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ABSTRACT

A study was conducted to examine the effects of four independent variables, i.e., college, department, teacher, and course, on course completion rates at the City Colleges of Chicago. Three colleges were chosen as representative of the eight City Colleges, and the English, Business, and Mathematics Departments were chosen from the departments with the largest enrollments. From within each of the three departments at the three campuses, ten teachers, each teaching one introductory course and one higher-level course in spring 1981, were randomly selected. Statistical analyses revealed significant variations in completion rates between teachers and between colleges, with these two factors accounting for about two-thirds of the total variation. There was also significant variation between departments across colleges and considerably greater variation between colleges than between departments within a college. The study revealed an insignificant level of variation between upper and lower-level courses. Since teacher effect accounts for the largest amount of variation in earned credit rates, staff development should be considered as a method for improving student achievement and retention rates. Differences between colleges may be due to policy, administrative expectations, or procedures, and an examination of these factors may be appropriate. (HB)

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Estimating the Effects of College, Department, Teacher and Course on Course Completion Rates

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Abstract

The objective of this study was to examine systematically the variance in earned credit rates (percent of students earning A, B, C, or D) in an urban community college system. An ANOVA design was employed to estimate the independent effects of four independent variables -- college, department, course, and teacher (nested within college by department). The results of the analysis indicate significant effects on earned credit rates due to college, department, and teacher. Differences between colleges and between teachers within departments in colleges account for the preponderance of the variance. This paper contains a discussion of departmental staff development tactics.

Estimating the Effects of College, Department, Teacher and Course on Course Completion Rates

Most urban community colleges, as well as many other institutions of higher education, are currently faced with high student withdrawal rates and low achievement rates. Those students who do not earn credit (that is, do not receive a final grade of A, B, C, or D) in their courses either officially withdraw, stop attending class without withdrawing, or continue to attend class and fail. Rouche (1982) believes that nearly half of all students in American community colleges do not earn credit for courses for which they are registered.

Typically the problem of low achievement and withdrawal is discussed in terms of student characteristics such as preparedness, aptitude, or intelligence. Other student variables have been added to the equation for predicting achievement or withdrawal, including motivation, aspirations, race, age, and financial status. Some current research has emphasized interactions between students and institutions that are related to achievement (Beal and Noel, 1980). This study differs from previous investigations of student withdrawal or achievement in that we are studying the relationships between institutional factors and earned credit (course completion) rates, rather than the more traditional relationship between individual or group background variables and school achievement.

The institutional factors that are included in this study are college, department, course, and teacher. At present we are aware of great variability in course completion rates from campus to campus, department to department, course to course, and teacher to teacher, but our under-

standing of these differences is limited to impressionistic views. In this study, we are examining the precise statistical effect that each of these four independent variables has on course completion rates.

Rakow, Airasian and Madaus (1978) employed analysis of variance to study a similar problem. They were concerned that many of the large scale studies of school differences (for example, the Coleman report) typically ignored within-school sources of variance and concentrated solely on between-school variation. Rakow et al. designed a study to divide within-school variance further into a component of variance associated with teachers within schools. They analyzed achievement test scores from a national representative sample of American schools. Their findings suggest that much of the variance in test scores that had been assigned to error variance is associated with teachers within schools.

Another related study by Gillmore, Kane, and Naccarto (1978) sought to demonstrate the generalizability of student ratings of instruction across teachers and courses. Their findings demonstrate that teachers themselves rather than course or section are responsible for the majority of variance in student ratings.

In this study we have used analysis of variance to obtain estimates of effects due to four independent variables on course completion rates. The study provides one of the first systematic examinations of the relative importance of this set of institutional factors. We believe that our findings will be useful in guiding other research studies and in drafting policy.

Method

The dependent variable in this study is earned credit rate, a term we use to represent the percent of all students initially enrolled in a

class who receive a final grade of A, B, C, or D (Easton and Guskey, 1982). Earned credit rate is an indication of both achievement and retention. The four independent variables mentioned earlier are college, department, course, and teacher. We chose three of the City Colleges of Chicago to be representative of the population of the eight City Colleges. One of these colleges is racially heterogeneous, one is predominantly black, and the third predominatly white. From the departments with the largest enrollments, we chose three -- English, business, and mathematics. Finally, from within each of the three departments on the three campuses, we randomly selected ten teachers who taught one introductory level course and one higher level course in the Spring of 1981, and recorded the completion rates in each of these two courses. There are a total of 90 teachers and 180 completion rates in the study. Three of the independent variables are crossed (college, department, and course), while teacher is nested within college by department.

The data were analyzed according to a complete statistical model, representing three crossed factors and their interactions, as well as the teacher effect nested with departments by college.[1]

Results

As we have always known, great variability exists in earned credit rates. The standard deviation of the 180 rates that we examined in this study is 17.0 and the overall mean is 61.6%. One quarter of the earned credit rates fall below 50% and one quarter of the rates are above 74%. Table 1 contains the mean rates for the three colleges, the three departments, and for each department at each college. The row and column mean

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[1]The data analysis was performed by Thomas Hoffer of The University of Chicago.

in the table indicate the extent of the variability between colleges and between departments. There is a considerably greater range of mean earned credit rates between colleges than between departments. To a large degree, the differences in mean earned credit rates among the colleges are reflective of differences in student populations at the colleges.

Table 1 does not contain the mean rates for the two different course levels included in this study because they are so similar to each other. The mean for the lower level course is 60.5% and for the upper level course 62.7%.

Insert Table 1 about here

Since the purpose of this study is to examine variability in earned credit or course completion rates in a systematic way, we analyzed the data according to an ANOVA model. The results of this analysis are presented in Table 2. Although among all of the effects in the model three are statistically significant, two of the variables -- college and teacher within department in college -- account for the preponderance of the variation. The model itself accounts for nearly 75% of the total variation in earned credit rates, with college and teacher together accounting for about two-thirds of the total variation. Department, college X department, and college X department X course effects each contribute more than 1% of the total variance.

Insert Table 2 about here

The teacher (within department X college) effect accounts for more variance that the college effect does. This indicates the magnitude of difference that exists among teachers teaching in the same department in the same college. Relatively speaking, there is more variability among

a group of teachers teaching the same subject at the same college than there is between three disparate colleges. The difference between low and high level courses is surprisingly little, which also indicates the relative importance of the individual teacher in determining earned credit rates.

Discussion

Although this study is focused on the variability in earned credit rates, the bottom line, of course, is how the earned credit rates can be improved. The large amount of variance due to the teacher effect suggests very strongly that staff development may be a key method for improving student achievement and retention rates. While there is some possibility of a selectivity factor at work here (through selective registration or informal recruitment) so that some teachers attract superior students, our results suggest that this is not the case. The negligible difference between the lower level and higher level courses reinforces the strength of the teacher effect. Research in student ratings of instruction also has shown relatively strong effects due to teacher and relatively weak effects due to course (Gillmore, Kane, and Naccarto, 1978). Our findings regarding achievement rates are similar to that analysis of student ratings of instruction.

One basic first step in altering these earned credit rates is to support and promote intra-departmental communication focused on teaching strategies and methods. Teachers today have fewer opportunities than in the past to discuss their teaching techniques with each other. There are many simple ideas that teachers could discuss among themselves at the departmental level. For example, previous research of ours at the City Colleges (G[illegible]y & Easton, 1982) indicates the importance of the initial

classes in the semester for student success. These and other ideas should be discussed at the college department level.

Although the teacher effect is very strong here, the other factors should not be overlooked. While the college effect may be due primarily to different student populations, there is also the possibility that policy (explicit or latent), administrative expectations, or registration and placement procedures may contribute to these differences. A view of student achievement rates from an institutional perspective could well be valuable and provide fresh or different ideas about changing achievement.

Of final interest is the difference in departmental earned credit rates across the colleges. We should look very carefully at these differences and seek reasons for them. Is math inherently more difficult than English? Are English teachers inherently better than math teachers? A more acceptable explanation might deal with expectations of both students and teachers. Employing the "institutional perspective" of this paper, we should begin to propose methods of altering these department differences.

Most studies of student achievement have examined individual variables and and qualifications. We have looked from an entirely different view, at factors that may be difficult to change, yet which may suggest alternative solutions to the task of raising student achievement. Because of the strong teacher effect in this study, we suggest trying to change teachers within departments. Had we found greater department or college effects, we would have urged closer scrutiny of situational factors. At it is, we believe these cannot be ignored, but the foremost priority is teachers.

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Table 1

Mean Earned Credit Rates by College and Department

	College A		College B		College C		All Colleges	
Business	58.0	(15.7)[a]	52.1	(14.6)	72.3	(11.7)	60.8	(16.3)
English	67.9	(18.7)	55.0	(11.5)	74.4	(9.6)	65.8	(15.8)
Math	58.5	(12.4)	44.0	(17.0)	72.3	(12.4)	58.3	(18.1)
All Departments	61.5	(16.2)	50.4	(15.1)	73.0	(11.2)	61.6	(17.0)

[a]The standard deviation is listed within the parentheses.

Table 2

Analysis of Variance in Earned Credit Rates

Source of Variation	df	SS	Proportion of Total Variance	MS	F
College	2	15,392	.299	7,696	47.70***
Department	2	1,739	.034	870	5.39**
Course	1	202	.004	202	1.25
College X Department	4	858	.017	215	1.33
College X Course	2	53	.001	26	0.16
Department X Course	2	288	.006	144	0.89
College X Department X Course	4	737	.014	184	1.14
Teacher (College X Department)	81	19,218	.373	237	1.47*
Error	81	13,070		161	

* $p < .05$
** $p < .001$
*** $p < .0001$

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