Proceedings of the Iowa Academy of Science

Volume 59 | Annual Issue Article 39

1952

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One of the problems of frequent concern to educators is that of predicting achievement of students so that both potentially superior and slow students can be identified early in a course for the purpose of giving adequate attention to such cases. The general method of the procedure to be discussed here might be applicable to many situations, but it is especially applicable in mathematics.

The two semesters' work in mathematics required of students in the College of Business Administration at Drake University is a source of difficulty for many students. The first semester course, business mathematics, covers elementary work through simple algebra, preparatory to the second course, mathematics of finance. The latter course deals with fairly complex problems of finance. Many business administration students have little background or aptitude for the work, and mortality in the courses has been rather high. Too, the work of the first course is of such an elementary nature that students of superior background and ability are seldom challenged.

With the hope of taking steps to remedy this situation, attention was given to the problem of predicting achievement in business mathematics. Most of the students involved did not have previous course work in college mathematics on which to base a prediction of achievement in business mathematics; consequently, a test was carefully developed for use at the beginning of the course. This test gave evidence of being by far the greatest single factor in prediction of several factors, including high school record and Q-score on the American Council on Education Psychological Examination. In a study completed in 1950 using students with grades of F in business mathematics or who dropped the course in one category and those with grades of D or better in the "successful" category, this predictive test score had a rather high degree of relationship with the tendency to succeed in business mathematics as shown by a biserial r of .733.

A discriminant function was developed using as the necessary dichotomous variable, the tendency to success in business mathematics which was assumed to be normally distributed, and using the predictive test score as the only independent variable. For this purpose, success in business mathematics was defined, approximately, corresponding to a D grade or better, and the proportion of students, approximately, who received a grade of F and who dropped the course were considered unsuccessful in business mathematics. Under the additional assumption that a linear relationship existed between the predictive test score and the tendency to success, data for 118 students of the 1949-50 school year were used in the computation of the discriminant function.

The discriminant function in the case of one independent variable may be expressed as: bx. The coefficient b may be found by solving the equation:

$$D = b\Sigma x^2$$

where D is the difference between the means of the numerically expressed variable in the dichotomy. The right-hand member of the equation is the same as in regression analysis using deviation values from the general mean. The data for the 118 students follows:

$$\Sigma x^2 = 4{,}001$$
$$\bar{x} \text{ (low group)} = 11.125$$
$$\bar{x} \text{ (high group)} = 18.065$$

Thus the discriminant function is

$$v = .001734x$$

where v is the deviation relative score.

By using an appropriate transformation[1], the function lends itself to the prediction of the probability of success of a given student in business mathematics. When the discriminant function is multiplied by NZ, where N is the total number of cases and Z is the ordinate value from a table of the normal distribution at the point which divides the two groups of the dichotomy, it yields an x value in deviation form for a given student. The deviation formula in this case is

$$v_o = NZ\ (.001734x) = .07497x$$

where N = 118. Z = .3664. The percentage of successful students used to find the Z value was 66%. To change the formula from deviation form to raw score form, the following equation can be used:

$$V_o - \overline{V}_o = a(X - \overline{X})$$

where $\overline{V}_o$ is the x value secured from a table of the normal curve at the percentage indicated for dividing the two groups of the dichotomy, $\overline{X} = 15.559$, general mean of the predictive test scores, and a = .07497. Thus, $\overline{V}_o = .4125$ and the transformed function becomes

[1]Wert, James E., Neidt, C. O., Ahmann, J. S. Biserial correlation. Unpublished mimeographed manuscript. The Educational Research Laboratory. 315 Curtiss Hall. Iowa State College, Ames, Iowa.

$$V_o = .07497X - .7540$$

This equation can be solved for any particular student given his predictive test score and gives a value in sigma units that yields a probability of success upon consulting a table of the normal curve. Table 1 gives the chances of success out of 100 for a given predictive test score.

Table 1

Probability of Success in Business Mathematics Based on Predictive Test Scores (Chances in 100 of Success)

Test Score	Chances of Success out of 100
0	23
1	25
2	27
3	30
4	32
5	35
6	38
7	41
8	44
9	47
10	50
11	53
12	56
13	59
14	62
15	64
16	67
17	70
18	72
19	75
20	77
21	79
22	81
23	83
24	85
25	87
26	88
27	90
28	91
29	92
30	93
31	94
32	95
33	96
34	96
35	97
36	97
37	98
38	98
39	99
40	99

Careful use of such a table has obvious advantages for a teacher in the course when advising and working with a student; for a student can be advised of his chances in 100 of succeeding in business mathematics based on evidence from the 1949-50 group in which the discriminant function was developed.

Such a method as has been described might have application in many mathematics courses. The probabilities of success in a course might be developed using several variables, as in multiple regression. The use of additional variables would, of course, complicate the computations involved. Where previous experience in college mathematics is a matter of record, other sudies have indicated the value of such factors in achievement prediction. The development of a predictive test might not be desirable or necessary where such other factors are available. Cautious and careful use of any such scheme showing chances of success seems to be indicated, when advising any particular student.

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