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ABSTRACT

During fall 1972, Bronx Community College inaugurated Project STIR, an interdisciplinary, block-programmed project designed to facilitate an intense, collaborative remediation program for entering Liberal Arts freshmen needing remedial assistance in reading, writing, and mathematics. This project was later renamed Project LINK, and was expanded to offer special courses for pre-nursing and evening students and to allow the enrollment of more Liberal Arts students. It was also expanded to include a full-semester orientation seminar for student counseling. This report presents the final assessment of the program. Results indicate that the program did little to reduce attrition, to improve achievement motivation or allied ego functions, or to improve writing or math ability. It was successful in improving reading competency. Methods of program evaluation are described, and faculty perceptions of the benefits and drawbacks of the program are noted. (DC)

ESEA - Title III Project No. # 42-736-109
"Remediation of Non-Cognitive and Achievement Deficits in Disadvantaged Community College Freshmen - Project LINK"

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Final Report

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PREFACE

The following report was made possible in part by the New York State Department of Education's Bureau of Two-Year College Programs, through an ESEA-Title III Grant #42-73G-109 to Dr. Richard A. Donovan, Associate Dean for Educational Development at Bronx Community College. His support was vital to this project. Grateful thanks are also extended to Dr. Nancy A. Hoddick of the Bureau of Two-Year College Programs for her help and support of this project.

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CHAPTER I

BACKGROUND AND INTRODUCTION

During the Fall 1972 semester, Bronx Community College inaugurated Project STIR, an inter-disciplinary, block-programmed project designed to facilitate an intense, collaborative remediation program for those entering Liberal Arts freshmen who needed remedial assistance in reading, writing and mathematics. Accordingly, the original STIR faculty consisted of one member from each of the three remedial subject areas plus an instructor in health (a credit-bearing college-level course) and one counselor. The Fall 1972 STIR program enrolled 38 day students; the Spring 1973 continuation, with the same faculty members, enrolled 30 day students. During the 1972-73 academic year, STIR faculty met as a project group at least once a week, on a regularly scheduled basis.

Since Project STIR was in essence a pilot program, project goals were stated rather globally by the faculty as follows: 1) integration of instructional efforts; 2) reinforcement of the philosophy of a humanistic approach to teaching; 3) on-going evaluation to assess progress; 4)socializing, both intra- and inter- staff and students; and 5) others, to come from the working group. These five goals formed the basis of a narrative report submitted by the project faculty involved.

A subsequent report in May 1973 by the Office of Institutional Research concerned itself with objective student output variables such as course registration, grades earned, pre- and posttest scores where available and retention rates, all in the Fall 1972 STIR group. Each academic subject component of the STIR program was analyzed separately and program-wide trends and preliminary conclusions were delineated. Through-out, data from two separate comparison groups were obtained:

1) Students eligible for STIR who expressed interest in the program as a result of a recruitment letter but who, for a variety of predominantly personal reasons (i.e. job conflicts etc.), did not enroll in STIR. This comparison group consisted of the same 33 students for all four academic subjects and will be referred to as "STIR eligible, non-takers".

2) Students in other class sections of the same course, during the same Fall 1972 semester who were taught by the same instructor as the STIR group. Although this comparison group was formed in the same manner for the four academic

subjects, the specific membership of each group varied as the college does not regularly operate in a block-programmed format. This group will be referred to for each academic subject as "Non-STIR, same instructor".

By specific academic subject areas, a variety of conclusions were reached for the pilot project. They will be enumerated here as these conclusions, in part, reveal the basis for Project STIR'S expansion. The expanded version was renamed Project LINK, and is the subject of the body of this evaluative report.

Fall 1972 STIR Findings

Reading. At the level of actual registration for the remedial reading course, designated RDL 02 for the entire college, a substantial difference was noted in favor of the STIR program. All STIR students were enrolled in RDL 02; by contrast, fully 50% of the STIR eligible, non-takers group were not enrolled in RDL 02 during the Fall 1972 semester, even though placement tests indicated RDL 02 was required. There seems to be a strong implication that the STIR block-program format seems to overcome some of the hazards inherent in a large traditional college registration procedure.

At the level of subject-matter mastery, the Department of Special Education Services routinely administers the Nelson-Denny Reading Test, Form A (Houghton, Mifflin Co.) to all incoming freshmen as a placement test. This department is responsible for all remedial reading courses; a raw score of 60 (corresponding to a grade-equivalent score of 11.4) has been established as the cut-off score below which RDL 02 is required. Form B of the Nelson-Denny is administered to those students for whom RDL 02 is required as an end-of-semester posttest. For these students, scores on Form A function as pretest scores. The department also administers a Departmental Final Mastery Test which emphasizes study skills as a second posttest measure.

A variety of statistical analyses, including an analysis of covariance on the Nelson-Denny posttest scores with the pretest scores as the covariate, found no evidence for differences in either direction between the STIR students and the comparison group of Non-STIR students taught by the same RDL 02 instructor. This result was not especially surprising as STIR embodied no new curricula or materials.

A product-moment correlation coefficient of .72 was obtained between the two posttest measures for the two groups pooled. Continued administration of both posttests seemed warranted in light of the .49 shared or common variance of the two measures and the concomittant .51 unique variance.

English. The only data available for the ENG 01 component of STIR was an analysis of ENG 01 grades earned by STIR students and by the STIR eligible, non-takers group. Unfortunately, grading practices are somewhat instructor-idiosyncratic. Fully 83% of the STIR students finishing the program received a grade of B for the ENG 01 course from the instructor, making comparisons somewhat problematic. No one received a grade of A, C or D.

By comparison, records indicated that only 18% of the 33 STIR eligible, non-takers group (6 students) received letter grades in ENG 01, in this case B's and C's. Another 15% received a grade of R (repeat) or F (failure), 6% received a grade of J (withdrawal) and 5% were enrolled in ENG 13 (college-level freshman English), even though they were required to take ENG 01 on the basis of a placement writing sample. The remaining 56% (20 students) of the comparison group were not enrolled in ENG 01 during the Fall 1972 semester, a finding analogous to that discussed in the preceding section under RDL 02. Again, all STIR students were at least registered for ENG 01; only 44% of the comparison group were so enrolled, in spite of placement results indicating its necessity for these students.

The grade-related difficulties in program assessment are fairly obvious; grading practices are not uniform from instructor to instructor nor from academic subject to academic subject. Evaluative conclusions must, of necessity, be cautious where grades form the data base. The homogeneous grades earned by the STIR students underlined this difficulty, and accordingly, procedures to evaluate the English (writing) component of further programs have stressed the necessity for measurements obtained on a more objective basis.

Mathematics. Again, only course registration in the first remedial mathematics course, designated MTH 05, and final grades therein were available as evaluative indicia for Project STIR. At the level of actual registration for MTH 05, there is, again, a substantial difference in favor of STIR. All STIR students were enrolled in MTH 05; by contrast, only 52% of the STIR eligible, non-takers comparison group were enrolled in MTH 05, even though placement tests indicated its necessity.

A comparison of grades awarded also seems to indicate a difference in favor of Project STIR: 58% of STIR students achieved passing letter grades from A to D, inclusive, as compared to 49% of the students in the Non-STIR, same instructor comparison group and 12% of the students in the STIR eligible non-takers comparison group.

The reasons for the difference, especially between the first two proportions cited above, are unclear. (48% of this last group were not enrolled in MTH 05; of the 16 students who were enrolled, only 25% passed the course with a grade from A-D, inclusive.)

Again, procedures to assess student progress in the mathematics component of further programs have stressed the necessity for measurements obtained on a more objective basis.

Health. HLT 91 (Critical Issues in Health) was the sole credit course that Project STIR students were enrolled in. At the level of course registration there was, again, a substantial difference in favor of Project STIR. All STIR students were enrolled in HLT 91; by contrast, only 27% of the STIR eligible, non-takers comparison group was enrolled in HLT 91.

Program-Wide Trends.

a) Registration: During the Fall 1972 semester 55% of the 33 STIR eligible, non-takers comparison group were not registered in RDL 02; 56% were not registered in ENG 01 and 48% were not enrolled in MTH 05. All three remedial courses were required for these students. By comparison, all STIR

students were enrolled in all three courses. As mentioned, these records suggest that the block-programmed format may be useful in overcoming some of the obstacles surrounding traditional registration procedures in a large college.

b) Retention: According to faculty records, 42 students registered for Project STIR in June 1972 and 38 students actually appeared in September 1972; 36 of these students finished the semester in January 1973, yielding a retention rate for the semester of 94%, a figure far in excess of any expectations.

Note: In fairness, it should be mentioned that Project STIR classes were in session between noon and 5:00 p.m. Students unable to commit this block of time were not registered for the program. Both comparative registration and retention data are undoubtedly affected by this factor.

Project LINK

The block-programmed format of Project STIR was expanded into the now renamed Project LINK in September 1973. LINK, as such, is thus an outgrowth of the interfaces between student needs, Project STIR evaluative data and continued program and curriculum development and implementation in the Office of the Dean of Academic Affairs.

The four faculty members which comprised the original 2 blocks of Project STIR (each of which contained a "family" of approximately 15 students) continued into Project LINK with but a change in counselor. During the Fall 1973 semester these 2 blocks were referred to as STIR/LINK; the students in these 2 blocks were, as before, Liberal Arts entering freshmen with remedial placements in reading, writing and mathematics. During the Fall 1973 semester there were an additional 3 blocks of Liberal Arts students, 2 blocks of Pre-Nursing students and 1 block of Evening students. Again, all students were entering freshmen with remedial placements in all three academic subjects.

The 8 blocks comprising Project LINK during the Fall 1973 semester started in September with a total of 123 students, 46 males and 77 females. All students in the 8 blocks took remedial reading (either RDL 01 or RDL 02) and remedial writing (ENG 01). All students in the 2 Pre-Nursing blocks took a remedial mathematics course open only to pre-nursing students

(MTH 08); students in most of the Liberal Arts blocks took the regular first remedial matnematics course (MTH 05); there were some Liberal Arts blocks where students took no mathematics course. Additionally, all students in the 8 blocks took Critical Issues in Health (HLT 91), the credit-bearing college-level course.

As mentioned in the narrative section of the original grant proposal, all LINK students were enrolled for the regular six-session orientation workshop/seminar (SPD 99) offered by the Department of Student Development to all entering freshmen at the college. Additionally, SPD 99 was extended through-out the semester for all LINK students. The results of tests administered under the provisions of this grant for the purposes of either guidance and counseling or program evaluation were used at the individual counselor's discretion, usually in supplementary individual counseling sessions.

During the Spring 1974 semester, Project LINK was composed of 5 blocks; 4 blocks were Liberal Arts and 1 was a Pre-Nursing block. There were a total of 68 new LINK students at the start of the Spring 1974 semester, 29 males and 39 females. As during the Fall 1973 semester, all students took remedial reading (either RDL 01 or RDL 02) and remedial writing (ENG 01). Again all Pre-Nursing students took MTH 08 and most of the Liberal Arts blocks took MTH 05. Again, all students were

enrolled in HLT 91 and SPD 99 for the entire semester. The original STIR faculty did not persist as an intact unit into the Spring 1974 semester.

During both the Fall and Spring semesters, a series of workshops were held for LINK counselors, academic faculty, administrators and the evaluation team. Although attendance was somewhat less than optimal, a substantial surfacing of both problems and advantages occurred.

As mentioned in the original grant proposal, the program objectives, listed in order of estimated liklihood of positive effects, were:

1. Reduced attrition
2. Improvement in specified dimensions of personality
3. Improvement in basic skills
4. Improved achievement in regular community college courses

The precise methodology and procedures followed for Project LINK program assessment follow separately in the next chapter.

CHAPTER II

DESIGN AND PROCEDURE

For the purpose of program evaluation, a variety of instruments assessing both scholastic aptitude and subject-matter achievement on the part of the students were administered in a pre- and posttest format to both Fall 1973 and Spring 1974 LINK groups. In all cases the instruments were administered as group tests. Additionally, a vocational interest inventory was administered once to each LINK group for guidance and counseling purposes. As mentioned earlier, individual results of the instruments used for program evaluation purposes were also made available to counselors on request by the Office of Institutional Research.

During the Fall 1973 semester the evaluation instruments were administered by either the counselors (scholastic aptitude, mathematics achievement) or the academic faculty (writing sample, reading achievement). The Fall faculty workshop surfaced some negative feelings of instrument-interference in the counselor-counselee relationship and, therefore, the Office of Institutional Research administered the scholastic aptitude instrument to all blocks and the mathematics achievement tests to some blocks during the Spring 1974 semester.

The appropriate academic faculty continued administration of the writing sample and reading achievement tests during the Spring semester; some mathematics faculty agreed to administer the Spring mathematics achievement test. Counselors administered the vocational interest inventory for both Fall and Spring LINK groups. In all cases, Spring and Fall, the Office of Institutional Research was available for make-ups of any missed instruments whatsoever.

For clarity, a calendar of the data collection schedule follows:

Fall 1973 LINK

September (Pretests)
Writing Sample
Nelson-Denny, Form A[1]
Educational Skills Test, Form A: Mathematics[2]
Differential Aptitude Test, Form L: Verbal Reasoning and Numerical Ability Subtests[3]

November
Kuder DD[4]

December (Posttests)
Writing Sample
Nelson-Denny, Form B[1]
Educational Skills Test, Form A: Mathematics[2]
Differential Aptitude Test, Form M: Verbal Reasoning and Numerical Ability Subtests[3]

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[1] Nelson, M.J., Denny, E.C. and Brown, J.I., Nelson-Denny Reading Test. Boston: Houghton, Mifflin Co.

[2] Educational Skills Test/College Edition: Mathematics. Monterey: California Test Bureau/McGraw-Hill, 1971.

[3] Bennett, G.K, Seashore, H.G., and Wesman, A.G., Differential Aptitude Tests. New York: Psychological Corporation, 1947, 1961.

[4] Kuder, F.G., Kuder form DD-Occupational Interest Survey. Chicago: Science Research Associates, 1964.

Spring 1974 LINK

February (Pretests)
Same as September, (see prior page)

April
Same as November, (see prior page)

May (Posttests)
Same as December, (see prior page)

The LINK groups for both Fall 1973 and Spring 1974 were described in detail in the preceding introductory chapter. The specific tests and procedures followed are described in the remainder of this chapter.

Measures

Writing Achievement. All English faculty in Project LINK obtained writing samples from their students during the first two weeks of class. The choice of topic was left to the student and a time limit of 20 minutes was imposed. Papers were then sent by section to the Office of Institutional Research where each paper was marked with a blue star; sections were re-assembled, and the papers were locked in a file cabinet. During the last two weeks of class the identical procedure was repeated; the papers were again sent to the Office of Institutional Research. This time the papers were each marked with a red star, and sections were re-assembled. At this

point, blue stars (pretests) and red stars (posttests) were combined for each section and a random re-assignment of each section's pre- and posttests was made to another English faculty member teaching in LINK. A cover letter was drafted (see Appendix A) wherein each English faculty person was asked to numerically rate each paper on an uncurved scale of 1 to 9. The faculty grader was unaware of the color coding scheme and did not grade his/her own students' papers. Moreover, the pre- and posttest for each student were rated by the same faculty grader. The intent of the procedure just described was the minimization of those variables which are commonly associated with a lack of internal validity. Procedures were identical for the 8 Fall 1973 LINK blocks and the 5 Spring 1974 LINK blocks, all of whom contained an ENG 01 component.

Reading Achievement. All entering freshmen at the college take the Nelson-Denny Reading Test, Form A as a placement examination. As mentioned in the introductory chapter, a raw score of 60 (grade-equivalent score = 11.4) is presently the operative cut-off point. During the Fall semester RDL 02 students were roughly grouped into two categories:

a) low group (raw score below 40; grade equivalent score less than 9.0) and b) higher group (raw score from 40-59; grade equivalent score between 9.0 and 11.4). Beginning with the Spring semester, the Department of Special Educational Services lengthened the remedial reading program to two courses, where necessary: RDL 01 (raw score below 40) and RDL 02 (raw score from 40-59). This curriculum change went through the regular College Curriculum Committee procedures.

Both RDL groups cited above were included in Project LINK; departmental posttest procedures are presently the same for both groups. The Nelson-Denny Reading Test, Form B and a Departmental Final Mastery Test are routinely administered by the department to assess end-of-semester student competency.

The Nelson-Denny includes two subtests, Vocabulary and Comprehension. Raw scores for these subtests are added together to get a total raw score, an indicia of reading competency. This total raw score was used in all data analyses. The Departmental Final Mastery Test emphasizes various study skills such as dictionary usuage, context clues, main ideas, outlining etc. and also yields a total raw score.

No reliability or validity information could be found for the Nelson-Denny. Similarly, no such information has yet been developed for the Departmental Final Mastery Test. Within these limitations,

the departmental assessment procedures were considered to be acceptable for LINK program evaluation purposes.

Mathematics Achievement. At the present time, mathematics placements at the college are accomplished by means of a student-mathematics instructor interview and an appraisal of high school mathematics preparation. The entering student is then placed either into a credit-bearing course, which may vary according to the students selected curriculum and his/her high school preparation and achievement, or into one of three remedial mathematics courses. For Pre-Nursing students, this remedial mathematics course is designated MTH 08; the course concentrates on the four basic arithmetic operations and concepts such as decimals, fractions and percentages. All other students requiring mathematics remediation are enrolled in either MTH 05 or MTH 06. MTH 05 concentrates on arithmetic review, elementary algebra and some computational geometry. MTH 06 encompasses intermediate algebra and some basic elements of trigonometry. MTH 05 usually has approximately double the course enrollment of MTH 06.

Project LINK included sections of MTH 08 for the blocks of Pre-Nursing students; there were 2 such sections during Fall 1973

and 1 such section Spring 1974. The Liberal Arts blocks, 5 in the Fall and 4 in the Spring, usually included a MTH 05 course, but not always. There was no mathematics course included in the Fall Evening block. Additionally, there was no MTH 06 included in either semester of Project LINK.

Since the department used no standardized instruments to assess student progress, the Educational Skills Test/College Edition: Mathematics (McGraw, Hill and Co.) (EST: Mathematics) was selected for evaluation and monitoring purposes. This instrument was administered in a pre- and posttest format to all MTH 08 and MTH 05 students both Fall and Spring. Counselors administered the test during the Fall semester; as mentioned, the Office of Institutional Research administered it during the Spring semester, although some mathematics faculty agreed to give it to their sections, also Spring semester. During the Fall semester, counselors also administered the EST: Mathematics to students in LINK not enrolled in any mathematics course. The research design used here was intended to make possible comparisons between MTH 08, MTH 05 and MTH 00 (no mathematics) groups.

The EST: Mathematics was specifically selected because, according to the Examiner's Manual[1] "EST was designed to meet the

[1] Educational Skills Test/College Edition: Mathematics, Examiner's Manual. Monterey: California Test Bureau/McGraw-Hill, 1971.

specifications of the curricula evolving in the open-door colleges of today." The test norms contained in the Examiner's Manual are derived from a sample drawn only from two-year institutions which are public, comprehensive, community colleges offering both transfer and terminal programs; all colleges are listed in the Junior College Directory published by the American Association of Junior Colleges. This standardization sample (N=4,217) was further broken down into three separate reference groups:

1. Students enrolled in mathematics courses listed as transfer credit toward the B.A. degree (N=2,003).

2. Students enrolled in mathematics courses labeled as terminal credit, A.A. degree (N=1,670).

3. Students enrolled in courses labeled as remedial (N=544).

Three separate sets of norms were derived, from the three reference groups listed above. This study used the norms derived from the remedial reference group, #3 above. The inclusion of the separate remedial norms, among other factors, seemed to be a test strength.

The content of the EST: Mathematics was not built on the usual arithmetic, geometry, algebra subtest scheme. Rather, it uses a scheme of fundamental knowledge, operations and problem-solving as the processes to be tested, with content drawn from the three areas

above in each of these processes. Accordingly, the test has three subtests and a resultant cumulative score:

a) Basic Information - Items (25) consist of terms, symbols, formulas, equivalents, which are deemed to be in the memory store as basic mathematical vocabulary. No calculations or derivations are required.

b) Computation - Items (25) consist of problems drawn from arithmetic, algebra, geometry and trigonometry.

c) Problem Analysis - Items (15) consist of word problems requiring skills used in the first two subtests plus the additional skills required in particular types of problem solving: determining the sufficiency of data for solving a problem, setting up a solution, and actually arriving at a correct solution.

The Examiner's Manual also gives extensive information on test score characteristics. Relevant portions of this information as being included below so that program results delineated in Chapter III might be clearly interpretable.

Reliability evidence of the EST: Mathematics scores is stated in terms of internal consistency only, by the usual Kuder-Richardson Formula 20 (KR-20). Also available are the standard errors of measurement for the raw scores, means, medians and standard

deviations (Table 1). Item statistics are also presented, in terms of item difficulty (% p) (Table 2). These statistics are derived from a relatively small sub-sample (N=209) of the entire original standardization group; the data contained in Tables 1 and 2 below are found on pages 27-28 of the previously cited Examiner's Manual.

Table 1

KR-20's, Means, Medians, Standard Deviations
and Standard Errors of Measurement for Raw Scores
EST: Mathematics, Form A
(N=209)

Test	No. of Items	KR-20	Mean	Median	S.D.	SEmeas.
Basic Information	25	.85	15.9	16	5.49	2.11
Computation	25	.86	14.5	14	5.31	1.96
Problem Analysis	15	.65	6.8	7	2.82	1.66
TOTAL EST: MATH.	65	.92	37.2	38	12.25	3.36

Table 2

Item Difficulties (% p)
EST: Mathematics, Form A
(N=209)

MATHEMATICS					
Basic Information		Computation		Problem Analysis	
Item No.	p	Item No.	p	Item No.	p
1	.87	1	.80	1	.40
2	.70	2	.65	2	.53
3	.77	3	.71	3	.82
4	.56	4	.84	4	.61
5	.56	5	.72	5	.67
6	.60	6	.81	6	.52
7	.72	7	.65	7	.18
8	.60	8	.67	8	.74
9	.62	9	.91	9	.37
10	.35	10	.51	10	.55
11	.40	11	.75	11	.51
12	.69	12	.67	12	.25
13	.34	13	.90	13	.24
14	.74	14	.59	14	.21
15	.49	15	.76	15	.18
16	.72	16	.61		
17	.51	17	.18		
18	.57	18	.42		
19	.71	19	.33		
20	.66	20	.46		
21	.70	21	.56		
22	.79	22	.43		
23	.57	23	.34		
24	.65	24	.21		
25	.66	25	.06		

The accurate interpretation of results in Chapter III might well be aided by information on two other aspects of the EST: Mathematics, the subtest intercorrelations and the percent of students in the standardization sample reference group #3 (norm group) who attempted all items, by level of performance. This information is contained in Tables 3 and 4 below and is cited in the Examiner's Manual on pages 30-31.

Table 3

Subtest Intercorrelation Coefficients
EST: Mathematics, Form A
(N as indicated in each cell)

Test N	Basic Inf.	Comp.	Prob. An.	Math. Total
Basic Information	1.00	.74	.58	.92
N	5167	5149	5142	5142
Computation		1.00	.58	.91
N		5156	5149	5142
Problem Analysis			1.00	.76
N			5149	5142
Math. TOTAL				1.00
N				5142

Table 4

Per Cent of Students in Reference Group #3 Attempting
All Items, By Level of Performance
EST: Mathematics, Form A
(N as indicated)

Test	Reference Group	Per Cent of Students Attempting All Items, By Fifths 1st	2nd	3rd	4th	5th	Total Group
Mathematics							
Basic Information	3	98	98	97	95	86	94
Computation	3	33	25	27	14	22	23
Problem Analysis	3	38	36	39	37	49	40
TOTAL	3	35	35	43	43	40	39

The Differential Aptitude Test: Verbal Reasoning and Numerical Ability subtests (Psychological Corp.) were also administered to all Fall and Spring LINK students in a pre- and posttest format, primarily to obtain an estimate of growth, if any, on a traditional "scholastic aptitude" measure.

However, the DAT: Numerical Ability (DAT: NA) scores might also be considered as a second measurement of mathematics achievement. More specifically, the 40 items on the DAT: NA assess competency in the four basic arithmetic operations, as well as such procedures as decimals, fractions, and percentages. There is no algebra, geometry, or trigonometry on the test.

The research design intended to assess differential growth, if any, between the three Fall LINK mathematics groups (MTH 08, MTH 05, MTH 00) and between the two Spring LINK mathematics groups (MTH 08, MTH 05) seemed even stronger with the addition of a second, different, mathematics achievement measure. Secondarily, the functioning of the two mathematics achievement instruments (EST: Mathematics and DAT: NA) in a student population such as LINK seemed to be potentially useful information for future evaluations of remedial mathematics programs.

Scholastic Aptitude. The Verbal Reasoning and Numerical Ability subtests of the DAT (Psychological Corp.) were administered to both Fall and Spring LINK groups as previously mentioned. The combined

score on the two subtests (DAT: VR + NA) yields a traditional measure of "scholastic aptitude". Form L was used as the pretest (Fall and Spring) and Form M as the posttest, also for both semesters. The revised Forms S and T were not yet available from the publisher in September 1973. (Although the standardization sample for Forms L and M dates to 1962, most test items date to 1947.)

The Fourth Edition Manual for the DAT [1] states that "Forms L and M contain tests which are equivalent in content and significance, though raw scores differ somewhat from one form to the other" (p. 15). The data analyses used with the DAT have obviated technical difficulties which might arise due to this non-equivalence. Analyses of covariance and product-moment correlations have been used; gain scores and their associated significance tests have not.

Unlike the recently developed EST: Mathematics, the DAT and its subtests are the subjects of a large body of published literature. For this reason, further descriptions of the instrument are probably not required in this section of the evaluation report.

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[1] Bennett, G.K. Seashore, H.G., Wesman, A.G., Differential Aptitude Tests, Fourth Edition Manual. New York: Psychological Corp., 1966.

Interests. The Kuder DD: Occupational Interest Survey (Science Research Associates) was used to assess vocational and personal interests for both Fall and Spring LINK groups. The instrument was primarily selected as a guidance and counseling adjunct, as stated in the original grant proposal. However, through intended use in a pre- and posttest format some indications of personal change were anticipated.

The first administration of the Kuder DD uncovered some problems concerning the validity of this instrument for students such as those in Project LINK. A substantial number of protocols were returned with an unacceptable or questionable "V score".

The planned pre- and posttest format was therefore discontinued and the instrument was administered only once to each LINK group. From this data, extensive cross-tabulations with both the Nelson-Denny Reading Test and the composite DAT: VR + NA score were performed. A report of these descriptive findings is included in the next chapter.

Procedural Deviations from Original Plan. In addition to the procedural modification concerning the Kuder DD just mentioned, two other difficulties arose, necessitating concomittant changes.

1) Although numerous students received a grade of R (Repeat) in various courses, no student received a grade of R in every course. Hence no student was willing to repeat Project LINK for a second semester. Such repetition for half of the students who did not reach standards in the Fall LINK group was originally postulated in the section entitled "Program Duration". A comparison was then to be made between LINK repeaters and non-successful Fall LINK students who repeated their remedial work in the regular college remedial format. This comparison was not possible for the reason just stated.

2) Since students who select themselves for participation in LINK presumably differ in material ways from students who prefer the Non-LINK regular remedial program, three subsamples of students were to be involved in the project evaluation. These three subsamples were to be: a) LINK students; b) Non-LINK students who did not wish to participate in LINK; and c) Non-LINK students who wished to participate in LINK but who could not be accomodated.

The project evaluation includes course registration, attrition and grade data for groups a) and b). However, all students who wished to participate in LINK were accomodated; hence the comparison group c) did not exist. Moreover, Non-LINK students in the comparison group b) could not be scheduled for the same testing program as LINK students.

Comparative evaluative data was therefore, of necessity, restricted to attrition data, and course registration and grades. (Substantial difficulty was also encountered in persuading LINK students of the importance of the testing program.)

There were no other procedural modifications or changes necessary. All other stipulated procedures associated with a) selection of student and staff participants, b) constant and differential features of the LINK and Non-LINK conditions, and c) design for assessing the effectiveness of the differential features were unaltered.

CHAPTER III

RESULTS

Attrition and course enrollment information through-out the year were collected for both Fall and Spring LINK groups. This information was also collected for the comparison group of 90 students who, on the basis of June 1973 placement testing, were also eligible for LINK on the basis of remedial placements in reading, writing, and mathematics.

The data from the LINK testing program were analyzed by computation of means and standard deviations for scores on all measures used in the study. Additionally, product-moment correlation coefficients were computed between all measures.

There was a problem with missing data, especially on the posttest measures. Accordingly, analyses of covariance with the pretest scores as the covariate were run on the intact data for all variables. The resultant unadjusted means and standard deviations for both pre- and posttest measures were then compared with the pre- and posttest score means and standard deviations obtained from students not taking both pre- and posttest measures.

The data from the LINK testing program were analyzed by numerous analyses of covariance, with a separate statistical test for treatment-group interaction. All data were analyzed separately by sex. Additionally, all mathematics measures were analyzed separately by the particular mathematics course enrolled in - MTH 08, MTH 05 MTH 00. Data on all variables were also analyzed separately by curriculum, Pre-Nursing vs. Liberal Arts. Data for the Fall semester on all variables were also analyzed separately for the two blocks of STIR/LINK vs. the remaining blocks.

The first two sections of this chapter contain the comparative information on attrition and course enrollment. The next three sections contain results pertaining to the writing, reading, and mathematics components of the LINK program. The next two sections contain results obtained from the scholastic aptitude and interest measures used in the study. The last section contains information obtained from LINK faculty.

Attrition

In a college as large as ours, attrition data is obtained by a comparison of computer registration tapes in successive semesters. All institutional data is retrieved in this manner. The question of attrition in smaller specialized programs is also answered via the

same procedure. However, in the case of experimental programs where attrition information is requested before the next semester begins, as herein, or where a more specific end-of-semester vs. beginning-of-semester retention percentage is desired, also as herein, a modification of the usual procedure is necessary.

The procedure used to compute an end-of-semester vs. beginning-of-semester retention percentage was the comparison of the registration roster with the end-of-semester computer grade print-out. Where the grade roster contained all grades of J or H (Official or Unofficial Withdrawal) or where grades were missing entirely, the student was counted as a program drop-out. This procedure was followed for the Fall LINK group and the Non-LINK comparison group for the Fall semester; it was also followed for the Spring LINK group for the Spring semester.

Follow-up of the two entering Fall groups, LINK and Non-LINK, was obtained through both a comparison of registration lists, Fall 1973 vs. Spring 1974, and a re-count at the end of the Spring 1974 semester on the basis of grade print-outs. This method was intended to provide as on-line information as possible.

Table 5 contains retention information for both Fall and Spring LINK groups and for the Fall Non-LINK comparison group.

Table 5

Project LINK: Retention Summary and Comparison
(N=123; 90; 68)

Group	Initial Regist. Fall 1973	End of Semester Fall 1973	Initial Regist. Spring 1974	End of Semester Spring 1974
Fall 1973 LINK	123	97	95	89
%		.79	.77	.72
Fall 1973 Non-LINK	90	72	59	59
%		.80	.65	.65
Spring 1974 LINK			68	57
%				.83

First-semester retention percentages for Project LINK, 79% in the Fall group and 83% in the Spring group, are not significantly higher than the Non-LINK comparison group figure of 80%. The first-semester

retention percentages for Project LINK are also similar to the institutional percentages obtained via the registration tape comparison method described on the prior page. The return-rate after the first-semester is currently approximately 75% for all students. Moreover, the first-semester return-rate for entering students with high school averages below 70 does not differ significantly from this 75% figure.

There was some tendency towards a sex-differentiated LINK first-semester retention percentage in favor of females. For the Fall LINK group, 82% of the females and 74% of the males were still enrolled at the end of the semester. The same tendency was evident in the Spring LINK group, where 87% of the females and 79% of the males were still enrolled by semester's end. This tendency in favor of female persisters was still in evidence when the Fall 1973 LINK group was followed to the end of their second semester: 77% of the females and 65% of the males remained.

As Table 5 indicates, the retention rate after two semesters was slightly higher for Fall LINK students than for the Non-LINK comparison group, 72% vs. 65%. This finding raises the question of possible differential long-term retention in favor of a special program, even when no first-semester or program-duration

differences are discernible. (A STIR follow-up addressed to this question is currently underway.)

The original STIR faculty, which persisted as a unit during the Fall 1973 semester in LINK, surfaced some feelings about possible differential retention in their 2 Fall STIR/LINK blocks. There was no evidence for any differential retention, in either direction.

Course Enrollment

All 123 Fall LINK students were enrolled in RDL 02 and ENG 01 during the Fall semester; 75 (or 61%) of the 123 students were enrolled in a remedial mathematics course. By comparison, only 47 of the 90 students in the Fall Non-LINK comparison group (or 52%) were enrolled in RDL 02; 48 of the same 90 students (or 53%) were enrolled in ENG 01; and 41 of the same group of 90 students (or 46%) were enrolled in a remedial mathematics course.

Again, as with Project STIR, students who were unwilling or unable to commit themselves to a block-schedule of at least three courses (RDL 02, ENG 01, HLT 91) or, more usually, four courses (RDL 02, ENG 01, HLT 91, and MTH 05 or 08), could not enroll in Project LINK. The Fall Non-LINK comparison group doubtless included

many students who could not so commit themselves. Remedial course enrollment figures for this Non-LINK comparison group are probably affected both by the time constrainsts the students bring to the registration procedure and by the number of courses they are willing to take at one time.

Writing

As mentioned previously, the writing samples obtained in regular ENG 01 class sessions were scored on an uncurved scale from 1 - 9. The overall pretest mean for the Fall LINK group was found to be 3.9, with a standard deviation of 1.7. 97 of the 123 LINK students submitted writing sample pretests. The overall posttest mean for the Fall LINK group was found to be 5.0, with a standard deviation of 2.1. However, only 76 of the 123 students submitted writing sample posttests. Therefore, the increase from pre- to post- in the Fall group might well be attributed to student self-selection on the posttest - with only the better student willing to take the posttest.

The problem just described was to be repeated on all measures, for both Fall and Spring LINK groups. There was a repetition of a relatively small pre- to post- increase, coupled with a striking

increase in posttest missing data. (Mathematics instruments, especially, showed this trend most strikingly.) Gains could not comfortably be attributed to the program.

To avoid endless repetition of this problem, it will not be re-illustrated under each of the following sections. To avoid possible misinterpretations of the results, analyses of covariance procedures were used on "intact" pre- and post- scores, those cases where both scores were available for a student. Various subsamples of LINK students, as mentioned, were contrasted in these analyses.

ANCOVA Results. Table 6 presents results for the various writing sample analyses of covariance. In all cases the pretest was the covariate.

Table 6

ANCOVA Results: Writing Samples, Fall and Spring LINK
(N = 123; 68)

Analysis	df	F
Fall LINK		
Males x Females	1, 63	1.54
Pre-Nursing (2 blocks) x Remainder	1, 63	12.78**
MTH 08 x MTH 05 x MTH 00	2, 62	4.23*
Spring LINK		
Males x Females	1, 37	0.46
MTH 08 x MTH 05	1, 32	1.12

**Significant at $p < .001$
*Significant at $p < .05$

The Fall F value of 12.78 cited in Table 6 represented a significant difference in writing scores when the two Pre-Nursing blocks were contrasted with the remainder of LINK; the Pre-Nursing students obtained significantly lower writing sample posttest scores. Since all Pre-Nursing students (and only they) took MTH 08, a more detailed 3-group analysis was run: MTH 08 x MTH 05 x MTH 00. A significant F value of 4.23 was obtained, with MTH 08 students, again, performing less well on the posttest than either MTH 05 or MTH 00 students.

The significantly lower writing sample posttest results for the two Fall Pre-Nursing blocks were not evidenced again in the Spring. However, in the Spring there was only one block of Pre-Nursing (MTH 08) students. Intact pairs of scores were available for only 6 of the Pre-Nursing students.

Ordinal Pre- and Post- Results. In an effort to assess the pre- and post- results more closely, the two protocols were examined for each of the students, Fall and Spring, with an intact pair of scores available. The results are presented in Table 7.

The results presented in Table 7 demonstrate that on occasion (23%, 10%) a time-blinded pretest writing sample may be scored higher than a time-blinded posttest writing sample when both samples are scored by the same instructor at the same time. These results would seem to indicate a possible "uneveness" in student writing performance, assuming

instructor rating is not a confounding variable.

Table 7

Ordinal Results: Writing Samples, Fall and Spring LINK
123; 68)

Group	Frequency	Percent
Fall LINK		
Pretest higher than Posttest	15	.23
Pretest and Posttest same	8	.12
Posttest higher than Pretest	43	.65
Total	66 *	100%
Spring LINK		
Pretest higher than Posttest	4	.10
Pretest and Posttest same	7	.18
Posttest higher than Pretest	29	.72
Total	40*	100%

*Note. - Fall: 66 of 123 students, or 54%, had intact pairs of scores. Spring: 40 of 68 students, or 59%, had intact pairs of scores.

Correlational Results. The obtained product-moment correlation coefficients between writing sample pretests and posttests were moderate for both semesters, .40 for the Fall group and .37 for the Spring group. Possibly the somewhat attenuated range of writing sample scores, in addition to factors discussed in the preceding section, served to depress the coefficients.

Writing: Summary. There seemed to be little evidence to substantiate a conclusion of significant improvement in student writing competency. Rather, there was some ordinal evidence for student "uneveness" in writing performance. Differentially, the Fall Pre-Nursing LINK students in ENG 01 evidenced significantly poorer end-of-semester writing performance than did students in the remaining Liberal Arts blocks.

Reading

As mentioned previously, the reading competency component of LINK was described through the use of both the Nelson-Denny Reading Test (N-D) in a pre- and post- format and the Departmental Final Mastery Test (DFMT) as a second outcome measure. Table 8 presents descriptive statistics, Table 9 presents various product-moment correlation coefficients between the cited measures, and Table 10 presents the results of the various ANCOVA analyses.

Table 8

Descriptive Statistics, Nelson-Denny Reading Test: Fall and Spring LINK
(N = 46, 77; 29, 39)

Group	Males Mean	Males SD	Males N	Females Mean	Females SD	Females N
Fall LINK						
N-D Pretest, Form A	42.1	11.1	45	41.8	12.2	74
N-D Posttest, Form B	53.2	12.5	33	51.1	14.8	59
Spring LINK						
N-D Pretest, Form A	42.9	12.1	24	37.7	7.0	27
N-D Posttest, Form B	54.0	14.8	19	47.5	12.4	24

The raw scores cited in Table 8 seem to indicate, for those students tested, equivalence between all groups, Fall and Spring, except for the Spring females who scored somewhat lower at both testings. The overall group means for both sexes pooled show a grade-equivalent score increase from 9.2 to 10.4 (Fall) and 9.0 to 10.2 (Spring). Again, this fairly uniform grade-equivalent increase of approximately one year in an essentially 4-month semester is difficult to interpret, given the lessened number of students appearing for the posttest. However, in

spite of possible student self-selection on the posttest, the obtained year score increase in roughly four months of elapsed instructional time would probably tend to substantiate a conclusion of programmatic adequacy, where reading skills are concerned.

Table 9

Product-Moment Correlation Coefficients,
Reading Measures: Fall and Spring
LINK
(N=variable)

	Males		Females	
Group	N-D Post-	DFMT Post-	N-D Post-	DFMT Post-
Fall LINK				
N-D Pretest, Form A	.59**	.34*	.65**	.45**
N-D Posttest, Form B		.42**		.45**
Spring LINK				
N-D Pretest, Form A	.61**	.45**	.82**	.65**
N-D Posttest, Form B		.55**		.70**

**Significantly different from zero at $p < .01$
*Significantly different from zero at $p < .05$

From data contained in Table 9, reading performance pre- to post- as measured by the standardized Nelson-Denny Reading Test seems to be fairly consistent, with the obtained pre- to post- coefficients uniformly high (.59 to .82).

The obtained coefficients between the N-D pretest and the DFMT are somewhat lower (.34 to .65). This would seem to indicate that although reading skills are associated with the skills in the Final Mastery Test, the latter instrument is probably somewhat wider ranging in content. Similarly, the relationship between the two outcome measures varies somewhat, with coefficients from .42 to .78.

Table 10

ANCOVA Results, Reading Measures:
Fall and Spring LINK*
(N = 123; 68)

Analysis	df	F
Fall LINK		
Males x Females	1, 88	2.26
Pre-Nursing (2 blocks) x Remainder	1, 88	0.27
MTH 08 x MTH 05 x MTH 00	2, 87	3.06
Spring LINK		
Males x Females	1, 40	0.67
MTH 08 x MTH 05	1, 34	0.21

* No analyses resulted in a statistically significant F ratio.

In all the ANCOVA analyses, the Nelson-Denny Pretest, Form A, scores were the covariate and the Nelson-Denny Posttest, Form B, scores were the outcome variable under consideration.

Reading Summary. Although technically somewhat difficult to interpret, LINK students evidenced gains on the standardized Nelson-Denny Reading Test. Whether this obtained gain was substantially greater than that evidenced by a Non-LINK comparison group could not be ascertained; Form B scores are not at this time routinely recorded where they can be computer retrieved. (Form A scores are recorded on computer tape for all students as a reading placement score. To retrieve Form B scores for the Non-LINK comparison group, rosters from all RDL instructors at the college would have been necessary.)

Reading performance and/or its measurement seems to be fairly consistent from beginning to end of semester, particularly where group standing, as measured by the correlation coefficient, is concerned. The various LINK sub-sample ANCOVA analyses delineated no significant differential results by curriculum group or sex.

Mathematics

As described previously, there were two Pre-Nursing LINK blocks in the Fall and one such block during Spring semester. The Pre-Nursing students, in all cases, were enrolled in MTH 06. The students in the Liberal Arts blocks, Fall and Spring, usually took MTH 05, but occasionally no mathematics, designated MTH 00. During the Fall semester the MTH 00 group was given the Educational Skills Test: Mathematics (EST: Math) by the counselors. (This was not possible during the Spring semester.) MTH 00, therefore, functioned as a comparison group during the Fall semester for mathematics program evaluation purposes.

Table 11 contains the descriptive statistics obtained from both the EST: Math and its subtests and the Differential Aptitude Test: Numerical Ability subtest (DAT:NA). Both instruments were administered in a pre- and post- format. Table 12 presents DAT: NA percentile equivalents; Table 13 presents the various product-moment correlation coefficients between the measures; the results of the various ANCOVA analyses are presented in Table 13 and Table 14.

Table 11

Raw Score Means, Mathematics Measures:
Fall and Spring LINK
(N = 46, 77; 29, 39)

	Pretest				Posttest			
Test	Males	(N)	Females	(N)	Males	(N)	Females	(N)
Fall LINK								
DAT: NA (Forms L and M)*	14.5	(32)	12.5	(63)	16.0	(24)	16.4	(49)
EST: Basic Information	7.8	(24)	7.0	(50)	9.9	(18)	8.3	(29)
Computation	6.6	(24)	7.2	(50)	8.8	(18)	8.0	(29)
Problem Analysis	3.2	(23)	3.0	(48)	4.0	(16)	3.3	(22)
Total	17.4	(24)	16.6	(51)	22.2	(18)	18.8	(29)
Spring LINK								
DAT: NA (Forms L and M)*	13.7	(22)	12.3	(35)	14.7	(18)	14.3	(28)
EST: Basic Information	6.8	(18)	6.0	(31)	10.8	(11)	9.0	(24)
Computation	5.2	(18)	6.1	(31)	7.6	(11)	8.1	(24)
Problem Analysis	2.9	(17)	2.6	(27)	3.6	(11)	2.6	(21)
Total	14.8	(18)	14.4	(31)	22.1	(11)	19.4	(24)

* Note - Raw scores on DAT: Forms L and M are not equivalent.
No significant differences between the sexes.

When the DAT: NA raw score group means presented in Table 11 were converted into percentiles for comparative purposes, the following equivalencies using published 12th grade norms were obtained:

Table 12

Percentile Equivalents, DAT: NA:
Fall and Spring LINK
(N = 46, 77; 29, 39)

Test	Pretest (%ile)		Posttest (%ile)	
	Males	Females	Males	Females
Fall LINK DAT: NA	.12	.13	.20	.22
Spring LINK DAT: NA	.12	.12	.17	.17

When the EST: Mathematics total score group means presented in Table 11 were converted into percentile equivalencies using the published reference group #3 (remedial) norms, the pre- to post- increase was found to be negligible. That is, the total score pretest group means for both males

and females, Fall and Spring, were all equivalent to an individual score at the 5 %ile. The obtained posttest total score group means, again for both males and females, Fall and Spring, were all equivalent to an individual score at the 6 %ile. In all cases, the group raw score pre- to post- increases represented an increase of 1% in placement using the standardized remedial norms.

By definition of the test domain, the DAT: Numerical Ability Subtest scores should be closely related in a predictive format to the EST: Computation subtest scores. Reference to Table 13 indicates that for the Fall LINK group this relationship was evident. The obtained Fall correlation coefficients between DAT: NA pretest scores and EST: Computation posttest scores was .40 (Males) and .63 (Females).

However, the predictive relationship was not evident during the Spring semester, with obtained coefficients of .19 (Males) and -.07 (Females). The various cell frequencies in Table 13 for the Spring semester were quite a bit smaller than for the Fall semester, but the lack of coefficient stability is still somewhat disquieting.

Similarly, the Spring coefficients obtained for females on the DAT: NA pretest with the 3 EST subtest posttests and with the total EST posttest score are disquieting, given that the DAT: NA is defined as a numerical ability/aptitude test.

The pre- to post- stability of the subtests can be extracted from Table 13. The coefficients ranged from -.12 (Problem Analysis) to .73 (Basic Information).

The correlational anomalies encountered with these two instruments might be viewed, in part, as an extension of the difficulty with the EST evident from the descriptive statistics in Table 11. That is, the mean gains over the 4 month instructional period on the EST were negligible; often they did not exceed the errors of measurement for the EST presented on page 21 of this report.

The results presented for both the DAT: NA and the EST suggest that growth, if any, in mathematics competency in LINK students occurs in the simple computational domain measured by the DAT: NA, not on the more sophisticated level of the EST. However, the issue of appropriateness of the EST for a truly remedial population seems to deserve more extensive investigation and replication.

Table 13

Product-Moment Correlation Coefficients, Mathematics Measures, Fall and Spring LINK
(N = Variable)

Pretest	Posttest DAT:NA Form M	EST: BI	EST: Comp	EST: Pr.An.	EST: Total	Posttest DAT:NA Form M	EST: BI	EST: Comp.	EST: Pr.An.	EST: Total
Fall LINK		Males						Females		
DAT: NA : (Form L)	.76	.65	.40	.23	.56	.71	.57	.63	.36	.68
EST: Basic Information	.48	.60	.29	.18	.45	.42	.59	.59	.25	.63
Computation	.63	.61	.53	-.06	.51	.43	.55	.45	.40	.58
Problem Analysis	.31	.27	.46	-.12	.32	.22	.32	-.07	.42	.22
Total	.60	.64	.45	.07	.52	.4[illegible]	.67	.51	.45	.68
Spring LINK		Males						Females		
DAT: NA: (Form L)	.47	.18	.19	.30	.22	.37	-.09	-.07	-.13	-.10
EST: Basic Information	.23	.73	.67	.60	.73	.00	.53	.40	.31	.49
Computation	.27	.53	.54	.50	.56	.13	.31	.37	.18	.35
Problem Analysis	-.14	.23	.27	.44	.30	.23	.32	.19	.23	.28
Total	.19	.63	.62	.60	.66	.12	.47	.41	.29	.46

ANCOVA Results. The ANCOVA results presented in Tables 14 and 15 were obtained from analyses which used either the DAT: NA pre- and post- scores or the EST: Mathematics Total pre- and post- scores. In both cases the respective pre-test scores were the covariate. Also, as in all ANCOVA analyses in this report, a separate F-test for homogeneity of the regression coefficient was performed prior to the computation of the usual F ratio. Except where specifically noted, this homogeneity of regression F-test always yielded non-significant results, indicating an absence of significant treatment-group-interaction effects.

Table 14

ANCOVA Results, DAT: NA Scores:
Fall and Spring LINK
(N = 123; 68)

Analysis	df	F
Fall LINK: DAT:NA		
Males x Females	1,63	0.30
Pre-Nursing (2 blocks) x Remainder	1,63	4.01*
MTH 08 x MTH 05 x MTH 00	2,62	4.42*
Spring LINK: DAT:NA		
Males x Females	1,39	0.01
MTH 08 x MTH 05	1,35	0.15

*Significant at $p < .05$

The Fall F value of 4.01 in Table 14 represented a significant difference in DAT: NA adjusted posttest scores when the two Pre-Nursing blocks were contrasted with the remainder of LINK; the Pre-Nursing students obrained significantly higher DAT: NA posttest scores. Since all Pre-Nursing students (and only they) took MTH 08, a more detailed 3-group analysis was performed: MTH 08 x MTH 05 x MTH 00. A significant F value of 4.42 was obtained, with MTH 05 performing significantly less well than either MTH 08 or MTH 00.

The significantly higher DAT:NA posttest results for the two Fall Pre-Nursing blocks were not evidenced again in the Spring. However, in the Spring there was only one block of Pre-Nursing (MTH 08) students and intact pairs of DAT: NA scores were available only for 9 of these students.

The Fall finding of significantly better end of semester mathematics performance by Pre-Nursing students (MTH 08 x MTH 05) as measured by the DAT:NA probably reflects the almost exact congruence between the test and the MTH 08 curriculum. However, the subsequent result when the MTH 08 x MTH 05 x MTH 00 analysis was performed is somewhat disquieting.

Table 15

ANCOVA Results, EST: Mathematics Total Scores:
Fall and Spring LINK*
(N = 123; 68)

Analysis	df	F
Fall LINK: EST Total		
Males x Females	1,40	0.80
Pre-Nursing x Remainder	1,40	0.23
MTH 08 x MTH 05 x MTH 00	2,39	0.14
Spring LINK: EST Total		
Males x Females	1,31	0.40
MTH 08 x MTH 05	1,31	2.60

* No analyses resulted in a statistically significant F ratio.

When ANCOVA results for the Computation subtest of the EST were examined, there were no significant differences in favor of Pre-Nursing (MTH 08) blocks for the Fall, as the DAT:NA results would have suggested. Again, there was a lack of consistency in results between the two mathematics measures.

Mathematics: Summary. On the basis of the EST, there was no evidence to support a conclusion of significant improvement in mathematics competency among LINK students. In many cases, gains did not exceed the standard

error of measurement. Moreover, the pre- to post- correlation coefficients for scores on some of the subtests of this instrument evidenced or pronounced lack of stability over the 4 month instructional period. However, adequacy of the instrument has not been fully demonstrated.

On the basis of the DAT:NA scores, there was some evidence for differential posttest computational performance in favor of MTH 08 Pre-Nursing students. Somewhat peculiarly, when MTH 00 performance was added to the analysis, both MTH 08 and MTH 00 students evidenced a greater gain in computational proficiency than did MTH 05 students.

Scholastic Aptitude

The Differential Aptitude Test: Verbal Reasoning and Numerical Ability (DAT: VR + NA) composite score yields a traditional measure of scholastic aptitude. A basic research question underlying the use of this instrument was whether or not time or the instructional process could indeed effect an obtained score increase on what has been traditionally regarded as a more "fixed" attribute than achievement in a specific academic subject. Secondarily, the individual results on the DAT were made available to counselors on request for guidance and counseling purposes.

Percentile equivalents for group means on the composite DAT: VR + NA scores are presented in Table 16. As with the NA mean percentile equivalents on page 47 of this report, published 12th grade norms were used.

Table 16

Percentile Equivalent Scores, DAT: VR + NA:
Fall and Spring LINK
(N = 46, 77; 29, 39)

Test	Pretest (%ile)		Posttest (%ile)	
	Males	Females	Males	Females
Fall LINK				
DAT: VR+ NA	.14	.13	.22	.19
Spring LINK				
DAT: VR + NA	.13	.14	.14	.16

From Table 16, scores on the composite DAT: VR + NA showed an increase for the Fall LINK group, but not for the Spring group. The obtained Fall increase pre- to post- led to the differential ANCOVA analyses presented in Table 17. In all cases, the DAT: VR + NA score was the covariate.

Table 17

ANCOVA Results, DAT: VR + NA Scores,
Fall and Spring LINK
(N = 123; 68)

Analysis	df	F
Fall LINK		
Males x Females	1,65	11.14**
Pre-Nursing x Remainder	1,65	2.81
MTH 08 x MTH 05 x MTH 00	2,64	2.91
Spring LINK		
Males x Females	1,39	0.03
MTH 08 x MTH 05	1,35	0.74

**Significant at $p < .01$

Somewhat surprisingly, there were differential gains in the composite VR + NA score when the data were ANCOVA analyzed by sex. Fall males evidenced significantly higher end of semester performance on the measure of scholastic aptitude. When additional Fall analyses were performed by specific subtest (VR and NA separately), the differential gain was evidenced on the VR subtest by the males.

Scholastic Aptitude: Summary. Scores on a traditional measure of scholastic aptitude showed some increase for the Fall LINK group. Somewhat unexpectedly, differential increases in favor of males were obtained, with the differential gain attributable to Verbal Reasoning subtest score gains by the males. The Fall results were not found again for the Spring group; here, pre- to post- scores showed little change. The various analyses performed seem to suggest that indicia of scholastic aptitude might not be as "fixed" as has been traditionally supposed, although increases noted for the Fall group might well be interpreted as the usual regression toward the mean. Further research in this area, using a large subject pool, would be most informative.

Interests

Originally, the Kuder DD was to be administered to all LINK students in a pre- and post- format to assess changes in inventoried interests. The individual results were also to be made available to counselors for guidance and counseling purposes. The initial administration of the Kuder DD turned up some unexpected instrument-

related problems with our students; accordingly, the original pre- and post- format was modified to include only one test administration per LINK group.

The Kuder DD V score proved to be somewhat problematic. The Kuder DD protocols are returned by Science Research Associates without an occupational print-out if the V score is less than 40 and/or if all occupational ranked values are less than .30. However, the Kuder DD General Manual (p. 6) cites a V score below 45 as suspect. Fully 19% of the 84 Fall Kuder DD protocols listed V scores between 40 and 44, the area of suspect validity; Unfortunately, the SRA computer does list occupational print-outs for scores in this range. The General Manual (p. 22) additionally cites a V score below 47 as psychometrically unacceptable.

If the less stringent criterion for acceptability, a V score of 45 or more is used, only 50% of the 84 Fall Kuder DD protocols were valid and usable. On replication with the Spring LINK group, 43% of the 33 protocols were again invalid.

For even the valid protocols, those with V scores of 45 or more, the occupations most frequently suggested on the basis of interests seemed oddly at variance with the students academic placement into remedial courses. Example: of 30 valid Fall female protocols

the most frequently suggested occupations were: Pediatrician (28), Psychiatrist (24), Physician (21), Optometrist (20) and Dentist (19). The Kuder Manual stresses the need for protocol interpretation in light of academic achievement and ability; never-the-less, computer print-outs listing the occupations just cited seem inadvisable and inappropriate for students enrolled in remedial courses.

The entire question of exactly why there were so many protocols with low V scores is being analyzed; the analyses are being done by reading score and DAT: VR and DAT: VR + NA scores.

Faculty Input

As previously mentioned, faculty workshops were held during both semesters. Although attendance was somewhat less than optimal, a variety of programmatic advantages and problems were surfaced.

Major advantages cited centered on the following:

1. Cross-discipline faculty facilitation as an outgrowth of the weekly faculty conferences, held by each LINK block individually. Teaching methods, common curricular areas, and problems served as foci of these meetings.

2. Better understanding of the particular strengths and problems of individual students, also as an outgrowth of the weekly, faculty conferences.

3. Less chance of a students "getting lost". This advantage was cited primarily by the counselors. From the weekly meetings, the counselor knew which student had not attended classes; Therefore, the counselor intensified efforts to contact the student.

Major problems cited were primarily structural and centered on the following:

1. Individual academic departments did not schedule or take into account the weekly two hour faculty conference. Therefore, in some LINK blocks, the four faculty members did not have a common, free time to meet.

2. Responsibility for opening and closing sections at registration was somewhat ambiguous, with some department chairmen somewhat reluctant to relinquish authority to the Project Director.

3. The Mathematics Department modularized many sections of MTH 05. LINK students therefore did not all stay with the same mathematics instructor for the semester. This proved to be fairly disruptive to the familial framework for faculty and students in the blocks.

4. SPD 99 is a non-credit course. Students are sometimes quick to grasp the fact that although attendance is requested, non-attendance carries no sanctions or penalties. Hence, not all college drop outs are immediately recognized as such.

The recommendations and conclusions that follow from the results cited in this chapter are detailed separately in the next concluding chapter.

CHAPTER IV

CONCLUSIONS AND RECOMMENDATIONS

Achievement of Project Objectives

As mentioned in the original grant proposal and as restated on page 11 of this report, the program objectives, listed in order of estimated likelihood of positive effects, were:

1. Reduced attrition
2. Improvement in specified dimensions of personality
3. Improvement in basic skills
4. Improved achievement in regular community college courses

The achievement of each of the above objectives will be detailed separately.

Attrition. First-semester retention percentages for Project LINK, 79% in the Fall group and 83% in the Spring group, are not significantly higher than either the Non-LINK comparison group figure of 80% or the institutional first-semester return rate of approximately 75%. However, there was some evidence to support a conclusion in favor of some differential female

first-semester retention- 82% in the Fall group and 87% in the Spring group.

When the Fall LINK students were followed into their second semester, the retention rate for LINK was slightly higher than for the Non-LINK comparison group, 72% vs. 65%. Again, females persisted at a somewhat higher rate, 77% vs. 65%. The two-semester LINK vs. Non-LINK differential raises the question of possible differential long-term retention in favor of a special program, a question which is unanswerable immediately.

However, in all fairness, the retention rate exhibited by the pilot project, STIR, was not evident on replication and expansion of the program.

Dimensions of Personality. Differential retention, LINK vs. Non-LINK, would offer direct evidence of increased persistence and indirect evidence of an increase in such constructs as achievement motivation and allied ego functions. No conclusion of improvement in these specified dimensions of personality can be drawn on the basis of retention figures cited.

On a more superficial level, instrument-related validity problems preclude any conclusion as to changes in interests on the part of LINK students.

Basic Skills. a) There was no evidence to substantiate a conclusion of significant improvement in writing skills.

b) On the basis of Nelson-Denny results, there was sufficient evidence to conclude that reading scores for the LINK group had been raised.

c) On the basis of the Educational Skills Test: Mathematics there was no evidence for any improvement in mathematics competency. However, on the basis of the DAT:NA scores, there was evidence of substantial improvement in the computational skills of the Pre-Nursing students.

d) Allied to the basic skills, there was a somewhat idiosyncratic finding of an increase in measured scholastic aptitude on the part of Fall male LINK students, particularly where verbal reasoning abilities are concerned.

Regular Community College Courses. This last objective must be assessed longitudinally. The LINK and Non-LINK groups will be followed with respect to: cumulative grade point average in college-level courses, degree credits earned; graduation or successful transfer from the college.

Plans for Project Continuation

Some faculty have expressed an interest in continuing the project; the Office of the Dean of Academic Affairs is amenable to this. The History and Social Science Departments want to join such an enterprize; the Office of the Dean of Academic Affairs is also amenable to this. As individual departmental or faculty interests so dictate, modified blocks will be scheduled.

Modifications or Changes in College Program

Various areas of change have been rather clearly delineated by the project and its assessment. From the standpoint of program and student competency assessment, the inadequacy of standardized, norm-referenced instruments has been underscored. Criterion-referenced, objectives-based tests should probably be developed in writing and mathematics. Specific competency or skill attainment on the part of the student could then be described.

Also as a result of the program assessment, various technical questions seem to deserve further research. Primary among these questions are those related to the validity of the Kuder DD for

inner-city students and those related to the gratifying increase in measured scholastic aptitude among our Fall male students.

In a much larger context, Project LINK has served to breakdown some of the rigid curricular boundaries between basic skill academic areas that are in reality quite interrelated. Interdepartmental communication concerning teaching methods and curriculum has improved substantially on the level of individual faculty, even if structural difficulties inherent in a traditional, departmental college remain.

The college is fully aware of these structural difficulties. The Office of the Dean of Academic Affairs has sought to obviate many of these problems through a proposed "Cluster College". This College, in essence, would be an expansion of Project LINK, into a structure where chances of success might be enhanced. Analogously, the college is aware of the need for instructional development, instruction methods and materials especially suited to our particular student population.

The experience with Project LINK has sensitized both faculty and administration to the problems and chanllenges posed by our remedial students. Hopefully this report has managed to convey some of our efforts to meet this challenge.

APPENDIX A

TO: ENG 01 Instructors, Project LINK

FROM: Dr. Thea Benenson TFB

DATE: January 7, 1974 May 8, 1974

RE: Evaluation of ENG 01 Component of Project LINK

Enclosed you will find writing samples collected from students currently in Project LINK, but taught by a colleague. Detailed comments or corrections on each paper are NOT necessary. Merely assign a numerical grade to each paper, using the following scale with your own grading standards. The numerical grades need NOT be curved in any way.

1 = The lowest level of writing.
2 = ⎫
3 = ⎬ These numbers are available to describe
4 = ⎭ gradations between 1 and 5.
5 = The mean (average) level of writing.
6 = ⎫
7 = ⎬ These numbers are available to describe
8 = ⎭ gradations between 5 and 9.
9 = The highest level of writing.

Please return the papers, marked with a number from 1 to 9, to me, Room 409 Gould Residence Hall at your earliest convenience. It is important that the papers are returned before intersession (June 1) since final data analysis is due to start at that time.

At this point I want to again express my personal thanks for your time and effort. Should there be any questions, I can be reached at extension 654.

TFB:sb
cc: Dean Richard Donovan
Dr. Norman Eagle

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