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ABSTRACT

Annual report data for the 1990, 1991, and 1992 school years of schools and colleges accredited by the Accrediting Commission of Career Schools/Colleges of Technology were analyzed to determine whether such schools and colleges have any characteristics that are significantly related to their performance. The following six measures were derived: graduation rates, withdrawal rates, and training-related placement rates of the schools calculated for full-time and for part-time students. For each of the 3 years studied, nearly two-thirds of full-time students leaving the accredited institutions graduated, and three-fourths of graduates found employment related to their area of study. Part-time students had lower (by 10-12%) graduation and training-related employment rates and higher (by 1-2%) withdrawal rates than full-time students did. Multiple-regression analysis established that the following school characteristics have consistent, statistically significant relationships with school performance: percentage of enrollment receiving Pell grants, percentage of students classified as Ability to Benefit students, average program length in weeks, main branch or campus, total enrollment, separate facilities, and faculty turnover. (Appended are project-related correspondence and eight tables detailing the correlations and multiple regression analyses for the identified performance measures for the 3 years studied.) (MN)

ANALYSIS OF ANNUAL REPORT DATA FOR SCHOOL YEARS 1990, 1991, AND 1992

CENTER ON EDUCATION AND TRAINING FOR EMPLOYMENT
COLLEGE OF EDUCATION
THE OHIO STATE UNIVERSITY

ANALYSIS OF ANNUAL REPORT DATA FOR SCHOOL YEARS 1990, 1991, AND 1992

Prepared for

Accrediting Commission of Career Schools/Colleges of Technology

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FOREWORD

The Center on Education and Training for Employment is pleased to submit this report to the Accrediting Commission of Career Schools/Colleges of Technology. Private postsecondary institutions play a major role in providing the training needed for an economy with an ever-increasing demand for technical skills. The Accrediting Commission is charged to ensure that the training provided by these schools adhere to the quality standards of the Commission.

One of the methods the Commission uses to carry out its responsibilities is an annual report from each school. The information in this report enables the Commission to monitor the school's operation and performance.

The data from the annual reports filed by all the accredited schools and colleges for the 1990, 1991, and 1992 school years formed the basis for the present report. Preliminary analyses had been conducted with the reports for the prior three years. We hope that the results of these analyses can provide guides for future activities of the Accrediting Commission to improve the capacity of the schools/colleges it accredits to serve their students.

This report was prepared by Dr. Morgan Lewis, a Research Scientist with CETE, with the assistance of Michael Mustaine who performed the many computer runs necessary for the analysis.

Dr. Lewis has asked me to express his appreciation to those who contributed in many ways in the preparation of this report. First to the Career College Association which funded the analysis and verification of the annual report data prior to the establishment of the Accrediting Commission as a separate entity, independent of the Association. Second, the staff of the Accrediting Commission, particularly Thomas Kube, Bruce Jenks, and Patricia Barkeloo, who are responsible for the collection and processing of the annual report data upon which the report is based. Third to Dr. Kevin Hollenbeck of the Upjohn Institute for Employment Research, Kalamazoo, Michigan and Dr. N. L. McCaslin of The Ohio State University who reviewed the definitions of outcome measures developed for this report. And, fourth, the members of the Accrediting Commission, themselves, who contributed many helpful suggestions and insights regarding definitions, analyses, and interpretations of the findings, while allowing Dr. Lewis full control over the final contents of this report.

I should add that while the Career College Association and then the Accrediting Commission provided the funding for the preparation of this report, its findings and conclusions are those of Dr. Lewis and not necessarily those of the Association, the Accrediting Commission, or our Center.

Ray D. Ryan
Executive Director
Center on Education and
Training for Employment

EXECUTIVE SUMMARY

This report presents the analysis of annual report data for the 1990, 1991, and 1992 school years of schools and colleges accredited by the Accrediting Commission of Career Schools/Colleges of Technology. The analysis attempted to determine if there are characteristics of these schools and colleges that have a significant relationship with the performance of the schools. Previous preliminary analyses had been conducted with the annual reports from 1987 to 1989. These previous analyses were used to refine the annual report form and the definitions used for this report.

Six measures of the performance of the accredited schools were derived from the information in the annual reports. These measures were graduation rates, withdrawal rates, and training-related placement rates of the schools, calculated separately for full-time and part-time enrollments. Because of students who continue from one school year to another, withdrawal rates are not simply the reverse of graduation rates. The most recent information on default rates on Stafford loans was obtained from the U.S. Department of Education for the 1990 and 1991 analyses and from the annual report forms for the 1992 analysis. The default information was used as an additional outcome measure.

For each of the three years, almost two-thirds (63 to 64 percent) of the full-time students leaving the accredited schools and colleges graduated. Slightly more than one-fifth (21 to 22 percent) of the students enrolled each year withdrew without completing their programs. A consistent three-fourths of graduates found employment related to the skills they had studied; this figure is based on graduates who were available for employment. Each year 8 or 9 percent of graduates did not seek employment because they continued their education, entered the military, or had other documented reasons for not seeking jobs. For part-time students, the graduation and training-related employment rates were 10 to 12 percentage points lower than the rates for full-time students. Withdrawal rates for part-time students were 1 to 2 percentage points higher than the rates for full-time students. The default rates on Stafford loans for the students who had left the schools two years prior to the year analyzed fluctuated around 25 percent.

These outcomes were related to 25 measures of the characteristics of the students and the schools, using multiple regression analysis. This analysis determines the net, independent effect of each school characteristic on the outcomes, holding the effect of all the other characteristics constant. The school characteristics listed below were found to have consistent, statistically significant relationships with school performance. Most of these relationships, however, were found for full-time enrollments. The outcomes for part-time enrollment have fewer systematic relationships with school characteristics.

- **Percentage of enrollment receiving Pell grants.**

  This variable reflects the percentage of students from poverty backgrounds served by a school. As the percentage of enrollment receiving Pells increase, graduation rates decline and withdrawal rates increase. The results for the Pell variable are consistent with other findings on the problems of educating students from poverty backgrounds. Results from other studies suggest that schools accredited by the Commission may graduate more students from disadvantaged circumstances than other postsecondary institutions.

  The percentage of enrollment receiving Stafford loans and Supplemental Loans to Students also influence some outcomes, but their effect is not as strong nor as consistent as the percentage of Pell recipients.

- **Percentage of students classified as Ability to Benefit (ATB).**

  This variable indicates the percentage of students served by a school who did not complete high school or obtain a General Educational Development certificate. As the percentage of ATB increases, withdrawal and default rates increase. The ATB variable may reflect an alienation from the mainstream of society that is related to a tendency to default on loans.

- **Average program length in weeks.**

  This variable indicates the average length of programs offered by a school. As program length increases, graduation rates decrease and withdrawal rates increase. As program length increases default rates decrease. It may be that students who complete longer programs earn more money and are better able to pay off their loans.

- **Main or branch campus.**

  Graduation and training-related placement rates are higher for schools that report they are the main campuses. Facilities and instruction may be better at main than at branch campuses. There also may be an institutional maturity factor at work. That is, main campuses are likely to be older with established operating procedures and long-standing relationships with the employers who hire their graduates.

- **Total enrollment.**

  Graduation rates decrease and withdrawal rates increase as the total enrollment of schools increase. It appears that schools with enrollments over 600 have a more difficult time graduating as many of their students as smaller institutions, when all other factors are held constant.

- **Separate facilities.**

  Schools that report separate facilities have higher graduation rates and lower withdrawal rates than schools without such facilities. There is no readily apparent explanation of why this should be so. Our speculation is that separate facilities, such as a restaurant operated as part of a food service program, may provide a more enriched learning environment.

- **Faculty turnover.**

  Turnover among faculty is associated with lower graduation rates and higher withdrawal rates. Turnover among part-time faculty is related to outcomes more than turnover among full-time faculty. High turnover rates are likely to be associated with a lower quality of instruction. It certainly is harder for teachers to establish supportive relationships with students when there are frequent changes. High turnover would also make it difficult to establish linkage with employers that often results in employment

The cumulative effect of these characteristics can be quite substantial. A main campus school with an enrollment of 600 or less that had few Pell recipients and offered short programs could be expected to have a graduation rate 20 to 30 points higher than a branch campus school with an enrollment over 600, the average percentage of Pell recipients, and long programs. The percentage of Pell grant recipients, ATB students, and faculty turnover could be used as monitoring signals to identify schools that are more likely to have problems with retention and graduation. Large enrollments together with high percentages of Pell and ATB students, and high faculty turnover would be an especially worrisome combination.

CHAPTER 1

INTRODUCTION

This report presents an analysis of the performance of schools and colleges that were accredited by the Accrediting Commission of Career Schools/Colleges of Technology during the period July 1, 1989 through June 30, 1992. During this period there were several changes in the relationship of the Commission and the association that represented the schools it accredits. The Career College Association (CCA) was created in July 1991 by the merger of the National Association of Trade and Technical Schools with the Association of Independent Colleges and Schools. Until July 1993, the Accrediting Commission was part of CCA and one of its predecessors. The Commission is now a separate, independent body. All of the analyses discussed in this report were conducted for the Commission, but prior to its establishment as a separate body, the funding was provided by CCA.

These are the two main questions that this report tried to answer:

1. Are there characteristics of schools that have a significant relationship with the performance of these schools?

2. If there are such characteristics, how much of the differences in performance across schools do these characteristics explain?

Multiple regression was the main analytic technique used to answer these questions. This is a statistical method of determining how much each variable in a set of variables influences an outcome of interest. One way to think of the results multiple regression produces is in terms of inputs and outcomes. Schools want to graduate their students and place them in good jobs that are related to the fields in which they were trained. These are the outcomes of schools and colleges. The schools that produce these outcomes differ on many dimensions, such as the size of their enrollments, the preparation of their students, the turnover of faculty, whether they are main or branch campuses, and so on. These characteristics of schools can be considered indicators or the inputs used to produce the desired outcomes. Multiple regression indicates which characteristics of schools have statistically significant relationships with these outcomes.

The report is based on information from annual reports submitted by schools accredited by the Commission for the three school years beginning July 1, 1989 and ending June 30 1992, school years 1990, 1991, and 1992. Prior to the preparation of this report, preliminary analyses were conducted with annual reports from the previous three school years to refine the nature of the data collected and the procedures used in the analysis. These initial analyses suggested improvements in the annual report form verification procedures, and definitions of variables that were implemented for the 1990 school year. The report forms for the next two years had only minor changes which did not change the definitions of the variables used in this report.

Six measures of the performance of the schools and colleges were derived from the information in the annual reports. These measures were graduation rates, withdrawal rates, and training-related placement rates of the schools, calculated separately for full-time and part-time enrollments. For the 1990 and 1991 analyses, the most recent information on default rates on Stafford loans (formerly Guaranteed Student Loans) was obtained from the U.S. Department of Education and used as an additional outcome measure. For the 1992 analysis, a question on default rates was added to the annual report form and the most recent rate reported by the schools and colleges was used.

These outcomes were related to various measures of the characteristics of the schools, such as total enrollment, percentage of students classified as *Ability to Benefit*, percentages of students receiving various type of financial aid, and several indicators of school operations.

Both the preliminary analyses of the previous annual reports and those conducted for the present report identified some school characteristics that have a consistent relationship with school performance. Chapter 2 discusses how the variables used in the analyses were defined. Chapter 3 presents the major findings, and chapter 4 discusses the implications of these findings for the policy and procedures of the Accrediting Commission.

CHAPTER 2

ANALYSIS PROCEDURES

Data on the variables used for this report (except default rates for the 1990 and 1991 analyses) were obtained from the annual reports. In the annual reports that had been filed with the Accrediting Commission for school years prior to 1990, much of the requested information had not been supplied. The missing data caused many problems in the analysis of the data for these previous years. Starting with the 1990 reports, initial analyses were conducted to identify missing data on critical variables. Listing of these variables were prepared for the Accrediting Commission and additional contacts were made with the schools to obtain the needed data. Consequently, since 1990 the reporting has been far more complete.

The default rates used in the 1990 and 1991 analyses were obtained from reports prepared by the U.S. Department of Education. The rates used in the 1992 analysis were obtained from the annual reports submitted by the schools and colleges for that year.

Measures of School Performance

Graduation rates, withdrawal rates, and training-related placement rates were calculated for each school by aggregating information on enrollment, withdrawal, and graduation provided for each program offered by a school and calculating overall school rates. Separate rates were calculated for full-time and part-time enrollments. In the analyses that we had performed on annual reports from previous school years, we found that calculating these rates was not as straightforward as we initially thought it would be.

Annual reports are submitted to the Accrediting Commission on a school year basis, defined as July 1 through June 30. The information in the reports is verified annually by site visits to a sample of reporting schools. The numbers reported in the various categories—new enrollments, continuing students, re-entries, graduation, and withdrawals—are the totals for the year. Information that traces a defined group of students from initial entry until exit, either through graduation or permanent withdrawal, is not available from these reports. New definitions based on an entering cohort have been adopted by the Commission and will be used in future reports.

Graduation Rates

In our analysis of annual report data from the years prior to 1990, we calculated graduation rates by dividing the number reported as graduating by the number reported as enrolled during a school year. This procedure had problems because not all students enrolled in a given year graduate that year. This definition underestimates the true graduation rate, especially in programs that normally take two years to complete.

Because of difficulties of properly accounting for the students in the first year of a two-year program, we decided to calculate separate graduation rates for programs that differ in length as measured by clock hours of instruction. We defined certificate programs as those with 1,199 hours of instruction or less, and diploma programs as those with 1,200 of instruction or more.

For the certificate programs we used the following formula to calculate predicted graduation rates:

$$\frac{N_{graduating} + (N_{continuing} \times \text{proportion graduating})}{N_{enrolled}}$$

The rationale for using this formula was that the graduation rate among those continuing was likely to be as high as the overall graduation rate for the year. It is the experience of the CCA schools, as well as public institutions, that most students who withdraw do so in the first few months of their programs. Graduation rates among those continuing should be at least as high as the overall graduation rate.

For the longer, primarily diploma programs, we used the following formula to calculate predicted graduation rates:

$$\frac{N_{graduating} + (N_{continuing} \times \text{proportion graduating})}{N_{enrolled\ at\ start\ of\ year} + N_{reentries} + N_{estimated\ withdrawal}}$$

The rationale for the numerator in this formula was the same as that for the certificate programs. The rationale for the denominator was that new starts in these longer programs cannot complete their program in the first year. Hence we only used those who were in the program at the start of the school year *plus* those who had been in the program during a previous year had withdrawn and reentered during the current year *plus* an estimate, based on prior years, of the those who had been in the program the previous year and withdrew prior to the current year. The estimated withdrawal figure was calculated using the overall withdrawal rate for the shorter certificate programs applied to the number of new enrollments in the current year to the program.

Preliminary analyses were made using these definitions, and the results were presented to a meeting of the Accrediting Commission in February 1991. It was the judgment of the Commission members that these formulas appear to overestimate actual graduation rates because they underestimate withdrawal rates.

The Commission suggested we try a third definition: the number graduating divided by the number graduating plus the number withdrawing. This definition simply disregards the problem of continuing students for the current year. Some of these students will graduate and some will withdraw in the next school year and will be included in the rate when they do so.

The three possible definitions were submitted for review to two experts in research on employment and training programs external to the Center on Education and Training for Employment. Both the experts agreed that the third definition was most appropriate for these

data. (Their critiques of the possible definitions are appended to the report.) The *estimated* graduation rates presented in this report are based on the third definition: number graduating divided by number graduating plus number withdrawing. We emphasize *estimated* in the previous sentence, to indicate that this rate is not based on a defined group of entering students who are followed until they complete or withdraw from their programs. As noted above, the Accrediting Commission has adopted a cohort-based definition for implementation in future annual reports.

Withdrawal Rates

Withdrawal rates present less of an analytic problem: a withdrawal is a withdrawal regardless of when it occurs. Withdrawal rates were calculated by dividing the total number withdrawing during a school year by the total number enrolled during that school year. This definition, however, like that for graduation, is not based on a defined group of entering students. When the new definition for graduation rates is implemented, the definition of withdrawal will also be based on a defined group of entering students.

Because of continuing students and the definition of graduation rates adopted to allow for them, withdrawal rates are not simply the reverse of graduation rates. Since continuing students are not included in the calculation of graduation rates, graduation plus withdrawal rates do not sum to 100 percent. In each school year we have analyzed, about 40-45 percent of full-time and part-time students neither graduate nor withdraw. Instead they start during one school year and continue their studies into the next year. Consequently, not all the variables found to have a significant relationship with graduation have a similar reverse relationship with withdrawal.

Even though graduation and withdrawal rates are defined differently, school characteristics that have a positive relationship with graduation rates often have a negative relationship with withdrawal rates, and vice-versa. For example, the school characteristic that had one of the highest one-to-one correlations with graduation rate in the 1992 school year was the percentage of students who received Pell grants (r = -.31). This is a negative correlation because as the percent of students receiving Pell grants increased, graduation rates decreased. For withdrawal rates, the percentage of students receiving Pell grants had a positive correlation of slightly higher magnitude (r = .35). It is positive because as the percentage receiving Pell grants increases, the percentage withdrawing increases. In other words, some of the school characteristics that explain withdrawal rates are the same as—but in the opposite direction from—those that explain graduation rates.

Training-Related Placement

Training-related placement (TRP) is a critical measure of the performance of schools and colleges whose primary mission is to teach specific occupation skills. There is considerable evidence from studies of public vocational-technical education that employment in the field studied is essential if students are to realize employment benefits from their training (Bishop 1989).

In the analyses that had been conducted with the annual reports prior to 1990, we used the definition of TRP approved by the U.S. Department of Education. This definition allows students who withdraw for related employment to be included in both the numerator and denominator of the rate calculation. This appeared to us to be potentially biasing the rate in a positive direction so we calculated a separate rate that excluded those who withdrew from both the numerator and denominator.

The two rates differed very little. Entering the number who withdrew for related employment in both the numerator and denominator increased the TRP by only 1 percentage point. In the analysis presented in this report, therefore, we used the rate that included only those who graduated and were available for employment. This rate appeared to us to be less vulnerable to criticism that the calculation is biased to yield higher placement rates for the schools.

To calculate TRP, we adjusted the number graduating by eliminating those who were unavailable for employment because they were continuing their education, entering the military, or had other documented reasons why they were not seeking employment, such as illness or pregnancy. The number excluded for these reasons has been consistent over the three years, averaging 8 to 9 percent of the total number of graduates. The mean numbers excluded from the calculation of TRP are shown in Table 2.1. The large standard deviations reflect the wide variation in the number of graduates from the accredited schools and colleges, which in 1992 varied from 0 to 1,805.

TABLE 2.1

MEAN NUMBER OF FULL-TIME GRADUATES EXCLUDED FROM CALCULATION OF TRAINING RELATED PLACEMENT BECAUSE THEY WERE UNAVAILABLE FOR EMPLOYMENT, SCHOOL YEARS 1990,1991, AND 1992

Reason for Exclusion	1990		1991		1992	
	Mean	SD	Mean	SD	Mean	SD
Further education	6.2	17.5	6.7	23.4	7.2	18.5
Military service	.7	1.8	.7	1.9	.6	3.4
Other documented reasons	8.1	22.6	7.8	20.4	7.8	17.0
Total graduates	183.2	212.2	171.9	196.3	177.0	193.2
Number of schools	1037		1062		1017	

Default Rate

Default rate was used both as an outcome variable and as an explanatory variable. It was used as an outcome variable to determine if there are school characteristics that predict what the default rate of the school will be. It was also used as an explanatory variable to determine if the default rate of schools is related to school performance as measured by graduation, withdrawal, and TRP. Obviously, default could not have a direct, causal relationship with these outcomes because it occurs after them. Default rate could, however, be an indirect measure of the qualifications of the students recruited by the school or the quality of the instruction these students are provided.

Default rate, for example, has a high one-to-one correlation with the percentage of students classified as ATB (r = .51 in the 1992 data). This coefficient indicates a strong tendency for default rates to increase as the percentage of students classified as ATB increases. One-fourth (26 percent) of the variability in default rates across schools can be predicted from the percentage of students classified as ATB in the schools. The multiple regression analysis tests whether this relationship remains when variables measuring many other school characteristics are entered into the equation.

As noted above, the default rates for the 1990 and 1991 analyses were obtained from reports prepared by the U.S. Department of Education. These reports present the default rates for schools with 30 or more former students in default for the fiscal years that ended two years prior to the year the reports were issued. In 1992, the default rates were obtained from the annual report forms filed by the schools, but these rates also were as reported by the U.S. Department of Education for the fiscal year two years prior.

Measures of School Characteristics

The annual report filed with the Accrediting Commission includes questions about prior education of students, sources of student aid, staffing, facilities, complaints or legal actions, and other aspects of the school's operation. Many of these questions were converted into measures that could be entered into a multiple regression equation. These measures were of two types, categorical and continuous variables.

Categorical Variables

A categorical variable indicates whether a characteristic is present or not. Values of 1 and 0 are assigned arbitrarily to indicate the presence or absence of a characteristic. The variables used in this analysis were coded so that the 1 value was always assigned to the "Yes" answer. There are certain "Yes" answers, however, that were considered likely to be associated with less positive outcomes. The following variables were judged likely to have negative relationships with positive outcomes (graduation and TRP) and positive relationships with negative outcomes (withdrawal and default):

– change in ownership,

- physical moves to a new location,
- pending legal actions,
- judgments or settlements during the past year,
- complaints under review,
- program review or audits.

Some other characteristics were expected to have positive relationships with positive outcomes and negative elationships with negative outcomes. These variables included:

- accreditation by a body in addition to ACTTS
- linkage programs with public or private funding sources for funding occupational training,
- articulation agreements with other institutions,
- having separate facilities,
- being the main rather than branch campus of a school.

When reviewing the results presented in the next chapter, it is important to keep in mind that a negative sign on a regression coefficient does not always indicate a relationship that schools should try to avoid. Both the nature of the characteristic and the nature of the outcome must be considered. If the outcome is undesirable, withdrawal or default, and the school characteristic is desirable, e.g., dual accreditation, a significant negative coefficient indicates a condition a school should try to achieve. The negative coefficient indicates that schools that have the characteristic tend to have lower rates of the undesirable outcome. In the reverse condition when the outcome is positive, graduation or TRP, and the school characteristic is undesirable, e.g., complaints under review, a negative coefficient once again indicates a desirable condition. In this case, the negative coefficient indicates that schools that do not have the undesirable characteristic have higher rates of the desirable outcome.

Continuous Variables

Continuous variables can have a wide range of values. Most of the continuous variables used in this analysis are percentages or rates calculated by dividing a characteristic of interest by a base number that enables comparisons to be made across schools. For example, the actual number of students at a school who are classified as Ability to Benefit (ATB) has little meaning in itself. When the number of ATB is converted to a percentage of all enrolled students, comparisons can be made across schools.

These are the continuous variables that were used for the analyses presented in this report:

Percentage of full-time enrollment receiving the following kinds of financial aid–
- Stafford loans
- Supplemental loans to students
- Pell grants

Percentage of full-time enrollment–
With high school diploma
With General Educational Development (GED) certificates
Classified as Ability To Benefit (ATB)

Percentage of part-time enrollment–
With high school diploma
With General Educational Development (GED) certificates
Classified as Ability To Benefit (ATB)

Average program length in weeks, calculated by dividing sum of weeks of all programs at a school by the number of programs offered[1].

Number of full-time equivalent instructional staff

Student/faulty ratio, calculated by dividing student full-time equivalent enrollment by the number of full-time equivalent instructors.

Staff turnover rate, calculated by dividing number of instructors that departed during the year by total number of instructors employed during the year. Calculated separately for full- and part-time staff.

Ratio of number of full-time staff to part-time staff at end of reporting year.

Ratio of key staff to full-time equivalent instructors. (This variable was used in the 1990 and 1991 analyses. In the 1992 annual report form, the question on key staff was revised which led to many schools not providing this information. The amount of missing data caused this variable to be dropped in the 1992 analysis. In future annual report forms, this question will define more specifically what is meant by key staff.)

Population of area where school is located. (This variable was used in the 1990 and 1991 analyses. It never yielded significant relationships with outcomes and was dropped in the 1992 analysis.)

Total full-time enrollment.
Total part-time enrollment.

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[1]Another measure of program length was also calculated: average program clock hours, calculated by dividing sum of clock hours for all programs at a school by the number of programs offered. This variable was entered into preliminary runs, but average weeks of program was found to have more significant relationships with outcomes. Since the two measures are highly correlated, clock hours was dropped from the final analyses.

The enrollment variables were used as continuous variables in the one-to-one correlational analyses. For the multiple regression analyses, however, it was necessary to convert enrollment into a categorical variable. As noted above, enrollment was used as the denominator in the calculation of many of the rates used in the analysis. This leads to a technical problem in regression analysis called *multicollinearity*. When independent variables have substantial intercorrleation, multiple regression can yield misleading results.

To deal with this problem and still yield estimates of the effects of enrollment on the outcomes, total full-time enrollment was converted to a set of variables with the following categories:

Schools with total enrollment of 300 or less
Schools with enrollments of 301 to 600
Schools with enrollments of 601 to 900
Schools with enrollments of 901 or more[2]

These categories yield a set of variables that are interpreted in a way similar to the interpretation of the single categorical variables discussed above. The regression coefficient for a single categorical variable reflects the effects of the presence of that variable and is interpreted with reference to the absence of that variable. With a set of variables, such as that created for total enrollment, the regression coefficients are interpreted with reference to the one category in the set that is not entered into the equation. In the regressions presented in chapter 3, the category not entered was enrollments of 901 or more. Schools in the categories with lower enrollments are thus interpreted in comparison to schools in the largest enrollment category.

Two other variables were also created to facilitate the analysis. A comparison of the ATB and default rate variables in the 1990 data found some schools with very high percentages of ATB students had very low default rates and vice-versa. The simple correlation of percent ATB and default rates, while quite substantial (r = .51 in the 1990 data), reflects only the linear (straight-line) component of this relationship. To test if the curved (quadratic) components in the relationships between ATB and the outcome variables were significant, the variable ATB^2 was created by squaring the ATB variable.

The second variable was created to determine if there is an interaction between the percentage of students at a school that received Pell grants and the percentage of ATB students at that school. Separately these variables reflect the presence in a school of students from low income families (Pell) and those who have not done well in school in the past (ATB). There is considerable evidence in educational research that low family income and poor school performance tend to go together. The interaction variable was created by multiplying the percent of students receiving Pell at a school by the percent of ATB students at that school. The

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[2]In preliminary analyses of the 1990 data the largest enrollment category was divided into 901 to 1200 and 1200 or more. These analyses indicated that these two categories did not differ significantly and only 3 percent of the schools were in the 901 to 1200 category. Consequently, the two largest categories were combined for subsequent analyses.

variable resulting from this multiplication tests if these two variables have a joint effect on the outcome variables independent of their separate effects.

Since these are unusual variables, a note on their presentation in the tables in chapter 3 is necessary. The multiplication use to create these two variables yielded very large values. If a school had the average 16.9 percent of ATB students, for example, its $A \times B^2$ variable would be 285.6. Regression coefficients are interpreted as the rate of change in dependent variables for a unit change in the independent variables. With such large values in the independent variables, the rates of change in the dependent variables are quite small, albeit, sometimes statistically significant. To present the regression coefficients in the tables without the required zeros after the decimal point, they are multiplied by 100.

For the 1992 analyses, five variables not used in the 1990 and 1991 data were created:

Percentage of students who lived over 50 from campus at time of enrollment

Ratio of part-time to full-time students

Percentage of full-time students
With some post-secondary education

Percentage of part-time students
With some post-secondary education

Dollars spent on new equipment and teaching aids as a percentage of gross tuition income.

Because these variables were not used in the 1990 and 1991 analyses, we have less confidence in the results they yielded. Consequently, the specific results are not presented in this report. The general direction of the findings are reported for those variables added in 1992 that had statistically significant relationships with school outcomes.

Table 2.2 presents the mean and the standard deviations for the variables used in the 1990. 1991, and 1992 analyses. The mean is the average value for all reporting schools and colleges. The standard deviation is an indicator of the variability, or range from lowest to highest value, for each of the variables.

TABLE 2.2
SUMMARY STATISTICS 1990, 1991, AND 1992
ANNUAL REPORTS, CCA TRADE AND TECHNICAL SCHOOLS

	1990 Mean	1990 SD	1991 Mean	1991 SD	1992 Mean	1992 SD
Outcomes						
Graduation, full-time	62.7	20.2	63.5	18.9	64.2	19.5
part-time	52.0	28.0	52.8	28.3	51.9	28.0
Withdrawal, full-time	21.9	11.2	21.6	10.8	20.7	10.7
part-time	22.8	15.3	23.2	15.9	22.1	15.4
Related placement, full-time	75.5	19.4	74.5	17.5	74.0	18.4
part-time	65.5	30.8	61.6	31.5	61.5	31.2
Default rate[a]	23.4	16.0	22.9	17.5	26.3	15.7
School Characteristics						
Change in ownership (%No)	94.0	23.7	96.6	18.1	96.0	19.6
School move (%No)	89.4	30.8	91.9	27.3	91.2	28.3
Actions pending (%No)	91.6	27.8	93.2	25.2	91.7	27.5
Judgments (%No)	94.5	27.8	95.0	21.8	93.5	24.6
Complaints (%No)	95.5	20.8	96.2	19.0	95.2	21.3
Program reviews (%No)	61.7	48.6	64.2	48.0	63.8	48.1
Other accreditation (%Yes)	15.5	36.2	13.8	34.6	14.1	34.9
Linkage (%Yes)	32.5	46.9	33.4	47.2	38.0	48.6
Articulation (%Yes)	13.6	34.3	13.9	34.6	15.6	36.3
Separate facilities (%Yes)	18.4	38.8	15.5	36.2	16.2	36.9
Main campus (% Yes)	76.1	42.7	78.6	41.0	83.7	37.0
Total enrollment, full-time	419.0	520.3	409.9	464.7	419.6	463.8
part-time	124.6	172.6	120.8	187.7	118.6	199.4
% Schools with full-time enrollment of						
300 or less	60.0	49.0	54.4	49.8	53.2	49.9
301 to 600	22.4	41.7	23.2	42.2	23.9	42.7
601 to 900	9.2	28.9	12.2	32.8	11.0	31.3
901 or more	8.4	NA	10.2	NA	11.9	NA
% Ability to benefit, full-time	16.9	19.6	14.6	21.5	13.1	16.8
part-time	13.8	18.3	14.4	21.4	11.1	16.7
% GED, full-time	11.5	9.4	11.7	9.6	11.9	14.3
part-time	10.2	10.5	10.5	11.0	10.6	12.0
% H. S. Diploma, full-time	54.5	21.7	57.4	20.4	56.1	20.7
part-time	56.1	23.3	54.0	24.2	55.1	24.0
% Prior postsecondary, full-time	17.1	NA	16.3	NA	18.9	20.9
part-time	19.9	NA	21.1	NA	23.2	25.9

Variables	1990 Mean	SD	1991 Mean	SD	1992 Mean	SD
% of Total Enrollment receiving--						
Pell grants	49.1	32.3	50.3	32.2	55.3	30.9
Stafford loan	60.0	30.1	56.9	32.6	55.0	31.7
Supplemental loans	22.9	26.2	19.0	25.5	18.4	24.6
Student/faculty ratio	26.9	25.3	31.6	38.1	31.8	33.0
Instructional staff, full-time equivalent	15.2	17.0	15.2	18.6	15.6	15.7
Faculty turnover, full-time	22.4	19.1	21.8	22.1	18.7	19.8
part-time	17.6	25.6	20.8	28.5	19.3	26.3
Ratio full/part-time staff	2.9	4.8	3.1	4.5	2.7	4.5
Average program length, in weeks	34.0	24.7	40.9	41.2	37.8	26.9
Number of schools, full-time	1037		1062		1017	
part-time	409		441		406	

NA=Not available in these runs.

[a]Most recent available at time of analysis

CHAPTER 3

FINDINGS

This chapter presents the results of the multiple regression analysis of the variables defined in Chapter 2. A multiple regression coefficient (R) reflects the degree of association between an outcome variables and the best possible combination of the explanatory variables. The square of this coefficient (R^2) indicates the proportion of variability in the outcome that can be attributed to the explanatory variables. The closer the R approaches a value of 1.00, the better the independent variables explain variations in the outcome variable. The R must be over .70, however, before half the variability is explained. The adjusted R^2 controls for spuriously high Rs based on a small number of observations. Since many observations were used in these analyses, the adjustment reduces the R^2 very little.

Before discussing the multiple regression results, however, we summarize the one-to-one correlations between the explanatory variables (school characteristics) and the outcome variables (school performance) for full-time enrollment[1]. One-to-one correlation coefficients (r) are interpreted in much the same manner as multiple Rs: the closer the coefficient comes to 1.00, the highest possible correlation, the more similar are the rates of variations in the two variables. It is not necessary that the measures of the two variables be similar, but changes in one variable must be accompanied by similar changes in the same direction in the other variable if there is to be a positive correlation.

The school characteristics that have one-to-one correlations of .20 or higher with school performance are presented in Table 3.1. We use the .20 level as a cutoff because is it highly significant statistically (a probability of occurring by chance less than 1 time in 1,000), and also begins to have practical significance as a school characteristic that should be given attention. (The full tables listing all the correlations of the school characteristics with the outcome variables are presented in Appendix Tables 3.1 to 3.4.)

It is important to note that correlation does not necessarily mean causation. Similar rates of variation in two variables may or may not reflect the effect of one of the variables on the other. If we were to correlate the shoe size of men with their height, we would find a significant correlation. Taller men tend to have larger feet than shorter men. This does not mean that large feet cause men to grow taller or that height causes large feet. What causes both of these characteristics are the genetic components of individuals as these components interact with the nutrition available in the environment. Both shoe size and height are only reflections of basic causes. In a similar manner, many of the variables used in this analysis are only reflections of more basic relationships between school and student characteristics and school outcomes.

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[1]The correlations for part-time enrollments tend to be in same directions, but usually lower than the correlations for full-time enrollments. In general, school characteristics are less related to the outcomes of part-time students than they are for full-time students.

All of the correlations with graduation rates are negative indicating that as programs become longer, the percentage of students receiving Pell grants increases, and the number of full-time students increases, graduation rates tend to decrease.

TABLE 3.1

CORRELATIONS OF .20 OR MORE BETWEEN SCHOOL OUTCOMES AND SCHOOL CHARACTERISTICS FOR FULL-TIME ENROLLMENTS, SCHOOL YEARS 1990, 1991, AND 1992

School Characteristics	1990	1991	1992
		Correlation Coefficients	
With Graduation Rate			
Program length in weeks	-.29	-.27	-.34
% Pell	-.28	-.27	-.31
Total enrollment	-.20	-.19	-.22
With Withdrawal Rate			
Default rate of school	.29	.31	.28
% Pell	.27	.26	.35
% Ability to benefit	.25	.26	.21
Total enrollment	.22	.22	.25
Enrollment 300 or less	-.21	-.25	-.27
With Default Rates			
% Ability to benefit	.51	.41	.51
% High school graduate	-.29	-.20	-.19
Withdrawal rate	.29	.31	.28
Faculty turnover, full-time	.26	.12	.22
Program length in weeks	-.20	-.07	-.30

Note: All correlations but one significant, $p < .001$, $-.07\ p < .02$

The first four correlation with withdrawal rates indicate that as these characteristics of schools increase, withdrawal rates increase also. The negative coefficient for schools with enrollments of 300 or less means that these schools in comparison to schools with enrollments of 901 or more (the category not entered into the equation) have significantly lower withdrawal rates.

No school characteristic had a correlation of .20 or more with training-related placement rates (TRP). The two highest were .14 for schools with enrollments of 300 or less, and -.14

for number of instructional staff. Both of these indicate a tendency for TRP to decline as school size increases.

The percentage of students classified as ATB has a positive correlation with default rate, and the percentage of students with high school diplomas has a negative correlation. As the percentage of ATB students increases, the percentage of students with diplomas decreases. And both of these measures have significant relationships with default rates. The measure of program length in weeks has a negative relationships with default. This means that schools with longer programs tend to have lower default rates. The 1991 correlation of program length with default was the only coefficient in Table 3.1 to drop below the .001 significance level. There is no apparent explanation for the much lower correlation in 1991.

Multiple Regression Analysis

Multiple regression differs from simple correlation in that it tests the independent relationship of each explanatory variable entered into an equation with the outcome variable, while controlling for the intercorrelation of all the variables with each other. Appendix Tables 3.5 to 3.8 presents the regression analysis of the full-time enrollment data. The entries in the tables in the rows opposite the explanatory variables are partial regression coefficients. These coefficients are interpreted as the rate of change in the outcome (dependent) variable for a unit change in an explanatory (independent) variable when all other variables in the equation are held constant.

When interpreting the meaning of a partial regression coefficient, one first has to ask, "Is it statistically significant?" If the coefficient for an explanatory variable is not significant, the explanatory variable does not have an independent relationship with the outcome variable greater than would be expected by chance. Significance is indicated in the tables by asterisks: one asterisk indicates a result that would be likely to occur by chance 5 times out of 100, two asterisks indicate a result likely to occur 1 time out of 100, and three asterisks indicate a result likely to occur 1 time out of 1,000. All of the partial regression coefficients in the tables are interpreted as rates of change in the outcome variables for unit changes in the explanatory variables. All of the outcome variables are percentages. The units of the explanatory variables, however, differ widely from categorical variables that can take only two values, 0 or 1, to continuous variables, such as the percent of enrollment receiving Pell grants, that can vary from 0 to 100.

The categorical variables, it will be recalled, were always coded so that *Yes* answers which indicated that a school had specified characteristics were assigned a value of 1 and *No* answers, indicating the absence of those characteristics, were assigned a value of 0. Positive regression coefficients are thus interpreted as the amount these outcomes increase when the school characteristics are present, and negative coefficients are interpreted as the amount these outcomes decrease when these characteristics are not present. Two of the outcomes, however, graduation and TRP are desirable, and two, withdrawal and default, are undesirable. Thus the signs on the coefficients must be interpreted in conjunction with the desirability of the outcome. Regression coefficients for continuous variables are interpreted in the same way as categorical

variables–the rate of change in the outcome variable for a unit change in the explanatory variable–but the units in which the explanatory variables are measured must be considered.

It is very difficult to identify general patterns in the overwhelming number of figures in the appendix tables. To make the discussion of these results easier to follow, we focus on those variables for full-time enrollment that had statistically significant relationships with the outcome variables two out of the three school years. The full-time variables had more significant relationships than the part-time variables. This underscores the observation made earlier in connection with the discussion of one-to-one correlations: outcomes for part-time students have fewer and weaker relationships with school characteristics than outcomes for full-time students. If a variable was not significant one of the three years, the non-significant year is indicated by *NS* in the tables.

Graduation Rates

Table 3.2 summarizes the variables that we found to have statistically significant relationships with graduation rates for at least two of the three years we examined.

Total Enrollment Categories

As we discussed in Chapter 2, it was necessary to convert the total enrollment variable into a set of categorical variables to enter it into the regression equations. When entered in this way, the categories shown in the table are interpreted in comparison to the largest enrollment category–901 or more students–which is not shown in the table. For all three years, schools with enrollments of 300 or less and from 301 to 600 consistently had higher graduation rates than schools with enrollments of 901 or more. Schools with enrollments of 601 to 900, however, do not have significantly higher rates than the largest school category.

It bears repeating that the estimates of the effects of the variables listed in the table are independent of the other variables that also influence graduation rates. Stated another way, in 1992 when the effect of other school characteristics, such as the percent of Pell recipients and the average length of programs, were controlled, schools with enrollments of 300 or less had graduation rates 13 percentage points higher than schools with enrollments of 901 or more.

TABLE 3.2

VARIABLES INFLUENCING GRADUATION RATES
TWO OR THREE SCHOOL YEARS

	1990	1991	1992
Categorical variables			
Enrollments			
300 or less	+11.4	+10.2	+13.0
301 to 600	+5.6	+5.7	+8.8
Main campus	+4.3	+4.0	+4.7
Dual accreditation	+4.6	+3.8	+3.1
Separate facilities	+3.3	NS[b]	+3.3
Continuous variables[a]			
% Pell	-1.4	-1.7	-1.9
% Stafford	NS	+ .8	+ .8
% SLS	NS	- .8	- .8
Average weeks	-2.6	-1.8	-2.4
Faculty turnover			
Part-time	NS	- .5	- .8

Note: The figures represent the net, independent effects in positive or negative percentage points of the variables listed on graduation rate.

[a] Change in graduation rate for a change of 10 units in the variables listed.

[b] NS=Not significant this school year.

Main or Branch Campus

The coefficients in Table 3.2 indicate that for all three school years main campuses had graduation rates 4 percentage points higher than branch campuses. These findings suggest that facilities, equipment, and instruction are likely to be better at a main than at a branch campus. The results may also reflect a maturation factor: main campuses are likely to be older with

established operating procedures. It may be this institutional maturity, especially if it has led to good linkage with employers, that results in better graduation rates for main campuses.

Dual Accreditation

Information on whether schools had accreditation other than the Commission was examined. Schools were asked first if they held or were a candidate for accreditation by a recognized agency other than the Commission on Trade and Technical Schools. If they answered "yes," they were asked to give the name of the agency. Each of the three years about one-sixth of the schools reported they had or were a candidate for other accreditation.

Schools with dual accreditation had graduation rates about 3 to 4.5 percentage points higher than schools without dual accreditation, when all other characteristics entered in the equation are held constant. There is some speculation that school with more than one accreditation may be *accreditation shopping*–seeking backup in case accreditation from one agency is lost. If this were the motivation for dual accreditation, one would expect to find it among the poorer performing schools. The results in Table 3.2 suggest just the opposite. These results indicate it is the better schools that seek dual accreditation.

Separate Facilities

Separate facilities refer to separate buildings, classrooms, or laboratories for one reporting school. It is a different variable than main or branch campus. About one in six schools report such facilities and they have graduation rates that are higher by more than 3 percentage points than schools without them. We had initially hypothesized that separate facilities might be associated with better instruction, such as an aviation mechanics school that had a regular classroom building and a separate facility at an airport. The results suggest that separate facilities have some retention value.

Percent Receiving Financial Aid

The financial aid variables indicate the percentage of enrollment in a school that received the aid indicated. They range from 0 percent to 100 percent and on average across all schools over half of all students have received Pell grants and Stafford loans during the past three years, and about one-fifth received SLS. The percentage receiving Stafford and SLS have been dropping slightly, while the percentage receiving Pell has been increasing.

The percentage receiving Pell increased from 49 percent in 1990 to 55 percent in 1992. The regression coefficients have consistently indicated that for a 10 point increase in the percentage of enrollment that receives Pell grants, the percentage of enrollment that graduates decreases about one and one-half to almost two percentage points, when other variables in the equation are held constant.

To think of the meaning of these coefficients in another way, imagine two schools that are exactly average on all the characteristics listed in the tables and differ only in the percentage of students that receive Pell grants. In one school no one receives a Pell grant; in the other school everyone does. In 1992 the graduation rate for full-time students in the school with no Pell grants would be 72.7 percent and in the school with 100 percent Pell grants it would be 53.7 percent[2].

The two other financial aid variables in Table 3.2 are parallel but opposite. Neither of them was significant in 1990, but both were significant the next two years, at the same level of effect, but in opposite directions. As the percentage of students receiving Stafford loans increases, graduation rates increase at a rate slightly less than one percentage point for every 10 point increase in the percent receiving this aid. As the percentage receiving Supplemental Loans to Students (SLS) increases, graduation rates decrease.

Average Program Length in Weeks

When all other variables are held constant, shorter programs have a higher graduation rate than longer programs, as measured in weeks. For every 10 week increase in program length, graduation rates decrease by about two to two and one-half percentage points.

Faculty Turnover

Several questions were asked about the staffing patterns in schools, and explanatory variables were created from these questions. Separate variables were created for full-time and part-time staff. Turnover among part-time faculty was the only one of these variables to show a consistent relationship with graduation. Turnover was defined as the number leaving divided by the total number employed during the school year. Turnover among full- and part-time faculty has been about 20 percent, one-fifth of all employed, over the three years for which we have data. To anticipate the next section, turnover rates among both full- and part-time faculty were found to be associated with increased withdrawal rates.

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[2]For the school with no Pell grants the calculation involves the mean graduation rate plus the partial regression coefficient times the mean percentage receiving a Pell grant, minus 100: 64.2 + (-.19(55.3 - 100)) = 72.7. For the school with 100 percent Pell, the calculation is the same but zero is subtracted from the mean percentage receiving a Pell grant.

Withdrawal Rates

All students who enroll during a given school year do not graduate or withdraw during that school year. Each of the three years for which we have data, about 40 percent of full-time enrollment neither graduate nor withdraw. Because of these continuing students, it was necessary to establish a definition of graduation that did not penalize schools for continuing students. The definition adopted was the number of students graduating divided by the number graduating plus the number withdrawing. Withdrawal rates were defined as the number withdrawing divided by the number enrolled in a school year. Because of these differing definitions, withdrawal is not just the reverse of graduation. Many of the variables that influence graduation also influence withdrawal, but they are not identical. Table 3.3 lists those variables found to significantly affect withdrawal two of the three years.

The variables that have consistent significant influence on both graduation and withdrawal rates are the following:

- Enrollments of 300 or less and of 301 to 600
- Dual accreditation
- Separate facilities
- Percent enrollment receiving Pell grants
- Turnover among part-time faculty
- Program length in weeks

For all of these variables, their relationships with withdrawal are the reverse and about half the magnitude of their relationships with graduation. The lower estimates of the effect of these variables upon withdrawal are partially due to the restricted range of the withdrawal variable. The mean withdrawal rate is about one-third of the mean graduation rate.

There are three variables that did not reflect a consistent influence on graduation that do have such an effect on withdrawal. One is turnover among full-time faculty; this effect is parallel to, and approximately of the same magnitude as, turnover among part-time faculty. The other two are ability to benefit and default rate.

Ability to Benefit

The percent of enrollment classified as Ability To Benefit (ATB) was one of the most interesting variables examined in the analysis. The main effect of the ATB variable, to be discussed later, was found for default rate. Table 3.3 indicates that for every 10 point increase in the percentage of ATB students, withdrawal rates increase by 1.7 to 2.5 percentage points.

TABLE 3.3

VARIABLES INFLUENCING WITHDRAWAL
TWO OR THREE SCHOOL YEARS

	1990	1991	1992
Categorical variables			
Enrollments			
300 or less	-4.4	-6.1	-8.3
301 to 600	NS[b]	-3.0	-5.3
Dual accreditation	NS	-2.0	-1.7
Separate facilities	-1.9	-1.6	-1.9
Continuous variables[a]			
% ATB	+1.7	+1.7	+2.5
% Pell	+ .6	+ .8	+1.1
Faculty turnover			
Full-time	+ .2	+ .3	+ .4
Part-time	+ .1	+ .4	+ .5
Average weeks	+1.1	+ .8	+ .6
Default rate	+1.2	+1.0	+ .9

Note: The figures represent the net independent effects in positive or negative percentage points of the variables listed on withdrawal rate.

[a] Change in withdrawal rates for a change of 10 units in the variables listed.
[b] NS = Not significant this school year.

Default Rate

The percent of students who default on their Stafford loans obviously cannot be a cause of withdrawal. Default occurs after withdrawal. We included it as an explanatory variable because we thought it might reflect certain characteristics of schools not captured by the other variables in our analysis. And for withdrawal rates, it does. Default rate has a

consistent, relationship with withdrawal independent of all the other school characteristics examined.

The default rates reported by the U.S. Department of Education have been challenged by some of the schools and colleges accredited by the Commission and the rates have been revised. In our analyses, however, we found the percentage of former students who default is a fairly stable characteristic of a school. We intercorrelated the default rates for the three most recent years for which we have data and found substantial coefficients. The rates for 1988 correlate .72 with the rates for 1989 and .63 with the rates for 1990, and the rates for 1989 correlate .84 with the rates for 1990.

Training-Related Placement

The economic benefits of studying occupational skills accrue primarily to graduates who obtain employment in jobs that require the skills they learned in their programs (Bishop 1989). We have labeled the variable that measures the percent of graduates who obtain such jobs, Training-Related Placement (TRP). Over the three school years analyzed, three-fourths of the graduates available for employment have found jobs in related fields. Unfortunately, TRP is the outcome with the fewest consistent relationships with school characteristics. Those relationships that do exist are presented in Table 3.4.

TABLE 3.4

VARIABLES INFLUENCING TRAINING-RELATED PLACEMENT TWO OR THREE SCHOOL YEARS

	1990	1991	1992
Categorical variables			
Main campus	+5.9	+3.9	+2.8
Dual accreditation	+4.0	NS[b]	+3.7
Continuous variables[a]			
% Stafford	+ .5	+ .6	NS

Note: The figures represent the net independent effects in positive or negative percentage points of the variables listed on training-related placement rates.

[a] Change in training-related placement rates for a change of 10 units in the variable listed.
[b] NS=Not significant for this school year.

Programs that are offered on the main campuses and at schools that have dual accreditation have higher rates of TRP than programs offered on branch campuses and at schools that do not have dual accreditation. These variables thus reflect the same type of association they had with graduation rates, and we suspect they are indicators of higher quality programs. We have no explanation of why the percentage of students receiving Stafford loans should be associated with TRP.

Default Rates

Probably more public attention is directed to default rates than any of the other variables examined in this report. There is a data problem in analyzing this outcome, because of the time delay in the publication of default rates. Students must leave school and the grace period for repayment must pass before data can be collected. Consequently, our analysis is always dealing with rates that are based on students who left their schools and colleges at least two years prior to the period covered by the annual reports from the schools. As we indicated earlier, however, default rates tend to be fairly stable across the three years we have analyzed. For the 1990 school year, we were able to match default data for those who left school that year with the annual report data for that year. The results were virtually identical to those obtained with the time-lagged data.

Program length is associated with default rates, just as it was with graduation and withdrawal, but these regression coefficients are negative meaning as program length increases default rates decrease. It seems reasonable that students who graduate from longer programs should earn higher wages and be in a better position to repay their loans.

We reported in an earlier section that default rates have an independent relationship with withdrawal, the reverse is also true. Even when other characteristics are held constant, schools with high withdrawal rates have high default rates.

Change in Ownership

Many of the variables we had thought likely to be associated with poorer school performance, such as legal action pending and complaints under review, were not statistically significant or were significant only one of the three years. Change in ownership was the only variable of this type to be significantly related to an outcome and that was only for two of the three years. In both of these years, schools with changes in ownership had higher default rates than schools that did not change ownership.

Recall that the most recent default data are for the school year two years prior to the year of the annual report. What this analysis may be showing is a tendency for owners who know their former students are experiencing default problems to sell their schools before the reports on these students are actually compiled and released.

TABLE 3.5

VARIABLES INFLUENCING DEFAULT TWO OR THREE SCHOOL YEARS

	1990	1991	1992
Categorical variables			
Ownership change	+3.5	+8.3	NS[b]
Continuous variables[a]			
% ATB	+4.9	+7.4	+5.6
% GED	+1.2	+1.2	NS
% SLS	NS	- .6	- .7
Average weeks	-1.2	- .4	- .7
Withdrawal rate	+1.7	+2.4	+1.3

Note: The figures represent the net, independent effect in positive or negative percentage points of the variables listed on default rates.

[a] Change in default rates for a change of 10 units in the variables listed.
[b] NS=Not significant in this school year.

We think variables that reflect undesirable conditions are not consistently related to outcomes because few schools report such conditions. Typically, less than 10 percent of schools reports legal action pending and less than 5 percent report complaints under review or changes in ownership. When a few schools that report such conditions have very high or very low outcome measures, these few schools can have a distorting effect on the regressions. Consequently, in our discussion we have emphasized those variables that have yielded consistent results over the three school years.

Ability to Benefit

We noted earlier that the ATB variable had its strongest relationship with default rates. In the three school years, default increased at the rate of half a percentage point or more for every 1 point increase in the percentage of ATB students enrolled at a school. This result must

be interpreted cautiously, however, for it was obtained when the variable ATB^2 was entered in the regression.

As we discussed in chapter 2, ATB^2 was created to determine if a curved (quadratic) function more adequately represented the relationship between ATB and default rates than a straight-line, linear function. We found that the ATB^2 variable did have a highly significant relationship with default, indicating there is a quadratic component to the relationship. The magnitude of the quadratic effect, however, is not large[3]. Nor did the addition of the ATB^2 variable yield a significant increase in the explanatory power of the full regression equation. With ATB^2 entered, the percentage of explained variance was only 1 point higher than when it was not included.

The major effect of entering the quadratic component (ATB^2) as a separate variable was to increase the estimate of the effect of the linear component of the ATB-default rate relationship. This is because the quadratic variable has a negative relationship with default rates while the linear variable has a positive relationship. In the linear component, as the percent of ATB students at a school increases, so do default rates. In the quadratic component, as ATB increases default rates decrease and vice-versa. The negative quadratic component indicates the relationship of ATB to default is best described by a "U" shaped curve.

For the 1990 data, we ran the default analysis with and without ATB^2 in the equation. When the quadratic component of the ATB-default relationship was estimated separately by entering ATB^2, the coefficient for the linear component almost doubled, increasing to .49. The effect estimate when ATB^2 was not in the equation was .26. In other words, the linear component explains most of the ATB-default rate relationship, and the estimate of the linear effect of ATB on default was increased when the quadratic component of the relationship was removed. Some possible explanations of how ATB may affect default are discussed in Chapter 4.

Another of the variables we created for the analysis was the percent of ATB students multiplied by the percent of Pell recipients at a school. This created variable tested whether the percent of ATB *and* Pell recipients at a school have an interactive effect independent of their individual effects. Significant interaction effects were found for graduation and withdrawal rates. For these outcomes—in contrast with the relationship of ATB^2 with default—the partial regression coefficients had the same signs as the ATB and Pell variables upon which they are based. For both graduation and withdrawal, the ATB-Pell interaction reduced the separate estimates of the effects of these variables. As the interactive effects increase, graduation rates decline and withdrawals increase. Some possible explanations are suggested in Chapter 4.

[3]The partial regression coefficient shown in the appendix table is multiplied by 100, hence the actual coefficient has two zeros between the decimal point and the value shown.

CHAPTER 4

INTERPRETATIONS AND SUGGESTIONS

In this chapter we try to interpret a complex set of statistical analyses and give our judgments as to what the most significant findings are. As in the other chapters in this report, we write in the first person plural to signify that these are personal judgments, not necessarily those of the Center on Education and Training for Employment or of the Accrediting Commission. Our positions are based on the findings, but we attempt to go beyond the statistics to explain what we think are the practical implications of these results.

The most important consideration in choosing the variables we discuss was the consistency of the findings in both the preliminary analyses of the 1987 to 1989 data and the present analyses of the 1990 to 1992 data. Our main criterion was that the variable was found to be statistically significant in half or more of the years in which it was analyzed. Our secondary criteria were either that the variable was significant for more than one outcome or had a strong effect on the one outcome it influenced.

Our findings are consistent with other studies of the outcomes of many different educational systems. The characteristics of the students which schools serve have a strong influence on the performance of these schools. They are not the sole influence, however. In the three years of data that we analyzed, we found certain school characteristics to have a significant effect each year on outcomes. First we summarize the major outcomes and present some comparison results from other studies. We then discuss effects of selected student characteristics on these outcomes, and then turn to the effects of school characteristics.

Outcomes

The definitions of graduation and withdrawal we used in this report indicated almost two-thirds (63 to 64 percent) of students *leaving* accredited schools and college graduated, and a little more than one-fifth of *total enrollment* (21 to 22 percent) withdrew. We could not locate any results from other postsecondary institutions that defined graduation and withdrawal rates in the same way they were defined for this report. The results we did find are generally based on a specific group of students (a *cohort*) that is followed for a specified period. The percentages that complete or withdraw from their programs are calculated based on the number that started these programs. The Accrediting Commission has adopted a similar definition for its annual reports.

The outcomes for the schools and colleges presented in this report are better than those reported using the cohort definition. Grubb (1993) presents results based on the High School and Beyond longitudinal survey that estimate dropout rates in the range of 42 to 51 percent in the middle years of the 1980s. The High School and Beyond data include students from community colleges (vocational and academic), public vocational-technical schools, and proprietary schools. Continuing students ranged from 9 to 14 percent.

There are many differences, in addition to the way graduation and withdrawal are defined, between the data used for the present report and that from the High School and Beyond study. The longitudinal data are based on a national survey of the high school class of 1980, all of whom were seniors and most of whom graduated. The postsecondary results are based on the status of these former students four years after leaving high school, a period of high educational and job mobility for young people. The annual report data are based on students with much more varied educational backgrounds ranging from a substantial proportion (approximately one-sixth) of ability-to-benefit (ATB) students to a slightly higher proportion who have had some postsecondary education before enrolling in a Commission accredited school. Some of these differences would be expected to work to the disadvantage of accredited schools—they enroll proportionally more high school dropouts, members of minority groups, and students from disadvantaged backgrounds (Byce and Schmitt 1992). While direct comparisons are not possible, the available data suggest that school accredited by the Commission may be graduating more of their students than similar public institutions and nonaccredited private schools.

Comparisons on training-related placement (TRP) are not as plagued by problems of definition. Most institutions that provide occupational preparation define TRP as the number of program completers who obtain related employment divided by the number of completers available for employment. Over the three years examined in this report, the number excluded from this calculation—the number unavailable for employment—has been a consistent 8 to 9 percent. This percentage has been about evenly divided between those continuing their education and those with other documented reasons for not seeking employment such as health problems or a need to care for children or other family members. Each year less than 1 percent were unavailable because they entered military service.

Each of the three years, three-fourths of the graduates of accredited schools who were available for employment were reported to have obtained jobs related to the skills they had studied. To locate comparison results, we conducted an ERIC search to identify all follow-up studies of postsecondary students entered into the literature between 1987 and 1992. We were unable to identify any national studies that had examined TRP, but we did find five state studies that examined the related employment of graduates of public vocational-technical institutions[1]. The rates in these studies for students who had completed their programs in the mid-1980s ranged from 82 to 96 percent.

On this measure, the schools accredited by the Commission appear to be doing slightly worse than similar public institutions. If, however, more of the students of the accredited schools actually complete their programs, and if these completers have larger proportions of high school dropouts, minorities, and economically disadvantaged, these slightly lower rates are certainly understandable. The percentage of *entering* students eventually obtaining related employment may actually be higher among graduates of Commission accredited schools than among graduates of similar schools, because of the apparent higher graduation rates in accredited schools.

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[1]Illinois 1987, New Hampshire 1988, Ohio 1988, Washington 1990, and Wisconsin 1988.

Student Characteristics

There were four indicators of student characteristics that met our criteria of consistent, statistically significant association with measures of school performance:

- Percentage of enrollment receiving Pell grants
- Percentage of enrollment with Stafford loans
- Percentage of enrollment with Supplemental Loans to Students
- Percentage of students classified as ATB

Of these four the percentage of Pell grants and ATB students had the more powerful effects.

Percent Receiving Pell Grants

The effect of the Pell variable is straightforward. As percentage of enrollment receiving the grant increases, graduation rates decrease and withdrawal rates increase. This was found in both the previous and present analyses. In the previous analysis, however, Pell grants appeared to have a more substantial effect on graduation rates–for every one point increase in the percentage receiving Pell grants, graduation rates fell about one-half point. In the present analysis the effect is less than half as big–for every one point increase in Pell grants, graduation rates fell less than two-tenths of a point.

The difference in the magnitude of the effect in the previous and present analyses is due primarily to the addition of measures of program length to the analysis. Pell grants are only awarded for programs of 600 hours or more. The analysis of the 1990 annual reports clearly indicated that program length has a strong effect on graduation rates: as program length increases, graduation rates decrease. When measures of program length were not included in the analysis, the Pell variable was reflecting some of the program length effect. Even when the program length variables were included, however, Pell still showed a strong independent effect.

The results for the Pell variable do *not* mean that receiving Pell grants make it less likely that students will graduate. Pell grants are made only to students whose own or family income is below the level defined by the federal government as poverty. High percentage of Pell recipients indicates a high percentage of students from poverty families. Students from such families traditionally are the most difficult to serve in educational settings. As the percentage of students living in poverty increases, graduation rates decrease. It is of interest, however, that the Pell variable does not have a significant effect on default rates. We will discuss this at more length in connection with the ATB variable.

These results suggest the most direct way for schools to increase graduation rates would be to decrease the percentage of their students who receive Pell grants. This would deny technical training to those who are most in need of it, and it is rarely feasible from the economic perspective of the school. The percentage of students receiving Pells could, however, serve as a signal to the Accrediting Commission.

In the average school, about half of the students receive Pell grants. We would suggest that those schools where 75 percent or more of the students receive Pells should receive

additional support to ensure their students are making adequate progress toward their occupational objectives. If the students are not making progress, attempts should be made to identify the reasons, and, where possible, to provide assistance with the problems being encountered. Percentage of Pell grants could be a key monitoring variable to identify schools that may be having problems.

Ability to Benefit

ATB and default rates are the most controversial variables examined in this report. Critics of proprietary schools claim that too many students who are not prepared for training programs are classified ATB in order to qualify for student aid. When these students have problems in their programs, they frequently withdraw from school and default on their loans. The analysis of the annual report data lends support to these criticisms. ATB had a significant relationship with withdrawal and a strong impact on default. As noted earlier, the one-to-one correlation between ATB and default rates was $r = .51$, the highest correlation between a school characteristic and an outcome variable in the analysis. One-fourth of the total variability in default rates across schools can be explained by the percentage of ATB students in those schools.

As high as this simple correlation is, however, it does not adequately describe the relationship between ATB and default. The analysis presented in chapter 3 indicated that this relationship was described better by a curved rather than a linear (straight-line) function. The linear component is in the middle of the curve and explains most of the relationship—as the percentage of ATB at a school increases so does the default rate of that school. At the two ends of the curve, however, these relationships are reversed—low rates of ATB are associated with high default and high rates of ATB associated with low default.

A possible explanation for these unexpected components of the relationship may lie in the experience of schools in working with ATB students. Schools with high percentages of ATB students may provide more supportive services which tend to counteract the increased tendency of ATB students to default. This explanation would not hold for the other end of the curve—low ATB and high default. Our examination of the scatterplot of the ATB-default data leads us to believe that this end of the curve is being heavily influenced by a few schools with very low percentages of ATB that have very high default rates. Such schools, called "outliers" by statisticians, have a disproportionate influence on regression analyses.

These intriguing aspects of the curved component of the ATB-default relationship should not divert attention from the linear component which explains a large proportion of the differences in default rates across schools. In our judgment, the explanation for this linear component lies with individual differences in students that are associated with dropping out of high school. Students who drop out are indicating their unwillingness to adapt to a structured educational setting. These are the students who are being admitted as ATB. They have the mental ability to succeed, as measured by the test that classifies them as ATB. Often, however, they do not have the personal qualities that enable them to benefit from classroom instruction. They give school another try but if they encounter the same factors that caused them to drop out of high school, many withdraw from their program. Feeling they have gained nothing from their experience, such former students are more likely to default on their loans. Knapp and Seaks (1992) concluded from an analysis of individual data on 2,000 Stafford loans that it is the

characteristics of individuals, not the characteristics of the institutions they attended, that influence whether or not loans go into default.

Having said this, the question arises as to why the Pell variable does not also have a similar relationship with default, when it strongly depresses graduation and increases withdrawal. Our hunch is that the ATB variable is a better indication of alienation from the mainstream institutions of our society. It seems likely that such alienation would be associated with a tendency to default on loans. Even though the Pell variable indicates the percentage of students from poverty background, it is not associated with the percentage of high school graduates at a school. ATB, in contrast, has a high negative correlation (r = -.53) with the percentage of high school graduates. If dropping out of high school reflects alienation and if alienation is associated with a tendency to default, the ATB variable appears to be tapping this tendency.

In the current climate of close scrutiny of proprietary schools, percent of ATB students should obviously be one of the factors monitored by the Accrediting Commission. It seems very likely that federal aid will be denied to those schools with a history of high default rates. The percentage of ATB students is a good predictor of default rates and could be used to identify schools that are likely to have problems in the future.

Stafford and SLS

The other two indicators of student characteristics that met our criteria as significant variables were the percentage of Stafford and SLS recipients. These variables do not have as large an influence as Pell and ATB, but they both affected more than one outcome. As the percent of Stafford recipients increase, both graduation and training-related placement (TRP) rates increase. As the percent of SLS recipients increase, both graduation and default rates decrease. Surprisingly, the Stafford variable did not meet our criteria as a significant influence on default rates. Stated differently: the percent of Stafford recipients at a school has no consistent significant influence on the percent of those recipients who will default.

School Characteristics

Our analyses identified several school characteristics that each year had a significant impact on school performance. These are the ones that met our criteria:

- Total enrollment, particularly schools with 300 or fewer full-time students
- Length of program in weeks
- Main vs. branch campus
- Dual accreditation
- Turnover of faculty, particularly part-time faculty
- Separate facilities

Total Enrollment

Total enrollment as a continuous variable has a number of significant one-to-one relationships with key outcomes and school characteristics. In addition, when total enrollment was converted to a categorical variable, schools in the smaller categories tended to have better outcomes than schools in the largest category. To simplify the presentation, and to avoid the technical problems inherent in using enrollment in the regression analysis, we focus on to the one-to-one relationships between enrollment and outcomes for full-time students.

Small schools have much higher graduation and lower withdrawal rates than larger school, all other factors held constant. This finding suggests that as school size increases it becomes more difficult to provide students with the personal contact that leads to feelings of support and identification with the school which appears to occur in smaller schools. When enrollment is correlated with other school characteristics, a pattern of modest but statistically significant relationships is found. Here are the correlations from the 1992 data of total enrollment with several other school characteristics:

	Correlation with Full-time Enrollment
Percent of students ATB	.08
Turnover part-time faculty	.11
Length of program in weeks	.16
Student-faculty ratio	.31
Complaints under review	.19
Legal actions pending	.25
Judgment or settlement rendered	.18
Program review or audit	.15

Taken together these characteristics suggest that as school enrollments increase the larger schools are somewhat more likely to offer longer programs with higher student-faculty ratios. The students whom large schools enroll are slightly less prepared. The part-time instructional staffs of larger schools have a little more turnover than is true of smaller schools. Larger schools are also more likely than smaller schools to be involved in legal actions and complaint procedures or to be audited, perhaps because students are less likely to feel part of the school.

None of these characteristics in itself means larger schools cannot perform as well as smaller ones, but the combination suggests larger school have a more difficult challenge. As school size increases, management and quality control problems increase. Owner/managers of small schools have a high degree of personal involvement, know all of their instructors and many of their students, and may even know many of the employers who hire their graduates. In large schools it very difficult to create a similar atmosphere. A large school, enrollments of 900 or more, offering longer programs, with high percentages of ATB and Pell recipients exhibits a combination that is especially likely to have lower graduation and higher default rates which warrants close monitoring.

Average Program Length

Program length, measured in weeks of the program, was found to decrease graduation and increase withdrawal. This will come as no surprise to the accredited schools: as programs become longer, it becomes more difficult for students to complete them. Somewhat surprisingly, length of program was found to have a positive effect on default rates. That is, as the average program length at schools increased, there was a tendency for default rates of those schools to decrease. It is harder for students to complete longer programs, but if they do, it appears they are more likely to repay their loans.

The explanation for this apparent contradiction probably lies with the level and quality of training in longer programs. Longer programs should teach higher level skills which should command a higher wage in the labor market. Graduates who earn higher wages should be in a better position to repay their loans. We cannot test this explanation, at present, because information on starting wages is not available.

The implications of this finding are that schools that offer longer programs should be required to demonstrate that their graduates do have an earnings advantage. Longer training is more costly to students both in direct costs and foregone earnings. To justify this extra cost, increased earnings should be realized upon completion of training.

Main or Branch Campus

Over three-fourths of the schools reported they were the main campuses of their institutions, and the percentage is increasing. Graduation and TRP rates for full-time enrollments were higher at main campuses than at branches by 3 to 6 percentage points both in the prior and present analyses. The regression coefficients for graduation rates were almost identical across the three year, but the effect on TRP appears to be weakening.

The consistency of these findings suggest there may be systematic differences in the preparation received at main and branch campuses. Main campuses are likely to have more established procedures and reputations with employers as sources of skilled workers than branch campuses. As part of its auditing procedure, the Accrediting Commission should examine the instruction at branches to determine if it is of the same quality as that received at main campuses.

Dual Accreditation

Dual accreditation had significant relationships with three of the four outcome measures. Dual accreditation was one of only three explanatory variables to have a significant relationship with TRP. We feel that dual accreditation is an indicator of high quality schools which are retaining their students and giving them an advantage in obtaining jobs using the skills they studied.

Higher quality of instruction, as reflected by dual accreditation, was not related to default rates. This is consistent with other studies (Knapp and Seaks 1992), that have also failed to find any relationship between school characteristics and default rates.

Separate Facilities

Schools that reported separate facilities had higher graduation and lower withdrawal rates than schools without such facilities. There is something about separate facilities that gives them more retention power. When we have presented preliminary findings about separate facilities to the Accrediting Commission in the past, some members have expressed skepticism about the result. They said it has been their experience that separate facilities are associated with poorer, not better, instruction. Instruction is poorer because of the difficulties of supervising teaching in the separate facilities. It may be that separate facilities provide a richer instruction environment. this is especially likely to be the case if the facility is located in an occupationally relevant setting, such as an airport, an automotive garage or the kitchen of a commercial restaurant.

Faculty Turnover

Faculty turnover, particularly among part-time faculty, is associated with lower graduation rates and higher withdrawal rates. The magnitude of the effect is not as large as many of the other significant variables. Because most schools do not have a large number of instructors, however, the addition or departure of a few can have a large impact upon the turnover rate.

For the three years presented in this report, the average number of full-time equivalent instructors was slightly more than 15 and the turnover rate among both full- and part-time instructors was about 20 per cent. This means in an average school with 15 instructors, three were departing each year. The departure of two or three additional staff in a single year would have a marked impact on turnover rate. Two more departures would bring the rate up to 33 percent and three more, six total, would yield a rate of 40 percent.

Some turnover if inevitable, but in our judgment, high rates reflect poor program quality. It certainly is difficult for instructors to establish supportive relationships with students in schools with high turnover rates. Schools that are continually replacing their faculty are not likely to be schools that are directing much of their effort into improving the relevancy and quality of their programs. And it appears that turnover among part-time faculty is a more sensitive indicator of poor school performance than turnover among full-time staff.

Other Variables

There were several other variables found to have substantial effect sizes in one or more of the school years that we have not discussed. That is either because previous data were not available or the variables were not found to be significant in half or more of the years analyzed.

With as many outcomes and school characteristics as were analyzed, some variables will be found significant just by chance. We have discussed those that we believe have a consistent, predictable influence on school performance. Other variables–like change in school ownership, and complaints under review–were found to be associated with school performance in some years and should continue to be examined in subsequent analyses.

New variables. For the 1992 annual report data, we created five new variables. Because we do not have trend data for these variables, we are not presenting their actual results. What we found suggested the following relationships:

- As the percentage of students who lived more than 50 miles from the school at enrollment increased, graduation rates increased and withdrawal rates decreased.
- As the percentage of students with some postsecondary education increased, graduation rates increased and withdrawal rates decreased.
- As the proportion of part-time to full-time students increased, graduation and TRP rates decreased and withdrawal rates increased.
- As the dollars spent on new equipment and teaching aids increased as a percent of gross tuition revenue, graduation and TRP rates decreased.
- None of the variables had significant relationships with default rates.

Some of the relationships seems reasonable, and some seems counter-intuitive. We do not want to speculate on possible causes of any of them, however, until we have tested the variables with data from other school years.

Improving the Data

Annual reports take a picture of schools at one point in time–their status at the end of each school year. The Accrediting Commission has adopted new definitions of graduation that will be based on what happens to a group of students from the time of their enrollment until they graduate or permanently depart from a school. Tracing a defined group from initial entry will yield actual data on graduation and withdrawal rates. No matter how annual reports are analyzed they can at best yield only estimates of these rates. We would recommend that the Commission consider following up student for a period after they leave school. A follow-up would yield information on placement in training-related employment not just at graduation but following a period of labor market experience.

The biggest problem in the previous analysis of the 1987 to 1989 annual reports was incomplete data, unanswered questions that could either be a legitimate zero or a figure that should have been entered but was not. By re-contacting the schools on the 1990 and subsequent reports, much of this problem was dealt with for the present report.

To improve the quality of the analyses, we recommend that the annual report collect information on average starting wages of program completers. We recognize that this is a sensitive issue and the Commission may wish to test it on an optional basis to see if useful data can be collected. The bottom-line for evaluating technical training is whether it confer a labor market advantage. The best indicator of the value of training is the wage it commands in the labor market.

With regard to school characteristics, we think it would be very useful to develop some questions that tap involvement with employers. Active involvement, in our judgment, is the key to keeping instruction relevant and giving graduates an advantage in their job search. Question that might provide information on employer involvement include the use of advisory committees, the extent to which instructors visit employers, and the methods schools use to ensure instructors stay current with developments in their occupations.

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APPENDIX TABLES

APPENDIX TABLE 3.1

CORRELATION OF GRADUATION RATE WITH SCHOOL CHARACTERISTIC MEASURES FOR FULL-TIME ENROLLMENTS SCHOOL YEARS 1990, 1991, AND 1992

School Characteristics	Outcome Measure–Graduation Rate Product-Moment Correlation Coefficients 1990	1991	1992
Categorical			
Change in ownership	.00	.02	.03
School move	-.00	.03	.06
Actions pending	-.10**	.00	.10**
Judgments or settlements	-.07*	.01	.04
Complaints under review	-.09**	.02	.05
Program reviews or audits	-.07*	-.03	.06
Other accreditation	.03	-.00	.02
Linkage programs	.02	.02	.02
Articulation	-.02	-.05	-.04
Separate facilities	.01	.02	.05
Main campus	.08**	.10***	.07*
Schools with total enrollments			
300 or less	.16***	.21***	.22***
301 to 600	-.03	-.07*	-.04
601 to 900	-.06*	-.11***	-.11***
Continuous			
Total enrollment	-.20***	-.19***	-.22***
% Ability to benefit	-.08*	-.13***	-.08*
% GED	-.05	-.02	.00
% High school diploma	.03	-.02	-.07*
% Enrollment receiving			
Pell grants	-.28***	-.27***	-.31***
Stafford loans	-.07*	-.05	-.06
Supplemental loans	-.00	-.06	-.10**
Instructional staff, FTE	-.14***	-.06	-.16***
Key/instructional staff ratio	-.06	.05	.06
Faculty turnover, full-time	-.00	-.00	-.06
Faculty turnover, part-time	-.10*	-.10*	-.18***
Student/faculty ratio	-.02	-.07*	-.03

School Characteristics	Outcome Measure—Graduation Rate Product-Moment Correlation Coefficients 1990	1991	1992
Ratio full/part-time	.06	-.02	-.04
Average weeks of program	-.29***	-.27***	-.34***
Default rate	-.08*	-.16**	-.10*
Range of observations	606-1037	682-1060	655-987

*p. = <.05
**p. = <.01
***p. = <.001

APPENDIX TABLE 3.2

CORRELATION OF WITHDRAWAL RATE WITH SCHOOL CHARACTERISTIC MEASURES FOR FULL-TIME ENROLLMENTS SCHOOL YEARS 1990, 1991, 1992

School Characteristics	Outcome Measure–Withdrawal Rate Product-Moment Correlation Coefficients 1990	1991	1992
Categorical			
Change in ownership	.02	-.02	-.04
School move	.08*	-.02	-.04
Actions pending	.14***	-.06	-.08**
Judgments or settlements	.09**	-.05	-.04
Complaints under review	.05	-.06	-.07*
Program reviews or audits	.10**	-.05	-.06
Other accreditation	-.02	.01	-.01
Linkage programs	-.02	-.02	-.02
Articulation	-.02	.00	-.01
Separate facilities	-.02	-.02	-.04
Main campus	-.0[illegible]	-.07	-.04
Schools with total enrollments			
300 or less	-.21***	-.25***	-.27***
301 to 600	.07*	.10***	.06
601 to 900	.13***	.10***	.15***
Continuous			
Total enrollment	.22***	.22***	.25***
% Ability to benefit	.25***	.26***	.21***
% GED	.12***	.08***	-.01
% High school diploma	-.10**	-.12***	.01
% Enrollment receiving			
Pell grants	.27***	.26***	.35***
Stafford loans	-.07*	.11***	.07*
Supplemental loans	.01	.02	.03
Instructional staff, FTE	.11***	.06*	.13***
Key/instructional staff ratio	.06	-.01	-.02
Faculty turnover, full-time	.11***	.06*	.15***
Faculty turnover, part-time	.19***	.15***	.22***
Student/faculty ratio	.10**	.12***	.09**

School Characteristics	Outcome Measure–Withdrawal Rate Product-Moment Correlation Coefficients 1990	1991	1992
Ratio full/part-time	.04	.00	-.03
Average weeks of program	.12***	.13***	.14***
Default rate	.29***	.31***	.28***
Range of observations	606-1037	682-1060	655-987

*p. = <.05
**p. = <.01
***p. = <.001

APPENDIX TABLE 3.3

CORRELATION OF TRAINING-RELATED PLACEMENT RATE WITH SCHOOL CHARACTERISTIC MEASURES FOR FULL-TIME ENROLLMENTS SCHOOL YEARS 1990, 1991, 1992

School Characteristics	Outcome Measure--Placement Rate Product-Moment Correlation Coefficients 1990	1991	1992
Categorical			
Change in ownership	.02	.01	.01
School move	-.01	.06	-.02
Actions pending	-.02	.04	.04
Judgments or settlements	-.02	-.01	.01
Complaints under review	-.10**	.02	.05
Program reviews or audits	-.02	-.02	-.01
Other accreditation	.04	.05	.03
Linkage programs	-.02	-.02	-.07
Articulation	-.01	-.05	-.05
Separate facilities	-.05	.03	.01
Main campus	.12***	.09**	.06
Schools with total enrollments			
300 or less	.14***	.11***	.10**
301 to 600	-.01	-.05	-.04
601 to 900	-.10**	-.02	-.02
Continuous			
Total enrollment	-.13***	-.12***	-.12***
% Ability to benefit	-.03	-.01	-.02
% GED	-.03	-.03	-.04
% High school diploma	.09**	.01	.03
% Enrollment receiving			
Pell grants	.01	.05	.02
Stafford loans	.05	.07*	.01
Supplemental loans	-.04	-.04	-.03
Instructional staff, FTE	-.14***	-.10**	-.13***
Key/instructional staff ratio	-.04	.05	-.03
Faculty turnover, full-time	-.08**	-.04	-.01
Faculty turnover, part-time	-.07	-.02	-.09**
Student/faculty ratio	-.03	.01	-.04

School Characteristics	Outcome Measure--Placement Rate Product-Moment Correlation Coefficients 1990	1991	1992
Ratio full/part-time	.00	-.09*	-.04
Average weeks of program	.06	-.03	-.12
Default rate	-.06	.02	.01
Range of observations	606-1037	682-1060	655-987

*p. = <.05
**p. = <.01
***p. = <.001

APPENDIX TABLE 3.4

CORRELATION OF DEFAULT RATE WITH SCHOOL CHARACTERISTIC MEASURES FOR FULL-TIME ENROLLMENTS SCHOOL YEARS 1990, 1991, 1992

School Characteristics	Outcome Measure–Default Rate Product-Moment Correlation Coefficients 1990	1991	1992
Categorical			
Change in ownership	-.13***	-.09**	-.02
School move	-.00	-.01	-.15
Actions pending	.02	-.02	.05
Judgments or settlements	.04	-.01	.03
Complaints under review	-.01	-.02	.01
Program reviews or audits	.04	-.12***	.13***
Other accreditation	-.04	.02	.02
Linkage programs	-.07*	-.10***	-.10**
Articulation	-.08*	-.09**	-.19***
Separate facilities	.03	.01	-.06
Main campus	-.14***	-.08**	-.05
Schools with total enrollments			
300 or less	-.11***	-.14***	-.05
301 to 600	.06	.07*	.03
601 to 900	.05	.05	.07
Continuous			
Total enrollment	.08*	.09**	-.19***
% Ability to benefit	.51***	.41***	.51***
% GED	.14***	.11***	.04
% High school diploma	-.29***	-.20***	-.19***
% Enrollment receiving			
Pell grants	.11***	.20***	.20***
Stafford loans	.18***	.19***	-.08*
Supplemental loans	.05	-.05	-.27***
Instructional staff, FTE	-.02	-.05	-.18***
Key/instructional staff ratio	-.05	-.04	.02
Faculty turnover, full-time	.26***	.12***	.21***
Faculty turnover, part-time	.15***	.07	.09**
Student/faculty ratio	.18***	.09**	.10**

School Characteristics	Outcome Measure–Default Rate Product-Moment Correlation Coefficients 1990	1991	1992
Ratio full/part-time	-.04	-.06	-.09**
Average weeks of program	-.20***	-.07*	-.30***
Default rate	1.00	1.00	1.00
Range of observations	606 1079	682 1057	655 987

*p. = <.05
**p. = <.01
***p. = <.001

APPENDIX TABLE 3.5
MULTIPLE REGRESSION ANALYSES OF GRADUATION RATE FOR FULL-TIME ENROLLMENTS SCHOOL YEARS 1990, 1991, AND 1992

School Characteristics	1990	1991	1992
		Partial Regression Coefficients	
Categorical			
Change in ownership	-2.83	1.58	2.20
School move	-1.05	1.08	2.76
Actions pending	-2.69	-3.25	1.89
Judgments or settlements	.76	.06	-.73
Complaints under review	-7.95**	-.75	.51
Program reviews or audits	-7.02	-2.64*	.44
Other accreditation	4.60**	3.77*	3.14*
Linkage programs	.31	.36	.52
Articulation	.17	-2.73	.03
Separate facilities	3.27*	2.61	3.29*
Main campus	4.25**	3.95**	4.68*
Enrollments of			
300 or less	11.43***	10.17***	13.03***
301 to 600	5.61*	5.71*	8.82***
601 to 900	4.26	1.90	4.80*
Continuous			
% Ability to benefit	-.06	-.08	-.31**
% GED	-.06	.03	.06
% High school diploma	-.04	-.06	-.07*
% Enrollment receiving			
Pell grants	-.14***	-.17***	-.19***
Stafford loans	.03	.08***	.08***
Supplemental loans	-.01	-.08**	-.08**
Ability to benefit squared (times 100)	.03	-.11	.28
ATB times Pell (times 100)	-.19*	.05	.10
Instructional staff, FTE	-.04	.11**	.03
Faculty turnover, full-time	-.01	-.02	-.01
part-time	-.01	-.05*	-.08***
Student/faculty ratio	-.01	-.01	.01
Ratio full/part-time staff	.10	.01	.17
Average weeks of program	-.26***	-.18***	-.24***
Default rate[a]	-.05	-0.10 *	-.09
Intercept	57.02***	70.43***	67.1***
Multiple R^2	.25***	.22***	.31***
Adjusted R^2	.23***	.19***	.29***
Observations	1017	1054	986

*p. <.05, **p. = <.01, ***p. <.001

[a]Default rate used as an independent variable in regressions for graduation, withdrawal, and training-related placement rates. Withdrawal rate used as independent variable in regression for default.

APPENDIX TABLE 3.6
MULTIPLE REGRESSION ANALYSES OF WITHDRAWAL RATE FOR FULL-TIME ENROLLMENTS SCHOOL YEARS 1990, 1991, AND 1992

School Characteristics	1990	1991	1992
		Partial Regression Coefficients	
Categorical			
Change in ownership	2.73*	-.29	-1.38
School move	2.10*	-.12	.41
Actions pending	2.81*	.17	-.00
Judgments or settlements	1.52	-1.03	.54
Complaints under review	1.04	-1.02	-1.19
Program reviews or audits	1.91**	.18	-.66
Other accreditation	-1.16	-1.97*	-1.68*
Linkage programs	-.01	.37	-.85
Articulation	-.54	1.21	.05
Separate facilities	-1.91*	-1.61*	-1.93*
Main campus	-.64	-1.00	-.63
Enrollments of			
300 or less	-4.43**	-6.07***	-8.31***
301 to 600	-1.23	-2.99*	-5.27***
601 to 900	.35	-1.72	-2.19
Continuous			
% Ability to benefit	.17**	.17**	.25***
% GED	.08*	.03	-.01
% High school diploma	.02	-.00	.03*
% Enrollment receiving			
Pell grants	.06***	.08***	.11***
Stafford loans	-.03	-.02	-.03**
Supplemental loans	.00	.01	.03
Ability to benefit squared (times 100)	-.19**	.05	.26**
ATB times Pell (times 100)	.10*	.07	
Instructional staff, FTE	.00	-.05*	-.02
Faculty turnover, full-time	.02**	.03*	.04*
part-time	.01*	.04***	.05***
Student/faculty ratio	.02	.01	-.00
Ratio full/part-time staff	.06	-.05	-.10
Average weeks of program	.11***	.08***	.06***
Default rate[a]	.12***	.10***	.09***
Intercept	22.01***	18.71***	16.09***
Multiple R^2	.27***	.27***	.31***
Adjusted R^2	.25***	.24***	.29***
Observations	1017	1057	996

*p. <.05, **p. = <.01, ***p. <.001

[a]Default rate used as an independent variable in regressions for graduation, withdrawal, and training-related placement rates. Withdrawal rate used as independent variable in regression for default.

APPENDIX TABLE 3.7
MULTIPLE REGRESSION ANALYSES OF TRAINING RELATED PLACEMENT RATE FOR FULL-TIME ENROLLMENTS SCHOOL YEARS 1990, 1991, AND 1992

School Characteristics	1990	1991	1992
		Partial Regression Coefficients	
Categorical			
Change in ownership	1.34	.69	1.40
School move	-1.18	3.98	-1.27
Actions pending	-7.57***	.51	1.21
Judgments or settlements	2.91	-.31	-2.01
Complaints under review	-6.31*	1.06	3.12
Program reviews or audits	-.19	-.70	-1.86
Other accreditation	3.96*	2.97	3.68*
Linkage programs	.88	-1.00	-3.11*
Articulation	-1.09	-1.99	-.19
Separate facilities	-.71	1.71	1.56
Main campus	5.90***	3.89**	2.79
Enrollments of			
300 or less	5.12	4.83*	-.45
301 to 600	3.80	1.70	-1.43
601 to 900	4.36	7.49	.48
Continuous			
% Ability to benefit	.16	.10	-.03
% GED	.01	-.05	.01
% High school diploma	.02	-.01	0.3
% Enrollment receiving			
Pell grants	-.03	.01	-.01
Stafford loans	.05*	.06**	.03
Supplemental loans	-.04	-.04	-.01
Ability to benefit squared (times 100)	.18	.24	-.24
ATB times Pell (times 100)	.06	.01	.22*
Instructional staff, FTE	-.12	-.01	-.15**
Faculty turnover, full-time	.01	-.02	.01
part-time	.00	-.02	-.06*
Student/faculty ratio	.00	.02	-.02
Ratio full/part-time staff	.18	-.21	-.03
Average weeks of program	.05	-.01	-.08**
Default rate[a]	-.04	.01	-.05
Intercept	55.38***	62.09***	76.81***
Multiple R^2	.09***	.06***	.07***
Adjusted R^2	.06***	.03***	.04***
Observations	1017	1054	986

*p. <.05, **p. = <.01, ***p. <.001

[a]Default rate used as an independent variable in regressions for graduation, withdrawal, and training-related placement rates. Withdrawal rate used as independent variable in regression for default.

APPENDIX TABLE 3.8
MULTIPLE REGRESSION ANALYSES OF DEFAULT RATE FOR FULL-TIME ENROLLMENTS SCHOOL YEARS 1990, 1991, AND 1992

School Characteristics	1990	1991	1992
		Partial Regression Coefficients	
Categorical			
Change in ownership	-3.48*	-8.34**	2.45
School move	.27	.97	-3.61**
Actions pending	-.99	-.00	1.29
Judgments or settlements	.37	1.11	.93
Complaints under review	1.78	.48	-1.89
Program reviews or audits	.44	-2.77**	1.44
Other accreditation	-.79	1.07	1.58
Linkage programs	-1.38	-2.60**	-1.56*
Articulation	.94	.26	-1.32
Separate facilities	.19	-.18	-2.05*
Main campus	-1.29	-.96	.19
Enrollments of			
300 or less	-1.65	-4.85*	-2.94
301 to 600	-1.78	-2.55	-.60
601 to 900	-1.91	-1.42	.51
Continuous			
% Ability to benefit	.49***	.74***	.56***
% GED	.12**	.12*	.00
% High school diploma	-.01	-.00	-.03
% Enrollment receiving			
Pell grants	-.00	.02	.05**
Stafford loans	-.04	.10***	.00
Supplemental loans	.03	-.06*	-.07***
Ability to benefit squared (times 100)	-.32***	-.65***	-.56***
ATB times Pell (times 100)	.00	.11	.01
Instructional staff, FTE	-.05	-.05	-.10**
Faculty turnover, full-time	.01	-.00	.08***
part-time	.00	.03	.01
Student/faculty ratio	.02	.00	-.01
Ratio full/part-time staff	-.15	-.17	-.12
Average weeks of program	-.12***	-.04***	-.07***
Withdrawal rate[a]	.17***	.24***	.13***
Intercept	15.52***	17.89**	25.58***
Multiple R^2	.35***	.32***	.41***
Adjusted R^2	.33***	.30***	.39***
Observations	1017	1057	966

*p. <.05, **p. = <.01, ***p. <.001

[a]Default rate used as an independent variable in regressions for graduation, withdrawal, and training-related placement rates. Withdrawal rate used as independent variable in regression for default.

APPENDIX LETTERS

LETTER FROM DR. KEVIN HOLLENBECK

LETTER FROM DR. N.L. MCCASLIN

Memorandum

W. E. Upjohn Institute for Employment Research

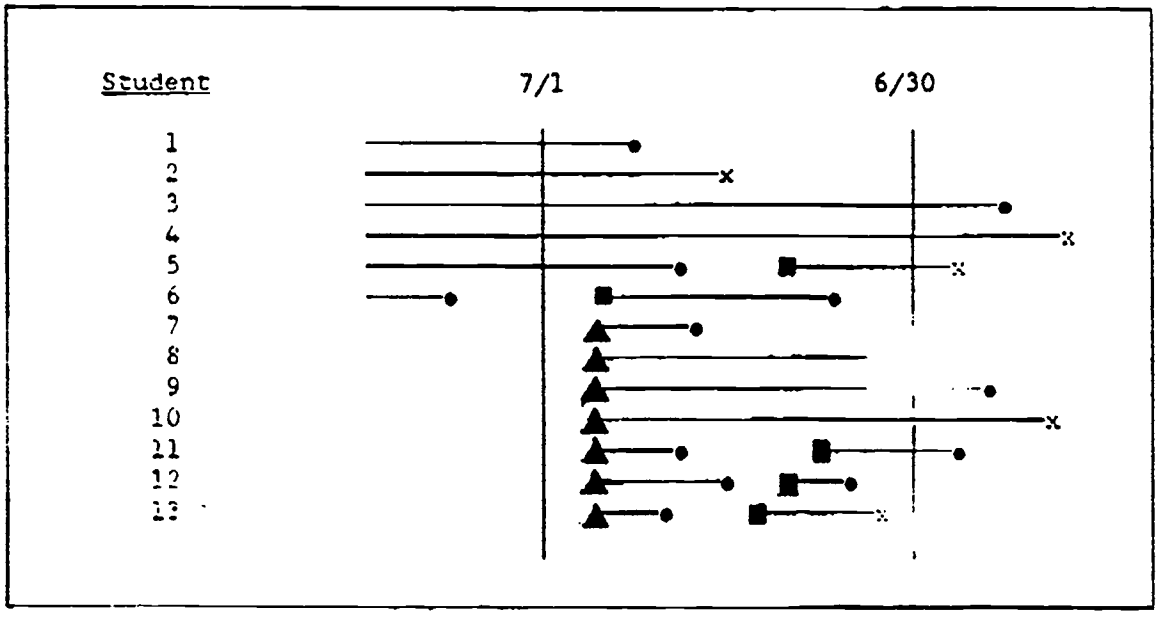
DATE: March 29, 1991

TO: Morgan Lewis

FROM: Kevin Hollenbeck

SUBJECT: Graduation Rates

First of all, I drew a picture in which I tried to exhaust the cases.



● withdrawal
■ re-entry
x graduation
▲ new enrollment

Student 1 entered prior to year and withdrew during the year.
Student 2 entered prior and graduated during the year.
Student 3 entered prior and withdrew after the year.
Student 4 entered prior and graduated after.
Student 5 entered prior, withdrew during the year, re-entered during the year, and graduated after.
Student 6 entered and withdrew prior, re-entered during the year and withdrew during the year.

Student 7 was new enrollee and withdrew during the year.
Student 8 was new enrollee and graduated during the year.
Student 9 was new enrollee and withdrew after the year.
Student 10 was new enrollee and graduated after the year.
Student 11 was new enrollee, withdrew, and re-entered during the year and withdrew later.
Student 12 was new enrollee, withdrew, re-entered and withdrew again during the year.
Student 13 was new enrollee, withdrew, re-entered, and graduated during the year.

I realize that these cases don't exhaust the possibilities but they are a wide variety and are interesting for the purpose of answering your questions. I also realize that I'm not sure what a continuing student is, but I assume it is a student who is enrolled on 6/30. With this definition, the school would report the following statistics for the year:

New enrollment	7
Re-entry	5
Withdrawal	8
Graduation	3
Continuing students	6

This means that in the given year, 3 of the 13 students ever enrolled, graduated in that year. Call this graduation rate 1. From a longitudinal perspective, 6 out of the 13 students ever enrolled, graduated. Call this graduation rate 2. From a cohort perspective, 3 out of the 7 new enrollees during the year ever graduated. Call this graduation rate 3. If you ignore continuing students (because you don't know if they will graduate or not), 3 graduated out of 7 students that left the institution during the year. Call this graduation rate 4. So,

Graduation rate 1	3/13
Graduation rate 2	6/13
Graduation rate 3	3/7
Graduation rate 4	3/7

Your first definition corresponds to Graduation rate 1. I didn't exactly understand your second definition, because I wasn't sure where "proportion graduating" comes from. Assuming that my graduation rate 3 is your proportion graduating, then your second definition yields a rate of (3 + 6 * 3/7)/13, which is approximately 5.6/13. Your third definition is very similar to graduation rate 3, except that if you use aggregate numbers, you'll get 3/8 instead of 3/7 because student 12 withdrew twice and got counted as 2 withdrawals.

The "true" graduation rate is what I've called graduation rate 2. But, of course, you can't measure that at the end of the year. Your second definition gets closest to the answer, but I'm not sure whether or not that is because of the particular cases that I dreamed up. The second definition seems to be too complicated. Therefore, your third definition seems to be the best.

I hope this helps.

THE OHIO STATE UNIVERSITY

Department of Agricultural Education

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Columbus, OH 43210-1099

Phone 614-292-6321
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April 5, 1991

Dr. Morgan Lewis
Center on Education and Training for Employment
1900 Kenny Road
Columbus, Ohio 43210-1090

Dear Dr. Lewis:

I have reviewed the information that you sent me regarding how to define graduation rates for students in NATTS' schools. As you have stated, this is not an easy task. I hope, at some time, information of this type will be collected by a third party in a national longitudinal study. As long as these figures are computed based on statistics provided by NATTS, individuals will view these findings with doubt and suspicion.

I believe that it is misleading to aggregate these different program arrangements into one graduation rate. It is important to examine the graduation rates separately for the various types of programs that NATTS schools offer (e.g., certificate and diploma). It also would be beneficial to consider the graduation rates by the length of program (e.g., hours, weeks). Also, it would be interesting to compare the graduation rates of students by type of support (e.g., Pell Grants, JTPA, personal funds)--particularly since postsecondary schools have been criticized for having such high dropout rates for students receiving federal funds.

It is inappropriate, in my opinion, to calculate graduation rates for programs where students cannot graduate in the year being reported. If a program requires two years to complete, the graduation rates for that program should not be computed until the two years have elapsed.

I believe that the third formula is the most appropriate if it is done separately for each type of program. As mentioned above, a graduation rate should not be computed for a program that students have not had time to complete.

Finally, computing and reporting the graduation rates using each of the three definitions would be an interesting exercise by itself. Empirical evidence could then be provided on the

degree to which the graduation rates for these three definitions differ. It also would be interesting to compare the graduation rates of NATTS schools with of other types of institutions (e.g., community colleges, technical institutes, 4-year colleges and universities).

You are to be commended for your thoughtful work on this problem. Please let me know if I can provide additional information.

Sincerely,

N. L. McCaslin

N. L. McCaslin
Associate Professor

NLM/jef