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ABSTRACT

A study was conducted to compare the academic success of students who completed developmental education courses at Northwest Technical College with that of students who did not take such courses, but whose placement test scores indicated that they should. Subjects of the study were selected from 499 students who were advised, based on their test scores, to enroll in developmental sections of Basic Communications (BC1000) or Technical Mathematics (TM1200) between 1980 and 1983. The study focused on the grades, grade point averages (GPA's), and retention rates of 136 students who enrolled in BC1000 and 147 students who elected to enroll in college-level Basic Communications (BC1001); and 143 students who enrolled in TM1200 and 73 students who chose to enroll in the college-level technical mathematics course (TM1201). Study findings indicated: (1) 17.6% of the BC1001 group withdrew, compared to 10.2% of the BC1000 group; (2) 17% of the TM1201 students and 15% of the TM1200 students withdrew; (3) while the BC1000 group had slightly higher GPA's than the BC1001 group, the TM1201 group had slightly higher GPA's than the TM1200 group; (4) those who received unsatisfactory grades in their developmental classes were more likely to withdraw from college than those who received satisfactory grades; and (5) 100% of the developmental students who eventually graduated had received satisfactory grades in Their developmental course work. Findings are illustrated in six statistical tables. (HB)

A COMPARISON OF GRADES, GPA, AND RETENTION OF DEVELOPMENTAL STUDENTS AT NORTHWEST TECHNICAL COLLEGE

Masters Project
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Section I: Problem

The open-door policies which typify many of the two-year colleges in this country can be seen as having both positive and negative aspects. From the positive point of view, for the first time a college education is available and affordable for many who were previously not able to attend college. Many of these students are economically and socially disadvantaged. Many times, however, they are ill-prepared for college-level course work. As more colleges have opened their doors and more students have entered, it has become clear that some sort of remedial classes must be included in the curricula if these students are to achieve a degree of academic success.

Learning centers, developmental labs, and resource centers were designed with the intent of helping these under-prepared students meet college requirements, especially in English, math, and study skills. The Developmental Education Program, which began in 1977, at Northwest Technical College near Archbold, Ohio, exists to enable students to improve their English, math, reading, and study skills to help them succeed in college-level courses.

The purpose of this study is to compare all students who scored below the acceptable levels on the Comparative Guidance and Placement Program Test (CGP) or the ACT entrance test. Cut off points for placement in developmental courses are the 45th percentile on the English and the 65th percentile on the elementary algebra sections of the CGP and a standard score of 15 on the English portion of the ACT and a standard score of 20 on the Math portion of the ACT. Students who score below these points are advised to enroll in either the math or communications developmental courses. Control Groups comprised of students who did not accept the

academic advice to take Developmental courses were compared with groups who did. The Developmental courses involved in this comparison were 1200 Technical Math I and 1000 Basic Communications. The corresponding credit courses are 1201 Technical Math II and 1001 Communications I.

The grades achieved by students in the math and communications sequences (1200/1201 and 1000/1001) were compared to the grades achieved in 1201 and 1001 by the control groups. Retention and grade-point averages of all groups were compared as a reflection of academic success. The intent of the study is to see what effect developmental courses have on math and communications skills respectively and academic success as evidenced by GPA. By examining the grades of developmental students and their counterparts in credit classes, it will help determine the effectiveness of the Developmental Program as a whole. By considering math and communications separately, the individual effectiveness of 1000 Basic Communications and 1200 Technical Math I (the developmental courses) may be determined.

If students successfully complete the developmental courses recommended by counselors based upon placement test results, then they should have higher grades in subsequent credit math or communications courses than those students who did not accept the advice to enroll in developmental courses. It is further hypothesized that the GPAs of the developmental students will be higher and the retention rate will be higher than those of the control groups.

Section II: Review of the Literature

A search of the literature reveals a large number of studies that have been conducted to evaluate the effectiveness of remedial/developmental programs in elementary school through the university level. Some studies are concerned with only one subject area, e.g., math; while others are more comprehensive and investigate the whole developmental program. Most of these studies were undertaken to evaluate a developmental program, although some were designed not as

evaluation tools, but as documentation of experimental findings. The present study falls into the second category. There was no attempt to suggest causes for the outcomes of the study. This study does not exactly replicate another research study; namely, one set in a two-year technical college, focusing on these four factors: developmental and regular math and communications courses, GPA, and retention of developmental vs. non-developmental students.

In a study of remedial arithmetic courses in three California community colleges, Randall (1972) evaluated the effectiveness of required remedial arithmetic courses in terms of improving skills and attitudes. While he did not compare the remedial students with a control group, he did find significant improvement in skills and he also found that attitudes about math were more improved by the traditional lecture than by a programmed text.

Of more significance to the present study is one conducted at Virginia State College by Clark (1967). He investigated 1) the relationship between entering non-remedial students' math placement test results and their academic performances in initial college math courses; 2) the academic performances of those students who had completed the remedial math course and who then enrolled in initial college math courses as compared with the academic performance of non-remedial students in these initial math courses; and 3) the relationship between remedial students' math weaknesses and remedial math course content. His findings indicated the remedial courses were somewhat effective in preparing math-deficient students to compete successfully with non-remedial students in two of three initial college math courses.

When English courses are examined, the same kinds of comparisons and evaluations have been made. For example, Baker (1982) compared college freshman achievement in remedial English courses and in freshman composition courses and found that significant gains were made by remedial students, although these gains, as measured

writing sub-tests, were not significantly different from those made by students in the regular freshman classes. Baker concluded that the remedial classes did not perform the remediation function better than the regular classes.

Some studies concluded that the developmental program was unsuccessful. At Harrisburg Area Community College, Basonic (1982) analyzed the academic performance and persistence of developmental students. Overall, the students were not successful in the developmental courses. These students had a pattern of low GPAs, suspensions, failing grades, and repeated courses. The study does not attempt to evaluate the program to find the reason for the failures.

Generally, the developmental programs show some degree of success. Snowden (1972), at Western Michigan University, confirmed that the GPA of the Developmental Group was significantly higher than that of two Control Groups and the Developmental Group maintained academic persistence equal to that of the Control Groups.

Retention rate is an extremely important factor for colleges, but especially that of high-risk students. By admitting high-risk students, colleges have a vested interest in their success. Placement tests need to be valid and reliable and accurately indicate which students need which developmental courses. Jenkins (1981), Lamm (1981), and Martin (1982) found that those students who followed the academic advice regarding placement in developmental courses had a significantly higher retention rate than those students who did not follow that advice. Through studies such as these, colleges and universities can accumulate data that can help in the evaluation of their developmental advisement policies.

Section III: Methodology

This study follows a causal-comparative design involving two groups whose independent variable is completion of a developmental communications or math course. The two groups are compared on the dependent variables of grades in each course, grade-point average, and retention.

The subjects were selected from a population of 499 students who, based on their placement test scores, were advised to enroll in 1000 Basic Communications or 1200 Technical Math I during the 1980-1983 academic years at Northwest Technical College. The College is an accredited two-year post-secondary state-supported institution which grants one-year certificates and two-year associate degrees.

The 1000 Basic Communications course is designed for students who need to renew their writing skills before taking 1001 Communications I. Course content emphasizes sentence structure, standard usage, punctuation, capitalization, spelling, and paragraph development. Communications I (1001) reviews sentence and paragraph structure, the mechanics of punctuation and grammar, with an emphasis on the fundamentals of expository writing. Improvement of analytical reading skills is stressed and the use of library resources is introduced.

An introductory algebra course, 1200 Technical Math I, is designed to strengthen algebra skills. Topics covered are fundamentals of algebra, algebraic expressions, special products, factoring, algebraic functions, and equations in general. Technical Math II (1201) emphasizes exponents, roots, radicals, logarithms, exponential functions, quadradic equations in one unknown, methods of solution of simultaneous linear equations, ratio, proportion, variation, and the methods used for determining the equation of a straight line.

Students in both the developmental and regular courses are afforded practice using textbooks and audio-visual materials. Individual help is given when needed.

Students who score below the 45th percentile on the English section of the Comparative Guidance and Placement Program Test (CGP) or below 15 on the English portion of the ACT are advised to enroll in 1000 Basic Communications. Those who score below the 65th percentile on the elementary algebra portion of the CGP or below 20 on the math portion of the ACT are advised to enroll in 1200 Technical Math I. If the CGP score is 45 and 65 or above, they are advised to enroll in 1001 and 1201 respectively.

Transcripts of all subjects were examined to determine the composition of the Developmental Groups and the Control Groups. Developmental Group 1000 is comprised of those students who completed 1000 Basic Communications and subsequently enrolled in 1001. Developmental Group 1200 is comprised of those who completed 1200 Technical Math I and subsequently enrolled in 1201. Control Group 1001 is those students who were advised to take 1000, but enrolled instead in 1001. Control Group 1201 is those who were advised to take 1200 but enrolled instead in 1201. Grade-point averages and retention rates were obtained from the student records.

A chi square test was used to compare the observed and expected frequencies of grades in 1001 and 1201 for the Developmental and Control Groups. The chi square was used in order to determine whether it was likely there is a relationship between grades in 1001 and 1201 and the completion of developmental courses. In other words, are higher grades achieved in regular courses after taking the developmental courses? The null hypothesis states that there is no relationship between grades achieved in 1001 and 1201 and the completion of developmental course 1000 or 1200.

Retention of the Developmental and Control Groups was also compared in a chi square test. The GPAs of the Developmental and Control Groups were compared using the mean and median. The mean and median illustrate what GPA is typical and allow interpretation of a single GPA in reference to a central point.

An analysis was made of the grades of the Developmental Groups to determine the frequency that successful completion of the developmental courses results in successful (A,B, or C) grades in the regular courses (1001 or 1201). The percentage of withdrawals from each group was also computed. Tables present this data in Section IV.

This study was concerned only with those students who had ACT or CGP test scores. There was 140 other students who were placed in Developmental courses based on their high school transcripts, personal preference, or other reasons. These students would have affected the results of this study had they been included.

One element that may affect the results of the study is the questionable reliability and validity of the Comparative Guidance and Placement Program Test. A major argument for using this test is the ease and rapidity with which it can be scored. This ease may compensate for the negative aspects if it indeed is placing a satisfactory number of students correctly. Individual institutions will have to decide the test's appropriateness. This study can provide some statistics to aid in answering these questions for Northwest Technical College.

Section IV: Findings

Since no research had been done at Northwest Technical College comparing the Developmental Course and regular course grades, this study was undertaken to get a better understanding of the relationships among the courses.

The first objective of the study was to determine the significance between the grades in the regular courses achieved by the Developmental Groups as compared with the Control Groups. Table I shows that there is a statistically significant relationship in the Communications 1000/1001 sequence, but not for the Technical Math 1200/1201 sequence. At a significance level of .10, the null hypothesis is rejected for Communications and accepted for Technical Math. Developmental Group 1000 received 48.39% of the successful (A,B,C) grades in 1001, and 40% of the D,F, Withdrawal grades. Developmental Group 1200 received 66.9% of the A,B,and C grades in 1201 and 65.48% of the D,F,W grades. This appears to show that those who completed 1200 are better prepared for 1201 than those who did not take 1200.

There were few similarities between the two subjects. The Communications sequence bore out one of the study's hypotheses: more of the Control Group withdrew from 1001 than did the Developmental Group (17.6% as compared with 10.2%). Although the Control Group 1001 had higher GPAs (mean = 1.90 and median = 2.04) the Developmental Group 1000 did not lag far behind (mean = 1.87 and median = 1.97).

By contrast, the Technical Math Developmental Group 1200 had higher GPAs (mean = 2.38 and median = 2.54) than the Control Group (mean = 2,32 and median = 2.55). These are very close, however. It had been hypothesized that the grade-point averages of the Developmental and Control Groups would not be statistically significantly different. A higher percentage of the Developmental Group withdrew from 1201 (17%) than of the Control Group (15%). (See Table 2)

Satisfactory completion of 1000 or 1200 nearly always resulted in a successful (A, B, or C) grade in 1001 or 1201. (See Table 3). It is interesting to note that only 1.4% and 2.9% of those who failed the Developmental Courses successfully passed 1001 and 1201 respectively. In fact, 94.44% of those who failed 1000, received D, F, or Withdrew from 1001. Likewise, 89.47% of those who failed 1200, received a D, F, or withdrew from 1201.

Retention was more difficult to calculate. Students enrolled in the Spring 1982 to Spring 1983 academic year were not included in the retention statistics because they added disproportionate numbers to the low end of the table. The figures in Table 4 illustrate retention for students enrolled Fall 1980 through Winter 1982. Attrition is very high for these students as evidenced by the percentage of withdrawal after 0 or 1 quarters: the successful portion of Control Group 1201, with 75% staying 2-8 quarters, has the best retention. The unsuccessful portion of Developmental Group 1000, with 56.25% withdrawing the same quarter, has the lowest retention.

An unsatisfactory grade can nearly always be associated with withdrawing. In the 1000/1001 and 1200/1201 sequences, a higher percentage of unsuccessful Developmental Group students withdrew the same quarter that they took the Developmental course. Regardless of grade, more Control Group 1001 students withdrew the same quarter than Developmental Group 1000. However, more Developmental Group 1200 students withdrew the same quarter than did Control Group 1201. The percentages, however, were very close: 31.01% and 29.84%. A chi square test revealed that there is a significant relationship between the variables of course and number of quarters enrolled. (See Table 5). Given that the typical number of quarters required for graduation is six, a large number of students don't stay in school that long. Enrolling in a Developmental Course usually means the student will need an additional quarter to graduate, assuming the

recommended course of study is followed and all courses are passed successfully. These students frequently have to repeat a course, however. Table 6 shows the small percentages of each group who actually graduated. Even though the numbers are small, 100% of the Developmental Groups' graduates had successfully completed 1000 or 1200. Likewise, 68% and 90% had successfully completed 1201 and 1001 respectively.

TABLE 1

CHI SQUARE TABLE OF OBSERVED AND (EXPECTED) GRADES IN 1001 AND 1201 FOR DEVELOPMENTAL AND CONTROL GROUPS

GROUP	GRADE IN 1001						
	A	B	C	D	F	W	Total
Developmental 1000	3 (3.8)	20 (26.9)	52 (43.7)	21 (17.8)	9 (15.9)	14 (19.2)	136
Control 1001	5 (4.2)	36 (29.1)	39 (47.27)	16 (19.2)	24 (17.1)	26 (20.8)	147
	8	56	91	37	33	40	283

$x^2 = 16.35$ significance level = .10

df = 5 critical value = 9.236

The null hypothesis is rejected: there is a significant relationship between the variables.

GROUP	GRADE IN 1201						
	A	B	C	D	F	W	Total
Developmental 1200	8 (5.9)	24 (22.5)	37 (39.7)	25 (31.8)	24 (19.2)	25 (23.8)	143
Control 1201	1 (3.0)	10 (11.5)	23 (20.3)	23 (16.2)	5 (9.8)	11 (12.2)	73
	9	34	60	48	29	36	216

$x^2 = 7.16$ significance level = .10

df = 5 critical value = 9.236

The null hypothesis is accepted: there is no significant relationship between the variables. It will be assumed that these variables are independent until evidence otherwise is obtained.

TABLE 2

MEAN AND MEDIAN GPA AND % WITHDRAWALS

FROM 1001 AND 1201

	Mean GPA	Median GPA	% Withdrawal
Control Groups			
Communications 1001	1.90	2.04	17.6
Technical Math 1201	2.32	2.55	15.0
Developmental Groups			
Communications 1000	1.87	1.97	10.2
Technical Math 1200	2.38	2.54	17.0

standard deviation = 0.284

These figures show that there is a very slight variance in GPAs between Developmental and Control Groups. The Developmental Groups do not fall far behind the Control Groups; but are very nearly even. Those who completed 1000 withdrew less frequently than did the Control Group. The opposite was true in Technical Math.

TABLE 3

GRADES IN 1000 AND 1200 COMPARED WITH GRADES IN 1001 AND 1201

Grade in 1000	# of students	# of ABCs in 1001	% of ABCs in 1001	# of DFWs in 1001	% of DFWs in 1001
S	118	74	98.6	44	72.13
U	18	1	1.4	17	27.87
TOTAL	136	75	100.0	61	100.00

Grade in 1200	# of students	# of ABCs in 1201	% of ABCs in 1201	# of DFWs in 1201	% of DFWs in 1201
S	124	66	97.1	58	77.3
U	19	2	2.9	17	22.7
TOTAL	143	68	100.0	75	100.0

These figures show that those students who successfully completed 1000 and 1200 received more As, Bs, and Cs in 1001 and 1201 than those who failed the Developmental courses. Although this occurred more often in the Communications courses, it is also true in the Technical Math courses.

TABLE 4

RETENTION BY PERCENT OF SATISFACTORY AND UNSATISFACTORY GRADES

Developmental Group 1000

# of quarters in college	% of S	% of 1000	% of U	% of 1000
0	10.38	9.01	56.25	7.38
1	29.24	25.41	25.00	3.28
2-8	58.49	51.63	18.75	2.46
8+	1.88	1.63	0	0

Developmental Group 1200

# of quarters in college	% of S	% of 1200	% of U	% of 1200
0	28.83	24.81	[illegible].4	6.2
1	26.126	22.48	27.78	3.87
2-8	45.04	38.76	27.78	3.87
8+	0	0	5.55	0.78

Control Group 1001

# of quarters in college	% of ABC	% of 1001	% of DFW	% of 1001
0	25.3	13.86	50.0	22.62
1	21.3	11.67	11.29	5.11
2-8	51.8	28.47	38.68	17.52
8+	.1.3	0.73	0	0

Control Group 1201

# of quarters in college	% of ABC	% of 1201	% of DFW	% of 1201
0	18.75	8.95	40.0	20.89
1	3.125	1.49	17.142	8.95
2-8	75.0	35.8	42.82	22.37
8+	3.125	1.49	0	0

These figures represent the number of quarters enrolled following the indicated course. Includes students enrolled only Fall 1980 through Winter 1982.

TABLE 5

CHI SQUARE TABLE OF OBSERVED AND (EXPECTED) FREQUENCIES OF THE NUMBER OF QUARTERS ENROLLED AFTER COMPLETING THE INDICATED COURSE

	NUMBER OF ACADEMIC QUARTERS				
COURSE	0	1-3	4-6	7-11	TOTAL
1000	20 (34.85)	49 (43.16)	41 (31.90)	12 (12.06)	122
1001	50 (39.14)	42 (48.47)	34 (35.83)	11 (13.54)	137
1200	40 (36.85)	44 (45.64)	34 (33.73)	11 (12.75)	129
1201	20 (19.14)	26 (23.70)	10 (17.52)	11 (6.62)	67
	130	161	119	45	455

Includes only Fall 1980 - Winter 1982

$x^2 = 21.04$ significance level = .10 The null hypothesis is rejected;

df = 9 critical value = 14.684 there is a significant relationship between the variables.

TABLE 6

NUMBER AND PERCENT OF GRADUATES FROM EACH GROUP

GROUP	NUMBER	PERCENTAGE
1000	6 of 55	100% had S
1001	19 of 89	89% had ABC
1200	12 of 51	100% had S
1201	13 of 37	69% had ABC

Includes students enrolled only Fall 1980 through Fall 1981.

Section V: Summary and Conclusions

The purpose of this study was to compare the academic success of students who completed developmental communications and/or math courses with those who did not take developmental courses, but whose placement test scores indicated they should. A chi square test was used to compare the frequencies of grades in 1001 Communications I after completion of 1000 Basic Communications and in 1201 Technical Math II after completion of 1200 Technical Math I. A chi square test was used to compare the retention rates of the Control and Developmental Groups. Grade-point averages of these groups were compared by mean and median. A comparison of satisfactory (S) and unsatisfactory (U) developmental grades was made with A, B, C or D, F, Withdraw grades in the regular courses. At the .10 significance level, there was a statistically significant relationship in the Communications sequence, but not in the Technical Math sequence. Developmental Group 1000 received 48.39% of the successful grades in 1001, Developmental Group 1200 received 66.9% of the successful grades in 1201.

17.6% of Control Group 1001 withdrew from 1001, compared with 10.2% of Developmental Group 1000. In contrast, 17% of Developmental Group 1200 withdrew from 1201 vs. 15% of Control Group 1201.

Developmental Group 1000 had slightly higher GPAs than Control Group 1001. The opposite was true of the Technical Math groups.

Those who received unsatisfactory developmental grades were more likely to withdraw. A high percentage of all groups withdrew from college after 0 to 3 quarters. Few of these students actually graduated. Of those who did, high percentages successfully completed the courses of this study. In fact, of those of the Developmental Groups who graduated, 100% had received S grades in their Developmental course. Likewise, 69% of Control Group 1201 and 89% of Control Group 1001 graduates had received A, B, or C grades in the regular course.

This study will be of significant importance to the administration and faculty of Northwest Technical College. This is the first collection of data concerning the success of developmental students. Although, it does not evaluate the program content or instruction, the information reported here can help answer the question "Are Northwest Tech students helped by completing developmental courses?" The study also provides information for educators interested in developmental education.

The results of this study will provide a starting point for further study of the Developmental Program at Northwest Technical College. Follow-up studies might be done to determine the local validity and reliability of the Comparative Guidance and Placement Test, to determine the correlation between IQ, high school GPA and success in the 1000/1001 and 1200/1201 sequences, and the correlation between CGP scores and ACT scores and student grades.

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