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ABSTRACT

Using data from the High School Transcript Study of the Class of 1987--more commonly known as the NAEP (National Assessment of Educational Progress) Transcript Study--a project explored the characteristics distinguishing schools that enroll large proportions of their handicapped students in vocational education. The study found that schools serving disadvantaged populations and schools with relatively large enrollments enrolled fewer handicapped students in vocational education overall and fewer handicapped students in mainstream vocational education courses. These schools also provided fewer vocational education offerings to nonhandicapped students, although the trend was more pronounced with handicapped students. Some of the explanations for these findings are that small schools are friendlier and more accepting of disabled students, that the climate of small schools fosters a sense of community that carries over to their treatment of handicapped students, and that larger, older schools have more traditional programs and are more reluctant to incorporate handicapped students into the regular vocational curriculum. In addition, schools with large percentages of disadvantaged students may have fewer financial resources and/or may use their resources to serve the disadvantaged population and not handicapped students. (KC)

PARTICIPATION OF SPECIAL EDUCATION STUDENTS IN HIGH SCHOOL VOCATIONAL EDUCATION: THE INFLUENCE OF SCHOOL CHARACTERISTICS

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INTRODUCTION

In the past decade, policymakers have become increasingly concerned about the participation of handicapped students in vocational education programs. Through its passage of the Carl D. Perkins Vocational Education Act, Congress has encouraged vocational educators to adapt their courses to meet the needs of students with disabilities. Reflecting these concerns, many vocational researchers have focused their efforts on students with disabilities and the issues surrounding their access to quality vocational programs. Much of this research has concentrated on describing the characteristics of high-quality vocational programs for students with disabilities (Phelps, 1980).

Until recently, reliable data has not been available to examine the actual rate of participation of handicapped students in vocational programs. That is, since 1983 when the U.S. Department of Education's Vocational Education Data System (VEDS) was discontinued, there has been no national data collected regarding the placement of students with disabilities in vocational education (for a discussion of the problems associated with earlier vocational data collection efforts, see Benson, Hoachlander, & Johnson, 1980). Thus, while it was possible from the extant research literature to describe exemplary programs and practices for disabled students, it was not possible to reliably measure the actual participation of handicapped students in vocational programs. However, with the recent completion of the High School Transcript Study of the Class of 1987 (more commonly known as the NAEP Transcript Study), nationally representative data has now become available to describe the participation of handicapped students in vocational education.

Analyses presented by the National Assessment of Vocational Education (NAVE) (1989) have used this data to describe the characteristics of disabled students participating in vocational education. In their final report to Congress, NAVE reported that handicapped students had received essentially the same access to vocational education as other students. The report also indicated that the extent to which students were admitted to mainstream vocational courses varied somewhat by handicapping condition, as well as by severity of cognitive limitation; and the number of vocational credits they earned varied with demographic and other student characteristics (NAVE, p. 25).

However, while the NAVE report described the individual characteristics of handicapped students in vocational programs, little was done to describe the characteristics

of the schools that enrolled the handicapped students. That is the purpose of this paper. Using data from the NAEP Transcript Study, we will explore the characteristics which distinguish schools that enroll large proportions of their handicapped students in vocational education courses.

The school characteristics we chose to examine describe the ecological and sociological environment of the school (Anderson, 1982). The ecological perspective on school climate emphasizes the temporal and physical aspects of the school environment, while the sociological perspective views the school as a cultural system of social relationships among teachers, students, and peers.[1]

First, we will briefly describe the data source used for this analysis, and then will follow with a descriptive section presenting the major tabular results. Next, we will provide a multivariate section in which we will more thoroughly explore the relative effect of school characteristics on the enrollment of handicapped students in vocational education. Finally, we will conclude our analysis with a brief summary and discussion section. At the end of this paper we will include a technical appendix that contains a detailed description of the NAEP Transcript Study data sets and the statistical methodology used in this paper.

DATA SOURCE

The NAEP transcript study collected high school transcripts for a nationally representative sample of high school students. Students were selected by using a complex multistage sample involving students from selected schools within ninety-four geographic regions nationwide. Transcripts for 6,064 mildly to severely handicapped youth were included in this survey. Courses on the transcript file were coded to identify which of the handicapped student's classes were taken in mainstream educational settings. Information was also collected on general student characteristics, special education student characteristics (including type and severity of handicapping condition), and characteristics of students' schools. (School characteristics are limited, however, to simple descriptors of

[1]Proponents of the ecological perspective include Barker, 1974; Moos, 1979; and Eggleston, 1977. Proponents of the sociological perspective include Brookover, Flood, Schweitzer, and Wisenbaker, 1979; and Rutter, 1979.

the school enrollment, number of teachers, and number of special education teachers, and do not include much programmatic information.)[2]

Using the course codes on the transcript file, all vocational courses were classified according to the Secondary School Transcript Course Taxonomy (SST), developed by MPR Associates for use with the High School and Beyond 1980 Sophomore Cohort Transcript file. At the most general level, the SST divides the vocational curriculum into three levels of vocational preparation types: (1) consumer and homemaking, (2) general labor market preparation, and (3) specific labor market preparation (see Hoachlander, Brown, & Tuma, 1987).

Descriptive Results

Average Number of Secondary Vocational Credits Earned

Table 1 displays the average number of secondary vocational education credits earned by handicapped and nonhandicapped students and the percentage of handicapped students with various amounts of credits in vocational education. These estimates are broken out by several school-level variables: First, variables reflecting the ecological perspective include school urbanicity and school size. Second, variables reflecting the sociological perspective include an index of the extent to which the school serves disadvantaged students, the percentage of the school that is enrolled in vocational education, the estimated student/teacher ratio of the entire school, and the relative size of the special education population within the school.[3]

Table 1 shows that in high schools with an enrollment of less than one thousand students, the nonhandicapped students earned on average 4.69 vocational credits, while handicapped students in similar schools earned on average 4.74 credits. Twenty-four percent of the handicapped students in small schools earned less than two credits in vocational education, 45.8% earned two to six credits, while 30.1% earned more than six credits in vocational education.

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[2]It is theoretically possible to merge the NAEP Transcript Study with data for the full NAEP assessment, thus taking advantage of the richer school-level data available in the full assessment. However, the variables needed for matching the two files are not available at this time. For further details on the NAEP Transcript Study and how it was used in this study, please see the Technical Appendix.
[3]The details of the construction of these variables are provided in the Technical Appendix.

In general, handicapped students earned slightly more vocational credits in high school than did nonhandicapped students—4.57 to 4.42 credits. Furthermore, the amount of credits earned by handicapped students varied according to some of the characteristics of their schools. This variation, however, paralleled the variation among nonhandicapped students within different types of schools. For example, handicapped students in smaller schools, in schools serving relatively advantaged populations, and in schools with smaller student/teacher ratios earned more credits in vocational education on average than did handicapped students in other types of schools. Similarly, nonhandicapped students in schools with these characteristics followed these patterns

However, while the course-taking patterns were comparable for handicapped and nonhandicapped students, the patterns were generally much more pronounced for handicapped students. For example, nonhandicapped students in schools serving relatively disadvantaged populations earned about one-fifth of a credit less than did nonhandicapped students from schools serving relatively advantaged populations. On the other hand, handicapped students from disadvantaged schools earned more than one full credit less than their peers in more advantaged schools. Additionally, more than thirty percent of handicapped students in disadvantaged schools earned less than two credits in vocational education, compared with less than eighteen percent of handicapped students from advantaged schools.

Figure 1 graphically highlights some of the findings in Table 1 by displaying the average number of high school vocational credits earned by handicapped students broken out by the school's urbanicity, size of enrollment, and proportion of disadvantaged students. Handicapped students in big city schools, in schools with large enrollments, and in schools serving a high proportion of disadvantaged students earned fewer vocational credits than students in other types of schools.

Percentage of Secondary Courses in Specific Labor Market Preparation

In describing the high school vocational education experiences of students, it is important not only to look at the total amount of exposure to the vocational curriculum, but also to examine the types of courses that students took. Table 2 displays the average proportion of high school vocational credits earned in Specific Labor Market Preparation (SLMP) courses by handicapped students and nonhandicapped students, as well as the

Table 1—Average number of high school vocational credits earned by handicapped and nonhandicapped students.

	Average number of voc. credits nonhandicapped	Average number of voc. credits handicapped	Percentage of handicapped students with < 2 voc. credits	2-6 voc. credits	> 6 voc. credits
Total	4.42	4.57	26.5	45.6	27.9
Urbanicity					
Big city	3.86	4.07	33.9	43.0	23.2
Medium city	3.81	4.25	29.1	49.1	21.8
Urban fringe	3.80	4.64	24.6	48.7	26.6
Small place	4.90	4.87	23.3	43.8	32.9
School size					
Smaller than 1000 students	4.69	4.74	24.2	45.8	30.1
Between 1000 and 2000 students	4.03	4.53	27.1	45.5	27.4
Over 2000 students	3.36	3.92	34.7	45.4	19.9
Disadvantaged					
High proportion of students	4.28	4.24	30.5	45.6	23.9
Medium proportion of students	4.50	4.56	26.3	45.5	28.2
Low proportion of students	4.46	5.35	17.6	45.9	36.5
Percentage of students in voc. ed.					
Less than 10%	4.15	4.40	28.7	45.9	25.5
Between 10% and 25%	4.66	4.70	25.8	45.6	28.7
Greater than 25%	4.65	4.71	23.3	45.2	31.4
Student/teacher ratio					
Less than 16 to 1	4.71	4.95	21.4	44.9	33.7
Between 16 and 23 to 1	4.15	4.44	29.0	45.4	25.6
Greater than 23 to 1	4.16	4.04	31.3	48.1	20.6
Size of special ed. population					
Less than 4% of all students	4.56	4.59	25.6	47.8	26.6
Between 4% and 10%	4.18	4.43	28.4	44.3	27.4
Greater than 10%	4.59	4.90	23.4	43.6	33.0

Figure 1—Average number of secondary vocational credits earned by handicapped students by selected school characteristics.

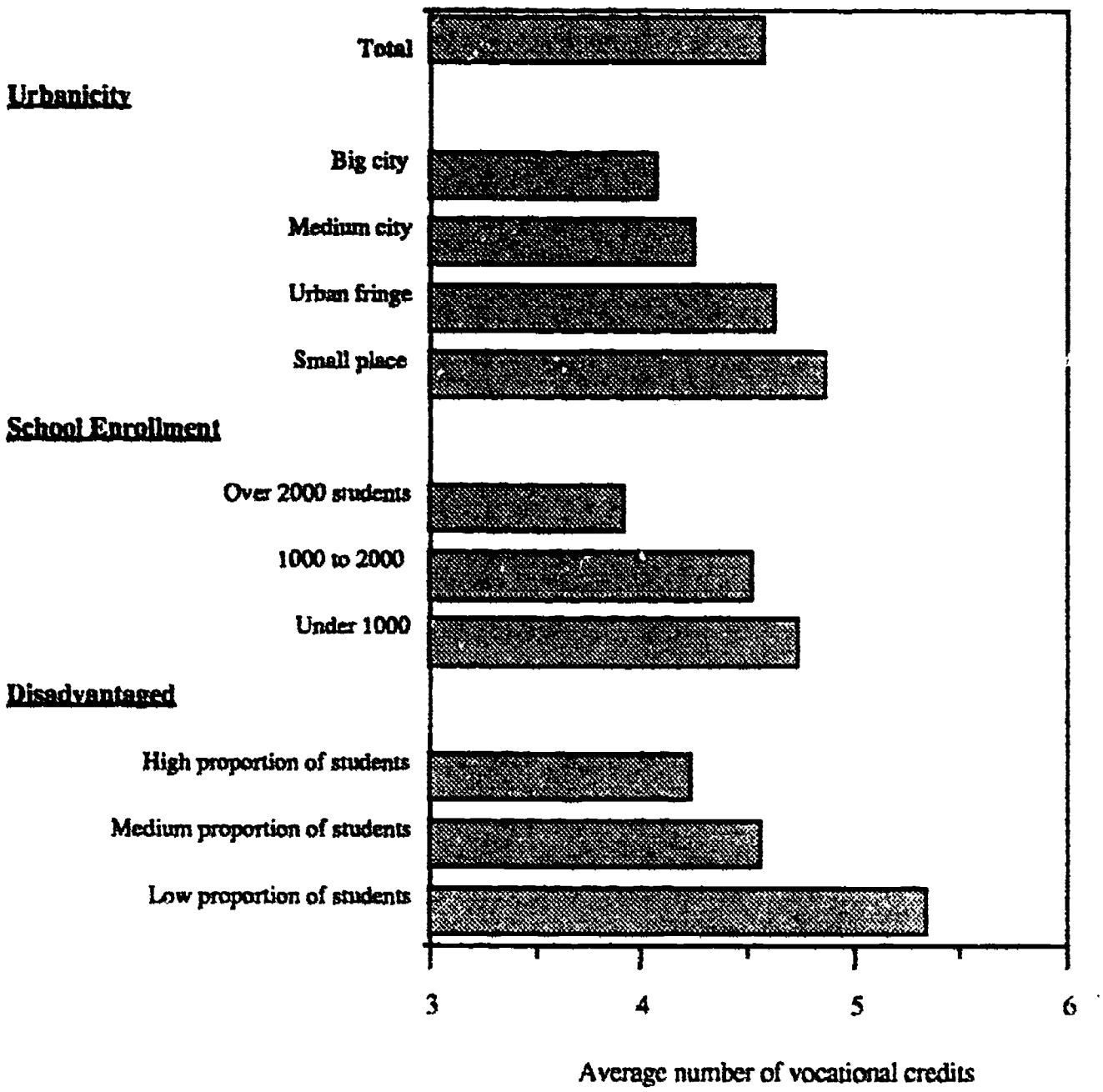

Table 2—Proportion of vocational credits earned in specific labor market preparation courses by handicapped students.

	Proportion SLMP credits nonhandi-capped	Proportion SLMP credits handi-capped	Percentage of handicapped students with < 25% SLMP credits	25%-90% SLMP credits	over 90% SLMP credits
Total	60	56	29.2	47.5	72.6
Urbanicity					
Big city	60	54	34.3	42.1	65.2
Medium city	59	48	37.2	45.6	66.1
Urban fringe	61	62	20.7	53.5	78.9
Small place	59	58	27.8	47.7	75.2
School size					
Smaller than 1000 students	59	56	29.6	48.5	73.6
Between 1000 and 2000 students	61	57	27.7	47.2	73.2
Over 2000 students	60	55	33.5	43.8	65.5
Disadvantaged					
High proportion of students	61	55	31.7	45.2	68.4
Medium proportion of students	58	58	29.8	45.8	73.5
Low proportion of students	60	58	22.0	57.1	79.9
Percentage of students in voc. ed.					
Less than 10%	60	55	30.6	46.4	70.6
Between 10% and 25%	59	59	25.4	50.3	75.5
Greater than 25%	60	55	31.5	46.0	72.4
Student/teacher ratio					
Less than 16 to 1	60	56	27.5	51.6	76.0
Between 16 and 23 to 1	60	56	30.8	43.8	70.9
Greater than 23 to 1	59	57	28.9	48.3	69.1
Size of special ed. population					
Less than 4% of all students	61	58	26.8	49.9	73.4
Between 4% and 10%	59	56	31.0	44.6	71.4
Greater than 10%	58	53	31.9	49.2	73.0

percent of handicapped students with various amounts of SLMP courses. Specific labor market preparation courses are defined as vocational courses that prepare students for a specific occupation or occupational area. While the proportion of a student's total vocational credits earned in SLMP courses does not necessarily indicate the quality of the student's vocational training, it does indicate how much of the student's vocational training has been directed toward eventual paid employment.

The percentage of vocational courses earned in SLMP by handicapped students was comparable to the percentage of SLMP earned by nonhandicapped students—fifty-six to sixty percent. Furthermore, the percentage of vocational coursework taken in SLMP did not vary substantially among different types of schools. This is further illustrated by Figure 2 in which the proportion of high school vocational credits earned by handicapped students is broken down by the school's urbanicity, size of enrollment, and proportion of disadvantaged students. While there are some differences among students attending these various types of schools, generally this variation is insignificant.

The exception was among schools in urban versus suburban or rural settings in which the variation in the amount of vocational credits earned by handicapped students in SLMP coursework was somewhat greater. More than one in three handicapped students in big or medium sized cities took less than twenty-five percent of their vocational coursework in SLMP, compared with only about one in five handicapped students in suburban or rural settings (Table 2).

Percentage of Secondary Vocational Courses Taken in Mainstream Settings

The Perkins Act requires that handicapped students be placed in the "least restrictive environment." Generally, the least restrictive environment implies that students receive vocational education in mainstreamed environments. As mentioned previously, the course codes on the NAEP Transcript Study identify which courses were taken by handicapped students in mainstream settings. Table 3 displays the average proportion of vocational credits earned by handicapped students in mainstream settings and the percentage of students taking various amounts of mainstream vocational courses.

Approximately eighty percent of all vocational coursework taken by handicapped students was in mainstream classrooms with more than three out of four handicapped students taking more than fifty percent of their vocational coursework in mainstream

settings.[4] However, handicapped students in big or medium sized cities, in large schools, and in schools serving disadvantaged populations took a substantially smaller proportion of their vocational coursework in mainstream classrooms than students in other schools.

Almost fourteen percent of handicapped students in big city schools were not mainstreamed in any of their vocational coursework, while more than sixteen percent of handicapped students attending schools with enrollments of greater than two thousand students took none of their vocational coursework in mainstream settings (Table 3).

Variation by Type of Handicap

The term "Special Education" refers to the teaching of students with a wide variety of general and specific cognitive, physical, and psychosocial conditions. Table 4 shows the average number of high school vocational credits earned by handicapped students with different handicapping conditions—mentally retarded (MR), physically handicapped, seriously emotionally disturbed (SED), learning disabled (LDG), and other handicapped.

SED students earned the fewest number of vocational credits of all handicapped students—less than four credits on average. Furthermore, SED students in large schools serving more than two thousand students earned less than three vocational credits overall. This generally reflected the overall trend among handicapped students shown in Table 1 in which handicapped students in large schools earned about three-fourths of a credit less than handicapped students in small schools. However, the trend was reversed for physically handicapped students. Physically handicapped students in large schools earned almost one full credit more than physically handicapped students in small schools.

Table 5 displays the proportion of high school vocational courses taken in SLMP (Specific Labor Market Preparation) by students with different handicapping conditions. Mentally retarded students earned fewer of their vocational credits in SLMP on average than did other handicapped students. This was due to the fact that mentally retarded students in large schools earned only about one-third of their vocational credits in SLMP, compared with mentally retarded students in small schools who earned more than fifty percent of their credits in SLMP. None of the other school characteristics seemed to have had a relationship to the proportion of SLMP credits taken by students within the other handicap groups.

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[4]Although VEDS had serious reliability problems, these estimates compare with the 1983 VEDS estimate of seventy-three percent of handicapped students in mainstream vocational programs.

Figure 2—Proportion of secondary vocational credits earned in specific labor market preparation by selected school characteristics.

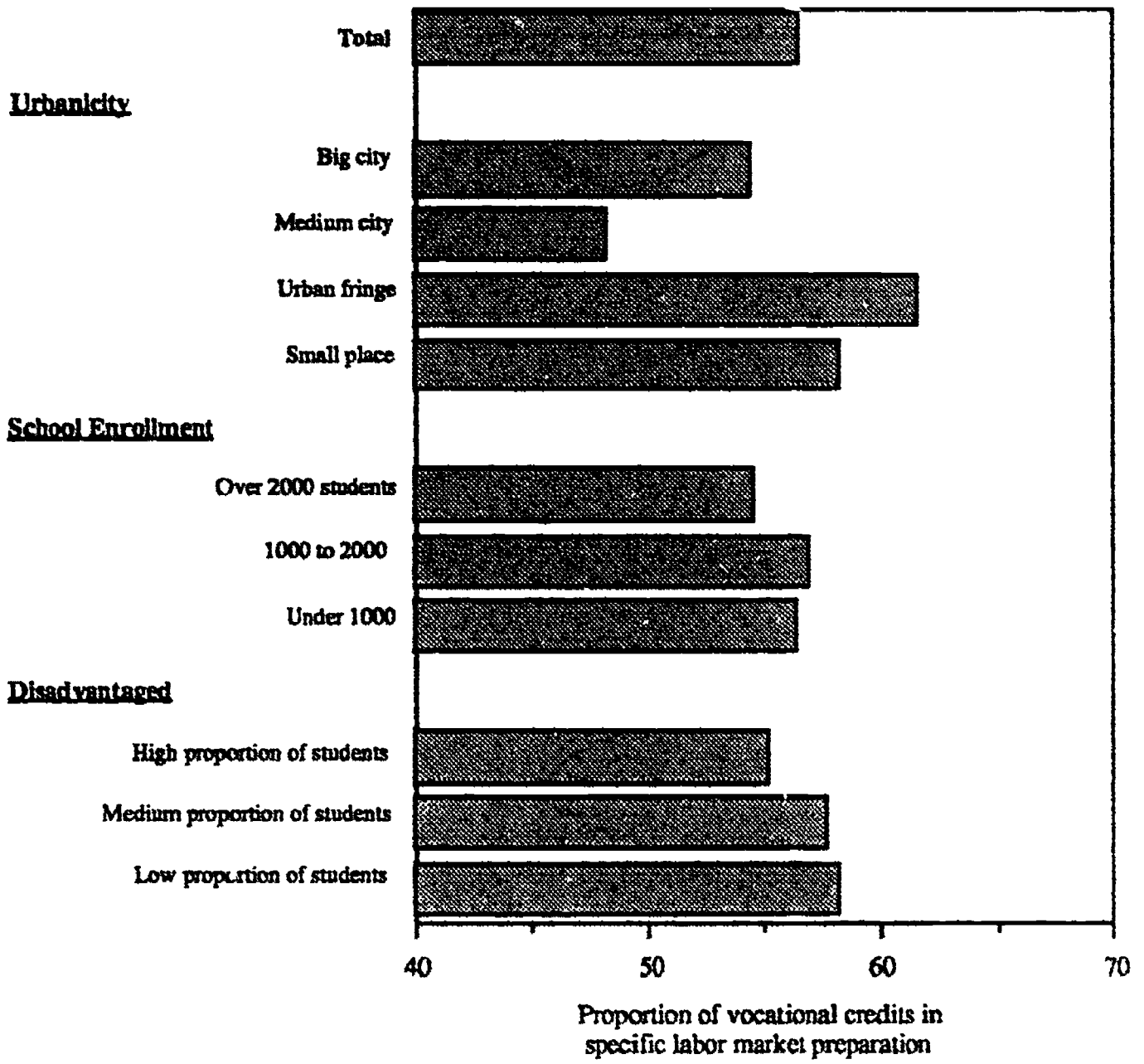

Table 3—Proportion of vocational courses taken by handicapped students in mainstream settings.

	Percent of voc. ed. credits in mainstream	Percent of all handicapped students with various amounts of mainstream credits		
		None	< 50%	> 50%
Total	80.0	6.5	12.8	75.1
Urbanicity				
Big city	65.7	13.8	18.6	59.1
Medium city	76.3	8.9	14.6	71.0
Urban fringe	85.2	2.3	11.6	82.8
Small place	84.4	4.7	10.3	79.5
School size				
Smaller than 1000 students	84.6	5.2	9.2	79.6
Between 1000 and 2000 students	78.7	5.6	15.2	74.8
Over 2000 students	62.8	16.3	20.1	55.2
Disadvantaged				
High proportion of students	69.8	11.5	17.5	63.8
Medium proportion of students	86.2	3.0	10.0	81.6
Low proportion of students	86.3	4.3	8.9	84.3
Percentage of students in voc. ed.				
Less than 10%	79.6	7.9	11.8	74.1
Between 10% and 25%	79.6	6.1	14.0	75.1
Greater than 25%	81.1	4.7	12.9	77.0
Student/teacher ratio				
Less than 16 to 1	84.3	5.0	9.9	80.1
Between 16 and 23 to 1	78.1	7.1	13.9	73.0
Greater than 23 to 1	74.8	8.5	16.2	69.4
Size of special ed. population				
Less than 4% of all students	82.3	5.1	12.1	78.0
Between 4% and 10%	79.8	6.5	12.9	74.3
Greater than 10%	72.6	11.4	14.3	68.4

Figure 3—Proportion of vocational credits earned in mainstream settings by selected school characteristics.

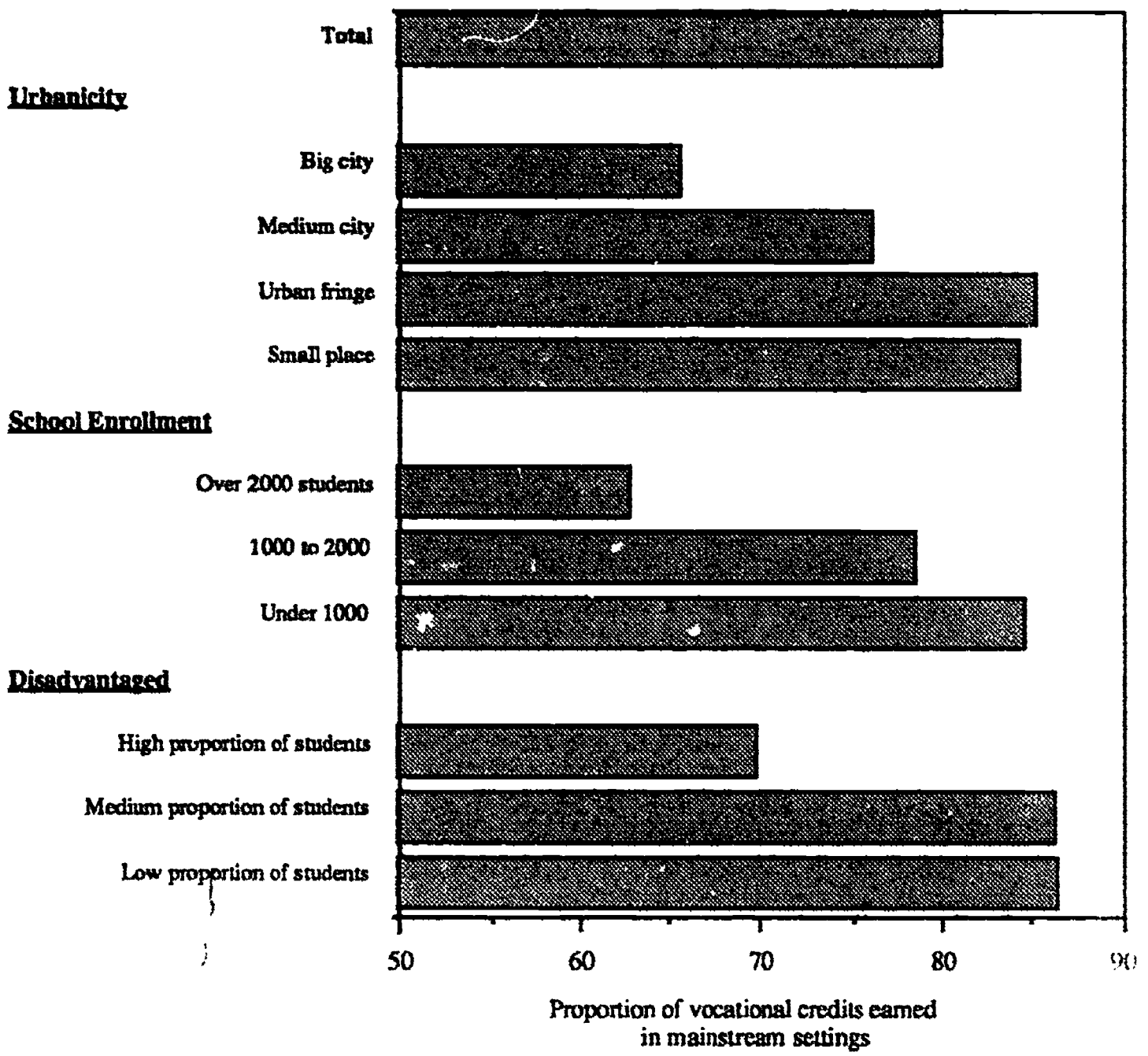

Table 4—Average number of credits earned in vocational courses by students with different types of disabilities.

	Average number of voc. credits	Type of handicap				
		MR	Physical	SED	LDG	Other
Total	4.57	4.78	4.52	3.94	4.64	4.04
Urbanicity						
Big city	4.07	4.75	3.96	4.34	3.74	4.82
Medium city	4.25	4.30	4.87	3.57	4.35	Low-N
Urban fringe	4.62	4.14	5.09	4.09	4.74	3.09
Small place	4.87	5.19	4.27	3.86	4.95	Low-N
School size						
Smaller than 1000 students	4.74	4.70	4.33	4.34	4.83	Low-N
Between 1000 and 2000	4.53	4.83	4.47	3.93	4.59	3.92
Over 2000 students	3.92	4.93	5.32	2.82	3.80	Low-N
Disadvantaged						
High proportion of students	4.24	4.81	4.39	3.91	4.07	4.44
Medium proportion of students	4.56	4.71	4.52	4.09	4.63	3.09
Low proportion of students	5.35	4.97	Low-N	3.41	5.63	Low-N
Percentage of students in voc. ed.						
Less than 10%	4.40	4.75	4.26	3.63	4.49	3.48
Between 10% and 25%	4.70	4.64	5.11	3.64	4.83	4.43
Greater than 25%	4.71	4.97	4.38	4.55	4.67	Low-N
Student/teacher ratio						
Less than 16 to 1	4.95	4.95	4.38	4.21	5.09	Low-N
Between 16 and 23 to 1	4.44	4.63	4.46	4.13	4.46	4.35
Greater than 23 to 1	4.04	4.93	5.00	3.18	4.02	Low-N
Size of special ed. population						
Less than 4% of all students	4.59	5.16	4.60	3.93	4.55	3.65
Between 4% and 10%	4.45	4.53	3.75	4.00	4.54	3.54
Greater than 10%	4.90	4.59	Low-N	3.82	5.36	Low-N

Mentally retarded students also took a smaller proportion of their vocational coursework in mainstream settings than other handicapped students—approximately sixty-two percent compared with eighty-six percent for LDG students (Table 6). Again, there was some variation according to the size of the school the student attended. As observed earlier, all handicapped students in large schools earned a smaller proportion of their vocational coursework in mainstream settings than handicapped students in smaller schools. This pattern was particularly pronounced for MR and SED students (Table 6). In schools with enrollments that were greater than two thousand, mentally retarded students earned only about thirty-seven percent of their vocational credits in mainstream courses. However, in schools with enrollments of less than one thousand students, mentally retarded students earned seventy percent of their vocational credits in mainstream courses. Likewise, SED students in relatively small schools earned about eighty percent of their vocational coursework in mainstream settings, compared to less than fifty percent for SED students in large schools.

Multivariate Results

These findings describe the vocational course-taking experiences of handicapped students in high schools with different characteristics. However, it is difficult to draw definitive conclusions about the relative effect of school characteristics on vocational enrollments because of the inherent limitations of descriptive tables. School characteristics that appear to have a dramatic effect on the amount and type of vocational education that handicapped students take may, in fact, have very little direct influence. For example, schools with large enrollments are more likely to be in big cities and thus serve more disadvantaged students than do small schools who are more likely to be in suburban or rural areas. Also, large schools are more likely to enroll minority students, students with lower ability levels, and so on. All of these factors may have a direct influence on vocational course taking. Thus, differences we have observed in the amount and intensity of handicapped students' vocational training in large versus small schools may be due to the fact that large schools are also associated with these other conditions and not due to "smallness" or "largeness" of schools per se.[5]

[5]On the other hand, school characteristics in these tables that seem to have little effect may actually have a large impact when other factors have been held constant. For example, while school size in Table 2 had little or no impact on the proportion of SLMP courses taken by handicapped students, school size may have

Therefore, to examine the net school influences on vocational course-taking patterns of handicapped students, we have conducted a multivariate analysis using ordinary least square regression. In performing this analysis, we have controlled for a wide variety of student background characteristics before examining the unique influence of each school-level variable shown in the preceding descriptive tables. The objective of this multivariate analysis is to provide the means for controlling other factors while analyzing the marginal influence of each school-level variable on vocational education outcomes.

All Vocational Courses

As a first step, we looked at how well we could predict the number of credits students with disabilities earned in secondary vocational education from the student's background characteristics and handicapping condition. These background factors included the student's race, sex, grade level in math and English, and handicapping condition, as well as the severity of the student's cognitive, physical, and psychosocial (or adaptive) limitations. Next we examined how well the school-level variables could predict the number of vocational credits earned compared with what could be predicted with the background characteristics and handicapping condition. With the student's background characteristics and handicapping condition alone we could explain about five percent of the variability among handicapped students in the number of vocational credits they earned in high school. Further, with the school-level variables we could explain an additional 2.2% of the variance.

Table 7 presents some of the results of the analysis for the number of vocational credits earned by handicapped students.[6] The entries in column one of Table 7 are the simple correlation coefficients; the entries in column two are the semipartial correlation coefficients. The correlation coefficients indicate the simple association of each school variable with the number of vocational credits earned by handicapped students. In other words, they indicate the same association examined in the descriptive section above. The semipartial correlation coefficients represent the association school variable with the number of vocational credits earned after the effects of the student's background have been

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an impact when the race and ability level of the students have been held constant. That is, for students of similar race and ability level, school size may, indeed, affect the proportion of SLMP taken by handicapped students.

[6]The results of the full regression analysis are presented in the Technical Appendix.

Table 5—Proportion of courses taken in SLMP by students with different types of disabilities.

	Average proportion of SLMP credits	Type of handicap				
		MR	Physical	SED	LDG	Other
Total	56	47	51	55	60	50
Urbanicity						
Big city	54	46	55	61	56	60
Medium city	48	31	46	54	57	Low-N
Urban fringe	62	46	53	63	64	44
Small place	58	57	50	47	60	Low-N
School size						
Smaller than 1000 students	56	51	47	48	59	Low-N
Between 1000 and 2000	57	44	56	59	61	43
Over 2000 students	55	34	47	53	62	Low-N
Disadvantaged						
High proportion of students	55	46	53	55	59	51
Medium proportion of students	57	48	47	54	60	Low-N
Low proportion of students	58	44	Low-N	59	60	Low-N
Percentage of students in voc. ed.						
Less than 10%	55	46	49	57	59	29
Between 10% and 25%	59	47	56	64	62	63
Greater than 25%	55	49	47	45	60	Low-N
Student/teacher ratio						
Less than 16 to 1	56	52	48	49	60	Low-N
Between 16 and 23 to 1	56	44	52	59	61	57
Greater than 23 to 1	56	47	55	55	59	Low-N
Size of special ed. population						
Less than 4% of all students	58	45	53	60	61	41
Between 4% and 10%	56	49	53	49	59	42
Greater than 10%	53	46	Low-N	56	56	Low-N

Table 6—Proportion of vocational courses in mainstream settings by students with different types of disabilities.

	Proportion of vocational courses taken in mainstream	Type of handicap				
		MR	Physical	SED	LDG	Other
Total	80	62	82	77	86	50
Urbanicity						
Big city	66	47	77	70	74	29
Medium city	76	60	80	82	84	Low-N
Urban fringe	85	76	81	83	87	81
Small place	84	67	86	76	91	Low-N
School size						
Smaller than 1000 students	85	70	88	80	91	Low-N
Between 1000 and 2000	79	59	81	81	85	74
Over 2000 students	63	37	67	48	72	Low-N
Disadvantaged						
High proportion of students	70	49	80	63	80	39
Medium proportion of students	86	76	84	86	90	Low-N
Low proportion of students	86	62	Low-N	77	91	Low-N
Percentage of students in voc. ed.						
Less than 10%	80	58	80	75	87	55
Between 10% and 25%	80	66	77	73	86	41
Greater than 25%	81	64	91	83	87	Low-N
Student/teacher ratio						
Less than 16 to 1	84	63	88	87	90	Low-N
Between 16 and 23 to 1	78	62	76	74	86	39
Greater than 23 to 1	75	57	85	67	79	Low-N
Size of special ed. population						
Less than 4% of all students	82	61	86	83	88	68
Between 4% and 10%	80	64	86	75	86	71
Greater than 10%	73	62	Low-N	66	85	Low-N

held constant.[7] The difference between these two correlation coefficients is an estimate of the amount of overlap between a variable and the other explanatory variables used. For example, the simple correlation of school size with the amount of vocational credits earned by handicapped students was -0.128. The negative sign indicates that larger school size is associated with smaller number of credits earned. The double asterisk following this estimate in the table indicates that this coefficient was statistically significant at the .01 level. The semipartial correlation coefficient of school size with the number of vocational credits earned was -0.084 (significant at the .05 level). This indicates the unique contribution of this variable to predicting the number of vocational education credits earned—that is, its contribution after all other variables have been held constant.

Column two of Table 7 shows whether or not the proportion of students taking vocational education within the school, the size of the school, as well as attendance at a school serving a large proportion of disadvantaged students influenced the amount of vocational credits earned by students with handicaps even when the student's background characteristics and handicapping condition were taken into account. However, other variables that have a significant simple association with the number of vocational credits earned had little or no association when other factors were held constant. By comparing for each variable the estimates of the simple correlation in column one with the estimates of the semipartial correlation for each variable in column two, this becomes apparent. For example, while the urbanicity of the school has a significant simple association with the number of vocational credits earned by handicapped students, this association is negligible when the differences between the student characteristics of urban and suburban schools have been taken into account. This is reflected in the small and nonsignificant semipartial correlation coefficients associated with "school urban" and "school rural."

Vocational Courses in Specific Labor Market Preparation

With the student background variables alone, we could predict about six percent of the variability among students with disabilities in the percentage of their high school vocational training that was earned in Specific Labor Market Preparation (SLMP) courses.

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[7]Semipartial correlation coefficients are generally thought to be a more accurate measure of the relative importance of a variable than statistics such as B or β coefficients. When independent variables are intercorrelated, as are the independent variables in this analysis, regression weights (both standardized and unstandardized) carry misleading information. For example, when two variables equally related to the dependent variable are also highly correlated with each other, the one with the highest correlation with the dependent variable will receive a large weight at the expense of the other variable (Darlington, 1968).

After adding the school-level variables used in this analysis, we could predict less than an additional one percent of the variability. That is, combining the school-level variables added virtually nothing to predicting the proportion of SLMP courses earned by handicapped students once differences in their family background and differences were taken into account.

Table 8 presents the simple and semipartial correlations of the school variables for the percent of vocational courses earned in SLMP. According to the findings reported in Table 2 above, the proportion of SLMP courses taken by handicapped students varied by the urbanicity of the school but not by any school characteristics. Even when taking into account the general characteristics of students in urban and suburban schools, this relationship remains significant—handicapped students in urban schools took a smaller proportion of their vocational coursework in SLMP than did students with similar background characteristics in suburban schools.

Mainstream Courses

It was easier to predict the proportion of vocational courses in mainstream settings taken by students with handicaps than to predict the total number of vocational credits they earned or the proportion of vocational credits they earned in SLMP. That is, both the student background variables used as controls and the school-level variables were both strongly associated with the amount of mainstreaming experienced by handicapped students in vocational courses. With the student background variables alone, we were able to predict approximately fifteen percent of the variability in the proportion of mainstream courses earned by handicapped students. Further, with the school variables included, we were able to predict an additional six percent of variance.

Table 9 displays the simple and semipartial correlation coefficients from the analysis of the proportion of vocational courses taken in mainstream settings. Most of the school variables had an impact on the proportion of vocational credits earned in mainstream settings that were still influential after background factors were controlled. Even when the student's background and handicapping condition were taken into account, students who were enrolled in schools that served relatively disadvantaged populations, schools that were in urban rather than suburban settings, and schools that had relatively large enrollments took fewer of their vocational courses in mainstream classrooms than did other handicapped students.

Table 7— Correlation coefficients for total vocational credits earned with school level variables after holding constant student background characteristics.

School characteristic	Simple correlation	Semipartial correlation
Percent of students taking voc. ed.	0.059**	0.067**
School size	-0.128**	-0.084*
School urban	-0.098**	-0.020
School rural	0.088**	-0.022
Disadvantaged index	0.138**	0.082**
Relative size of spec. ed. population	0.004	0.001
Student teacher ratio	-0.098**	-0.051

Note: * p<.05 **p<.01

Table 8—Correlation coefficients for percent of vocational credits earned in SLMP with school level variables after holding constant student background characteristics.

School characteristic	Simple correlation	Sempartial correlation
Percent of students taking voc. ed.	0.037	0.045
School size	0.010	0.022
School urban	-0.110**	-0.066*
School rural	0.044	-0.022
Disadvantaged index	0.050	-0.014
Relative size of spec. ed. population	0.020	0.028
Student teacher ratio	-0.017	-0.017

Note: * p<.05, ** p<.01

Table 9—Correlation coefficients for percent of vocational credits earned in mainstream settings with school level variables after holding constant student background characteristics.

School characteristic	Simple correlation	Semipartial correlation
Percent of students taking voc. ed.	-0.024	-0.017
School size	-0.225**	-0.196**
School urban	-0.196**	-0.049*
School rural	0.122**	-0.059
Disadvantaged index	0.250**	0.097**
Relative size of spec. ed. population	-0.011	-0.036
Student teacher ratio	0.061**	-0.010

Note: * p<.05, ** p<.01

SUMMARY AND DISCUSSION

This study used nationally representative data to describe the features of schools that provide vocational training to large proportions of their special education students. Although only a limited number of school-level variables were available in the NAEP transcript study, we found several variables that had an impact on the vocational enrollment of handicapped students. After other factors were held constant, these variables had a small effect on the overall amount of vocational education taken by students, a negligible effect on the proportion of vocational courses taken by students in SLMP, and a relatively large effect on the proportion of vocational courses taken by students in mainstream settings.

Other things being equal, we observed that schools serving disadvantaged populations and schools with relatively large enrollments enrolled fewer handicapped students in vocational education overall and fewer handicapped students in mainstream vocational education courses. These schools also provided fewer vocational education offerings to nonhandicapped students, although the trend was more pronounced with handicapped students.

There are several possible explanations as to why large schools currently do not serve handicapped students as well as do the smaller schools. First, as mentioned in the introduction, the ecological perspective on school climate has long emphasized the importance of school size in defining the overall climate of the school (Garbarino, 1980). Researchers who support this perspective have argued that students in small schools are spread more thinly than those in large schools and consequently are more involved in a wider range of school activities than are students in larger schools (Barker & Gump, 1964). According to Roger Barker and his colleagues, small schools are "undermanned." Furthermore, counselors, teachers, and students within small schools are less evaluative of individual differences and more accepting of students whose personal characteristics normally would set them apart from other students. Marginal students in small schools (i.e., at-risk students) reported receiving nearly as many requests to participate in school activities as did regular students, while in the large schools marginals were not sought after nearly as often as regulars. Thus, it appears as though students are less likely to "get lost" in the crowd in small schools and are more likely to be folded into the mainstream of all school activities. (This, of course, is the model behind "school within a school" programs

for at-risk students.) Finally, other research has shown that students who attend small schools behave better in school, that students perceive small schools as friendlier and more cohesive, and that students find the environment of small schools generally more satisfying (Duke & Perry, 1978; Morocco, 1978).

This model of the effect of school size may also relate to the participation of handicapped students in vocational classes, especially mainstream vocational classes. For example, it matches with the impression of many vocational teachers and researchers that the climate of small schools fosters a sense of community that, in turn, carries over to their treatment of handicapped students. In other words, they believe that handicapped students in schools with this sense of community are more likely to be looked upon by the counselors, teachers, and other students as "one of us" rather than as outsiders. As a result, the integration of these handicapped students into vocational coursework may be facilitated by the community atmosphere of "undermanned" small schools. In the words of one researcher, "small schools emphasize who one is rather than what one is" (Getzels, 1974).

From the sociological perspective, it makes sense that, other things being equal, schools serving disadvantaged students would enroll fewer of their students in vocational education courses and that a smaller proportion of their students' vocational coursework would be in mainstream settings. In early school climate studies, researchers used objective characteristics of schools such as their racial composition and average socioeconomic status to define school climate in terms of milieu or school culture. While measures of program quality are not available in NAEP, one could speculate that schools with larger proportions of disadvantaged students may have an overall school culture that supports older, more traditional vocational programs for their students. Programs for handicapped students may consist of primarily work study programs and not regular vocational coursework. In these older, more traditional programs, instructors may also be more resistant to incorporating handicapped students into the regular vocational curriculum.

In addition, schools with large percentages of disadvantaged students may have fewer financial resources and/or what resources they do have are used to serve their disadvantaged population and not handicapped students. Special needs students, both handicapped and disadvantaged, may thus be competing for the same scarce resources. In terms of actual dollars however, mainstream vocational classrooms should cost less, not more than self-contained vocational classrooms for handicapped students. In terms of staff

time and commitment, however, it might "cost" more to build effective mainstreamed vocational courses. In a study for the National Center for Education Statistics, MPR Associates (1987) found that in the exceptional vocational programs for special needs students that they visited, a counselor or special educator was responsible for discussing handicapped students with teachers, and did so diligently. This practice was found to be the key to increasing effective mainstreaming because it provided teachers with the informational support necessary to adapt their teaching styles and curriculum. Indeed, it was possible that counselors and special needs teachers within schools with greater percentages of disadvantaged students may be so overwhelmed meeting with the requirements of their disadvantaged students that they may not have sufficient time to devote to meeting the needs of their handicapped students. Given this scenario, Federal policymakers may want to consider provisions that will target greater amounts of Federal vocational resources to these schools.

Irrespective of the several school effects we found in this study, the most striking finding of this research was how poorly we could predict either the amount or the type of vocational training received by students with disabilities based on a fairly wide variety of individual and school characteristics. A cursory look at the descriptive tables in the first section of this paper shows that even when the amount or the type of students' vocational training differed by school characteristics, the amount of variation was generally quite small. However, the models and methodology we used in this analysis were by design quite simple and direct. Using more sophisticated modeling techniques and better school-level indicators, we may have been able to do a better job of predicting the vocational course-taking patterns of handicapped students. Nevertheless, we are left with the impression that, although we did identify several school-level factors that influenced the mainstreaming of vocational education students with handicaps, overall we still cannot explain very well the variability in their vocational course-taking patterns.

TECHNICAL APPENDIX

The NAEP Transcript Study survey file contains records for every secondary school course taken by the sampled students. Information for each course includes a seven digit Classification of Secondary School Courses (CSSC) identification number, the school year and term in which the course was taken, the credits earned, and the student's final grade. The last digit in the CSSC indicates whether the course was taken in the mainstream curriculum or in special education classrooms. This information was merged with the other files in the survey: the student, special education student, and school files.

The courses from each transcript data set were organized into the framework of the Secondary School Taxonomy (SST). This taxonomy was developed for organizing transcript data into four different curricula: academic, vocational, personal/other, and special education. To the extent possible, the level or difficulty of the course was specified in the taxonomic categories within each curriculum. For example, within the academic curriculum, courses are categorized as basic, regular, advanced placement, or as specialized topics. This last category includes primarily more advanced courses within a designated subject area, but it also includes courses that could not be accurately identified as fitting into one of the other categories. In the vocational curriculum, courses are designated as the first course in a sequence, second or higher course in a sequence, or as specialized topics. Any courses that could clearly be differentiated by their placement in a sequence were included in the specific sequence categories; again, the specialized topics category includes primarily courses that are advanced, but this category also includes courses whose levels could not be determined.

Using the CSSC codes on the transcript file, all vocational courses were further aggregated according to the Secondary School Taxonomy (SST) developed by MPR Associates for use with the High School and Beyond 1980 Sophomore Cohort Transcript file. At the most general level, the SST divides the vocational curriculum into three levels of vocational preparation types: (1) consumer and homemaking, (2) general labor market preparation, and (3) specific labor market preparation (see Hoachlander, Brown, & Tuma, 1987).

Variables

There are three main dependent or outcome variables used in this analysis: (1) the number of credits earned in vocational education, (2) the proportion of all vocational credits taken in specific labor market preparation, and (3) the proportion of all vocational credits earned in mainstream settings.

The construction of each of the independent variables is explained below.

- *Sex*—coded 1 if female and 0 if male.
- *Race*—coded 1 if white and 0 if nonwhite.
- *Handicap type (Mentally retarded, seriously emotionally disturbed, learning disabled, and physically handicapped)*—these variables were constructed from an item on the special education student file describing the student's handicap. The set of variables were "effects coded" so each variable within each handicap group can be compared with the average of the other handicap groups in the set (Cohen & Cohen, 1983).
- *Severity of limitation*—these variables describe the teacher's impression of the student's physical, psychosocial (adaptive), and cognitive limitations. These are coded on a 1 to 5 scale, from severe (1) to nonaffected (5).
- *Size of school*—the total enrollment of the student's school.
- *Size of special education population*—this is the simple ratio of the size of the special education population to the total school enrollment.
- *Proportion of the student body taking vocational education*—estimate by the school administrator of the percentage of the school population enrolled in the vocational or technical program.
- *Urbanicity*—two variables, city and rural, were "dummy coded" to represent urbanicity. The reference group for both variables is suburban schools.
- *Disadvantaged index*—this variable is based on five school-level variables (1) "Approximately what percentage of your students will drop out of school before graduating," (2) "How many students receive a subsidized school lunch and nutrition program," (3) "How many students receive remedial mathematics instruction," (4) "How many students receive English as a second language instruction," and (5) "How many students receive remedial reading instruction." The composite variable is the average of the nonmissing values of each of these variables after they have been standardized.

Missing Data

The presence of missing data was not a large problem in this analysis. The percent of missing data on any one variable ranged from zero to about seven percent. When a student was missing data on one of the dependent variables, that student was dropped from the analysis. This resulted in the removal of about seven percent of the students from the analysis of the proportion of vocational credits earned in SLMP, and the removal of about seven percent from the analysis of the proportion of vocational credits earned in mainstream settings. There were no cases with missing data on the number of credits earned in vocational coursework. When a student was missing data on an independent variable, the modal value for that variable was inserted for the missing value.

Method

For the estimates in the descriptive tables presented later in this paper, the sample was weighted using the "Final Usable Transcript-Linked Student Weight" (FINSTUWT). This weight corrects for unequal probabilities of selection at the school and individual level, sample nonresponse, trimming factors, and post-stratification adjustments. Variances for these estimates were calculated with a Taylor series approximation procedure embedded in MPR's STRATTAB computer program. Tables of estimates along with their associated standard errors and weighted and unweighted cell sizes are available from MPR Associates upon request.

SAS-PC was used to estimate the regression equations presented in this paper. Variances for the regression coefficients have been estimated using a Jackknife Repeated Replication procedure (JRR). This was accomplished by using the thirty-six jackknife replicate weights provided in the NAEP Transcript Study file. The details of this procedure are provided in the 1987 High School Transcript Study Technical Report (Thorne & Hayward, 1988). The full results of the regression analysis for (1) the number of vocational credits earned, (2) the proportion of vocational credits earned in SLMP, and (3) the proportion of vocational credits earned in SLMP courses are presented in Tables A1, A2, and A3 which follow. Presented in these tables are the raw or unstandardized regression coefficients (B), the standardized regression coefficients (ß), the squared semi-partial correlation coefficients, and the t test associated with these parameters. Two models

are shown, the model with only the student background characteristics entered and the model with both the student characteristics and school characteristics entered.

Table A.1—Regression results for total number of vocational credits earned on individual background and school level variables.

Variable	Individual background variables only				School and background variables			
	B	ß	Squared semipartial correlation	t	B	ß	Squared semipartial correlation	t
Intercept	1.5557			1.94	2.8977			3.24**
Sex (1=female)	-0.0421	-0.0141	0.0002	-0.50	-0.0536	-0.0180	0.0002	-0.64
Race (1=white)	1.0283	0.1609	0.0247	5.56**	0.8097	0.1267	0.0247	4.16**
Handicapping condition								
Mentally retarded	1.1171	0.1478	0.0032	2.33*	1.0605	0.1403	0.0032	2.22*
Physically handicapped	0.4474	0.0270	0.0000	0.70	0.3481	0.0210	0.0000	0.55
Learning disabled	0.4577	0.0724	0.0045	1.00	0.3622	0.0573	0.0045	0.80
Severely emotionally disturbed	0.2063	0.0192	0.0000	0.38	0.1556	0.0145	0.0000	0.29
Ratings of student's limitations								
Physical limitations	0.0318	0.0057	0.0015	0.18	-0.0150	-0.0027	0.0015	-0.08
Psychosocial limitations	0.3901	0.1123	0.0128	3.24**	0.3785	0.1089	0.0128	3.17**
Cognitive limitations	0.0502	0.0126	0.0003	0.38	0.0334	0.0084	0.0003	0.26
Grade level in reading	-0.0282	-0.0292	0.0007	-0.68	-0.0239	-0.0247	0.0007	-0.57
Grade level in mathematics	0.0820	0.0809	0.0028	1.89	0.0654	0.0646	0.0028	1.52
Percent of students taking voc. ed.					0.0118	0.0739	0.0045	2.62**
School size					-0.0003	-0.0637	0.0071	-1.99*
School urban					-0.1223	-0.0192	0.0004	-0.49
School rural					-0.1977	-0.0323	0.0005	-0.78
Disadvantaged index					0.0362	0.0915	0.0067	2.85**
Relative size of spec. ed. population					0.2102	0.0047	0.0001	0.16
Student teacher ratio					-0.0162	-0.0537	0.0026	-1.85
Unweighted sample size		6,064						
R^2 added		0.05				0.022		

Note: * p<.05, ** p<.01

Table A.2—Regression results for proportion of vocational credits earned in SLMP on individual background and school level variables.

Variable	Individual background variables only				School and background variables			
	B	ß	Squared semipartial correlation	t	B	ß	Squared semipartial correlation	t
Intercept	0.3166			3.32**	0.3207			2.99**
Sex (1=female)	-0.0441	-0.1302	0.0206	-4.48**	-0.0438	-0.1294	0.0206	-4.46**
Race (1=white)	0.0678	0.0926	0.0122	3.11**	0.0658	0.0898	0.0122	2.85**
Handicapping condition								
Mentally retarded	-0.0559	-0.0647	0.0126	-0.96	-0.0524	-0.0607	0.0126	-0.90
Physically handicapped	-0.0019	-0.0010	0.0015	-0.02	-0.0053	-0.0028	0.0015	-0.07
Learning disabled	0.0261	0.0361	0.0021	0.47	0.0250	0.0346	0.0021	0.45
Severely emotionally disturbed	-0.0125	-0.0101	0.0000	-0.19	-0.0118	-0.0095	0.0000	-0.18
Ratings of student's limitations								
Physical limitations	0.0518	0.0819	0.0068	2.48*	0.0516	0.0815	0.0068	2.46*
Psychosocial limitations	0.0069	0.0171	0.0005	0.48	0.0050	0.0125	0.0005	0.35
Cognitive limitations	0.0058	0.0126	0.0003	0.37	0.0062	0.0135	0.0003	0.40
Grade level in reading	0.0030	0.0268	0.0009	0.60	0.0021	0.0188	0.0009	0.42
Grade level in mathematics	0.0011	0.0095	0.0000	0.22	0.0010	0.0086	0.0000	0.20
Percent of students taking voc. ed.					0.0000	0.0412	0.0005	1.17
School size					0.0009	0.0474	0.0020	1.62
School urban					-0.0683	-0.0941	0.0043	-2.31*
School rural					-0.0262	-0.0376	0.0005	-0.88
Disadvantaged index					-0.0005	-0.0102	0.0002	-0.30
Relative size of spec. ed. population					0.1447	0.0286	0.0008	0.94
Student teacher ratio					-0.0006	-0.0171	0.0003	-0.56
Unweighted sample size			5,670					
R^2 added			0.057				0.005	

Note: * p<.05, ** p<.01

Table A.3—Regression results for proportion of vocational credits earned in mainstream settings on individual background and school level variables.

	Individual background variables only				School and background variables			
Variable	B	ß	Squared semipartial correlation	t	B	ß	Squared semipartial correlation	t
Intercept	0.2522			2.98**	0.5725			6.20**
Sex (1=female)	0.0098	0.0310	0.0000	1.12	0.0074	0.0234	0.0000	0.87
Race (1=white)	0.0698	0.1023	0.0246	3.61**	0.0243	0.0357	0.0246	1.23
Handicapping condition								
Mentally retarded	-0.0244	-0.0303	0.0665	-0.47	-0.0331	-0.0411	0.0665	-0.66
Physically handicapped	0.1330	0.0755	0.0002	1.95	0.1176	0.0668	0.0002	1.78
Learning disabled	0.1369	0.2032	0.0124	2.80**	0.1245	0.1848	0.0124	2.62**
Severely emotionally disturbed	0.0778	0.0674	0.0017	1.35	0.0854	0.0739	0.0017	1.53
Ratings of student's limitations								
Physical limitations	0.0378	0.0641	0.0083	2.04*	0.0246	0.0416	0.0083	1.36
Psychosocial limitations	0.0375	0.1002	0.0125	2.96**	0.0355	0.0950	0.0125	2.89**
Cognitive limitations	0.0066	0.0155	0.0016	0.48	0.0049	0.0114	0.0016	0.36
Grade level in reading	0.0086	0.0840	0.0169	1.98*	0.0096	0.0931	0.0169	2.26
Grade level in mathematics	0.0088	0.0820	0.0029	1.96*	0.0056	0.0522	0.0029	1.28
Percent of students taking voc. ed.					-0.0001	-0.0074	0.0003	-0.27
School size					-0.0001	-0.2012	0.0386	-6.19**
School urban					-0.0523	-0.0773	0.0024	-2.05*
School rural					-0.0479	-0.0737	0.0035	-1.87
Disadvantaged index					0.0044	0.1013	0.0095	3.29**
Relative size of spec. ed. population					-0.1793	-0.0381	0.0013	-1.35
Student teacher ratio					-0.0003	-0.0079	0.0001	-0.28
Unweighted sample size		5,670						
R^2 added		0.148				0.055		

Note: * p<.05, ** p<.01

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