	Data Source and Model	Distribution of the Absolute Values of Deviations Between Actual and Predicted College GPA			Average Deviation (Absolute Value)
		$\leq .25$	.25 to .49	$\geq .50$	
A.	Survey Data				
	I. High School GPA plus six other "background" variables	54.4%	35.1%	10.5%	.26
	II. High School GPA plus SAT Scores (Math and Verbal)	48.4%	32.8%	18.8%	.29
	III. SAT Scores (Math and Verbal)	35.9%	40.6%	23.5%	.36
B.	Test Data				
	I. High School GPA plus six other "background" variables	59.2%	22.2%	18.5%	.29
	II. High School GPA plus SAT Scores (Math and Verbal)	34.6%	46.1%	19.2%	.32
	III. SAT Scores (Math and Verbal)	53.8%	23.1%	23.1%	.33

1/ For example: Miller, Doris M. and Patricia O'Connor, "Achiever Personality and Academic Success Among Disadvantaged College Students", Journal of Social Issues, Summer, 1969.

WHY GO TO COLLEGE FOR AGRICULTURE?

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In a random sampling of the 18,000 registered at the University of Georgia, 1490 students were asked questions as to their own motivations and the incentives they attributed to others for going into higher education. It was found that the sample contained 143, all males, who were agriculture majors. This report will summarize the responses made by all the males (699) surveyed in general and these students in particular. Also, a comparison will be made with the results of a similar survey, recently completed by researchers at John Hopkins University, covering 7,948 students at 48 colleges and universities around the nation.

The questionnaire, employed to determine the motivational factors playing a part in the reasons why these University of Georgia students had come to the university, asked the randomly selected student population to list the five most important considerations (in order of importance) which applied to themselves, and to others, of both sexes. The list of possible motives offered for them to choose from included the following:

1. To learn a specific occupation
2. To improve the mind
3. To please parents
4. To make the right contacts
5. To become a better world citizen
6. To be with friends
7. To have fun
8. To surpass their parents
9. To postpone military service
10. To judge better between right and wrong
11. To appreciate the better things in life
12. To, perhaps, help improve society
13. To rear your children better
14. To become more intelligent
15. To become more discriminating
16. To know more about life
17. To find a suitable mate
18. To make use of an earned scholarship
19. To join a fraternity or sorority
20. To succeed in athletics

The questionnaire revealed that a third of the sample had already changed their majors at least once and that 18% were, at present, contemplating another change. Most (83%) were confident that their present choice would be directly connected with a future occupation. Only 4% saw any correlation between it and life in the home. Another 10% were uncertain of its usefulness in any fashion. A few (1%) optimistic souls thought their majors might even be helpful in military areas. In addition, 27% admitted having felt, at one time or another, that college was a waste, and 12% were of this conviction at present.

Why did our agriculture majors come to the university? Their choices, in order of importance, from the list of twenty suggested reasons were as follows:

1. To learn a specific occupation
2. To improve the mind
3. To, perhaps, help improve society
4. To know more about life
5. To rear your children better