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ABSTRACT

The report analyzes the values of the Career Development Inventory (CDI) as a means of assessing the vocational maturity of the 44 students in the Appalachia Educational Laboratory's Employer-Based Career Education (AEL/EBCE) program. The test instrument measures attitudinal and cognitive skills which correspond with program goals, and was considered sufficiently reliable and valid as a measure of vocational maturity for the purposes of evaluating the AEL/EBCE program. The results of the administration of the CDI to the students on three occasions indicate that EBCE students performed best on the cognitive section of the test, and poorest on the first of two attitudinal sections. The report concludes that compared with a tenth grade norm group, the EBCE students' entering scores on the CDI were low, and the rank of the subtest scores was the reverse of the expected order. The test also indicated the importance of a counselor with wide-ranging knowledge of vocational development theory and a variety of career experiences on the cognitive career skill development of the students. (Author/JR)

Employer-Based Career Education

TR 37

Analysis of Scores on the Career Development Inventory

ACHIA EDUCATIONAL LABORATORY, INC.
Charleston, West Virginia 25325

September, 1973

Cover picture: Sam Burge, an EBCE student learns the fundamentals of operating a television camera at WMUL-TV in Nitro, West Virginia

Employer-Based Career Education

Analysis of Scores on the Career Development Inventory

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TECHNICAL REPORT NO. 37

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Preface

The following technical report is one of a series resulting from the evaluation of the Employer-Based Career Education program (EBCE) conducted by the Appalachia Educational Laboratory, Inc. The program is being designed as an educational alternative to conventional high schools through which students learn from planned experiences at employer sites as well as through individually guided academic experiences.

The focus of this report is measured changes in vocational maturity of the students participating in the program. Of particular concern is their planning orientation, familiarity with resources, and knowledge of occupations and career decision-making principles. The report is based on data collected during the first year of program operations, from September of 1972 through June of 1973.

The report was written by Dr. John T. Seyfarth, West Virginia College of Graduate Studies, under contract to the Laboratory. The EBCE evaluation was conducted and supervised by Dr. James H. Sanders, Evaluation Specialist with the Laboratory, and under the general direction of Dr. Charles L. Bertram, Director of Research and Evaluation for the Laboratory.

Members of the EBCE planning and operational staff participated in critical reviews of earlier drafts of the report. Critical reviewers included Ms. Charlotte Hollenberg, Associate Educational Development Specialist, and Dr. Charles G. Herger, Associate Educational Development Specialist.

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Introduction

Appalachia Educational Laboratory is one of four agencies in the United States involved in testing an employer-based career education model.[1] The program integrates academic studies with job experiences for high school-age students. Forty-four twelfth grade students participated in the initial year of the AEL/EBCE program, 21 entering in September (1972) and the other 23 in January (1973). The volunteers were from among currently enrolled seniors in Kanawha County (West Virginia) high schools who were able to complete the requirements for a diploma by June.

A wide range of abilities was represented in the group. Two Merit Scholarship finalists were among those who took part, and the group included other students with limited academic abilities.

The Career Development Inventory (CDI) Form 1 by Donald E. Super and David J. Forrest was one of several instruments participants completed as part of the program evaluation. The CDI was given on three occasions--in September, February, and May. In this report, Group I refers to those students who started the program in September and took the CDI three times. Group II students entered in January and completed the instrument at the second and third administrations.

Program Outcomes

A number of the student-related goals for the AEL/EBCE program refer to skills measured by the CDI. A partial list of these goals follows.[2]

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[1] Sidney P. Marland, Jr. "Career Education: A Report," NASSP Bulletin, LVII (March, 1973), p. 7.

[2] James H. Sanders. Outline of Product Evaluation Plan for Employer-Based Career Education. (Charleston, W.Va.: Appalachia Educational Laboratory, Inc., 1972), p. 2.

The student who completes the program should be able--

1. To make a realistic career choice based on abilities, interests, and values and the requirements of selected career areas.
2. To increase his knowledge of the variety of opportunities in the world of work.
3. To identify the functional, adaptive, and specific skills required for selected work situations of his choice.
4. To develop acceptable problem-solving, planning, and decision-making skills.
5. To document his educational needs (with the help of the staff) in relation to his career and/or academic goals.

The Instrument

The Career Development Inventory is a self-administered paper-and-pencil instrument intended to measure vocational maturity of adolescent boys and girls. The instrument yields three scale scores and a total score. The scales are: (A) Development of a planning orientation toward a career (33 items); (B) Familiarity with and use of the resources which can be helpful in vocational exploration (28 items); (C) Knowledge of occupations and of career decision-making principles (30 items). The first two scales are described by the authors as attitudinal, and the third as cognitive. The total score is intended as a measure of overall vocational maturity.

The authors of the CDI believe that "the adolescent years are for most boys and girls years of vocational exploration".[3] They hold that high school students generally are not prepared to make long-term vocational commitments and that they need a chance to try out a variety of different occupations

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[3]Donald E. Super and David J. Forrest. Career Development Inventory Form I Preliminary Manual. (New York: Teachers College, Columbia University, 1972) (Mimeograph), p. 11.

for short periods of time. Properly guided, young people who have this opportunity progress rapidly to a point where they can make intelligent and informed vocational decisions.

The AEL/EBCE program and others like it provide varied and realistic vocational experiences for adolescent boys and girls and thereby, hopefully, advance these students to higher stages of vocational maturity.

Reliability Measures

The CDI yielded stable scores when 82 tenth grade students were retested within two to four weeks. The reliability coefficients ranged from .71 on Part C to .85 on Part A. For the total score, the reliability coefficient was .87. Somewhat lower coefficients (ranging from .67 to .71) were found when larger numbers of tenth graders were retested at six month intervals.[4] Nevertheless, the reliability of the instrument appears to be suitable for present purposes.

Although minimum fluctuation in scores is desirable over short intervals of time, an instrument which purports to measure an age-related developmental variable such as vocational maturity should show consistent changes in the predicted direction over longer intervals. This in fact occurred when the CDI was given to a cross-section of eighth, tenth, and twelfth grade students. The number in each group ranged from 60 (low) to 82 (high). Differences in mean scores on the three scales and total test were significant at the .01 level of confidence by analysis of variance.

Construct Validity

Construct validity refers to whether an instrument measures the characteristics it claims to measure. Since there is no commonly accepted

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[4] Ibid., pp. 20-21.

measure of vocational maturity, it is difficult to establish the construct validity of an instrument. The evidence for the construct validity of the CDI is based for the most part on correlations between scores by tenth grade students on the CDI and two other recognized vocational instruments. They were the Crites Vocational Development Inventory and the Gribbons and Lohnes Readiness for Career Planning Scale. The correlation between scores of 100 tenth grade students on the CDI Part A and the Vocational Development Inventory total score was .42 ($P < .01$).

Fifteen tenth grade students took the individually-scored Readiness for Career Planning scale, and significant correlations were found between the single score yielded by that instrument and scores on the CDI. The correlations were .74 for Part A ($P < .01$); .67 for Part B ($P < .01$); .61 for Part C ($P < .05$) and .75 for CDI total ($P < .01$).

The Findings

The means and standard deviations on the three subtests and the total instrument for the two groups of students on three occasions are presented in Table 1.

In Table 2, mean differences and t-test scores for both groups on three subtests are shown. Group I had statistically significant gains in February and in May on Part A (Planning Orientation), whereas Group II had positive but not statistically significant gains on that section. Group I had a statistically significant positive gain on Part B (Resources for Exploration) in February and a slight (not statistically significant) loss in May. Group II had a slight loss (not statistically significant) on Part B in May. Group I had a slight loss on Part C (Information and Decision Making) in February and a slight gain in May (neither statistically significant). Group II had a statistically significant loss on Part C in May. Graphical presentations

Table 1

Subtest and Total Means and Deviations on Career Development Inventory by Group and Date

Scale	Sep. Mean	Sep. SD	Feb. Mean	Feb. SD	May Mean	May SD
Part A						
Group I	99.10	20.46	117.52	17.46	119.10	20.27
Group II			103.43	17.73	108.00	19.19
Part B						
Group I	255.76	53.03	271.43	54.31	263.57	60.75
Group II			259.83	54.10	251.30	65.08
Part C						
Group I	19.29	4.86	19.19	5.20	19.81	5.67
Group II			20.09	5.28	18.52	6.14
Total						
Group I	374.14	65.67	408.14	64.86	402.48	78.50
Group II			383.35	63.77	377.39	76.51

Table 2

Mean Difference Scores and t-Test Values for CDI by Group

Scale	Sept.-Feb. Mean	Sept.-Feb. t	Feb.-May Mean	Feb.-May t
Part A				
Group I	18.43	2.71**	1.57	1.59*
Group II			4.57	0.94
Part B				
Group I	15.67	1.46*	-7.86	0.78
Group II			-8.52	0.77
Part C				
Group I	-0.10	0.67	0.62	0.89
Group II			-1.83	2.33**

* P<.10
** P<.05
*** p<.01

of the means appear in Figures 1, 2, and 3.

The CDI is still in the process of development, and national norms are not yet available. In fact, the only norms presented in the Manual were based on scores by 400 tenth grade students in Genesee County, Michigan. Comparisons of initial scores by EBCE students with the percentile scores developed for the Michigan students are shown in Tables 3 and 4. (The instrument used with EBCE students contained two fewer items on Part B. However, the adjustment in scores would have made only slight differences in the findings.)

In relation to the Michigan students, both groups of EBCE students do best on Part C and poorest on Part A of the CDI. The authors suggest that the more common order of development is for the skills represented by Part A of the CDI to be mastered first, and those tested by Part C last. They note that students with low Part A scores and high B and C scores "may have developed superficially and with unwarranted rapidity in the exploratory and decision-making areas, without being really ready for those experiences".[5]

In Table 5, scores of EBCE students on the three CDI subtests and total for the May testing are compared with means of twelfth grade students. The data are from the CDI manual 6. No information was provided about the comparison group except that they attended a suburban high school.

Presumably some of the increase in scores on the CDI between September and February can be attributed to maturation and normal adolescent experiences rather than to the effects of the program alone. Assuming that students entering the program in January were similar to the initial group except for treatment differences, a comparison of scores of the two groups on the February

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[5]Donald E. Super and David J. Forrest. Career Development Inventory Form I Preliminary Manual. (New York: Teachers College, Columbia University, 1972) (Mimeograph), p. 18.

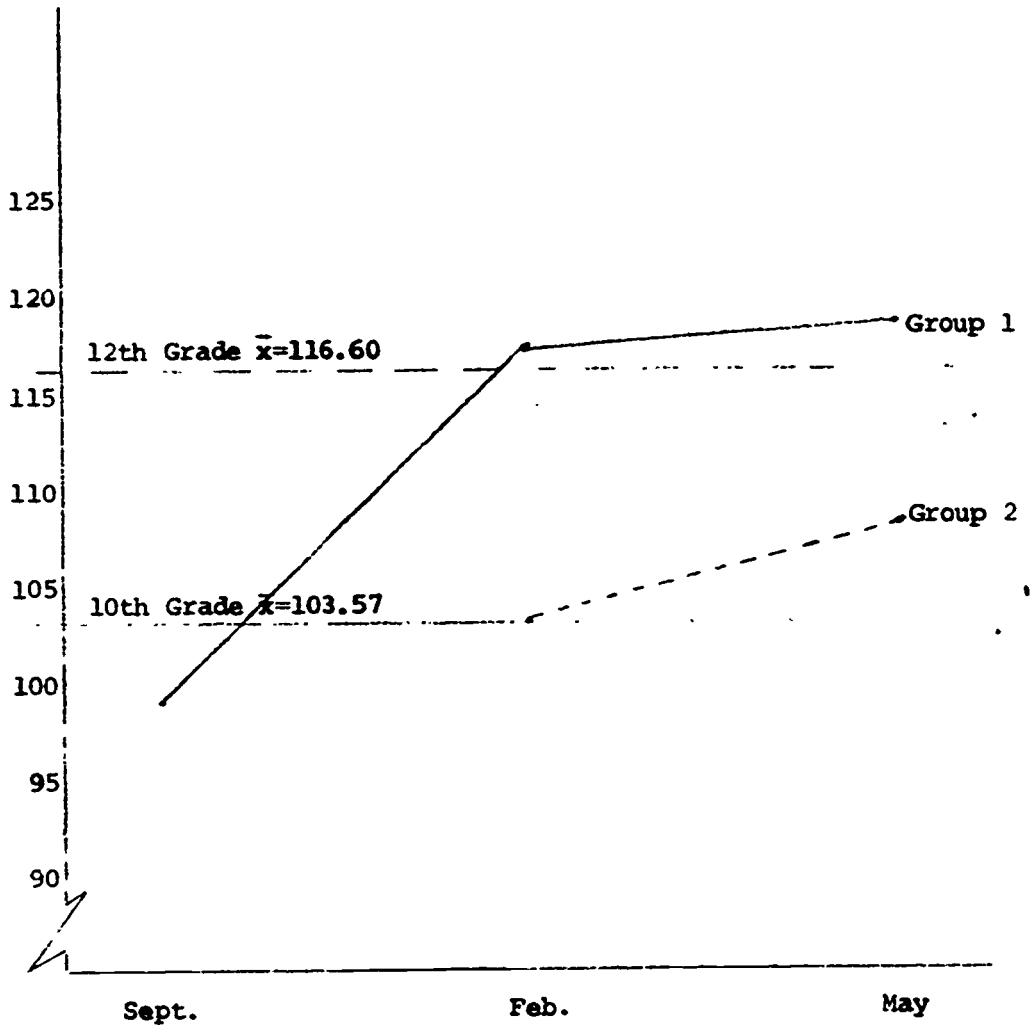

Figure 1

Scores on CDI - Part A by Group and Date

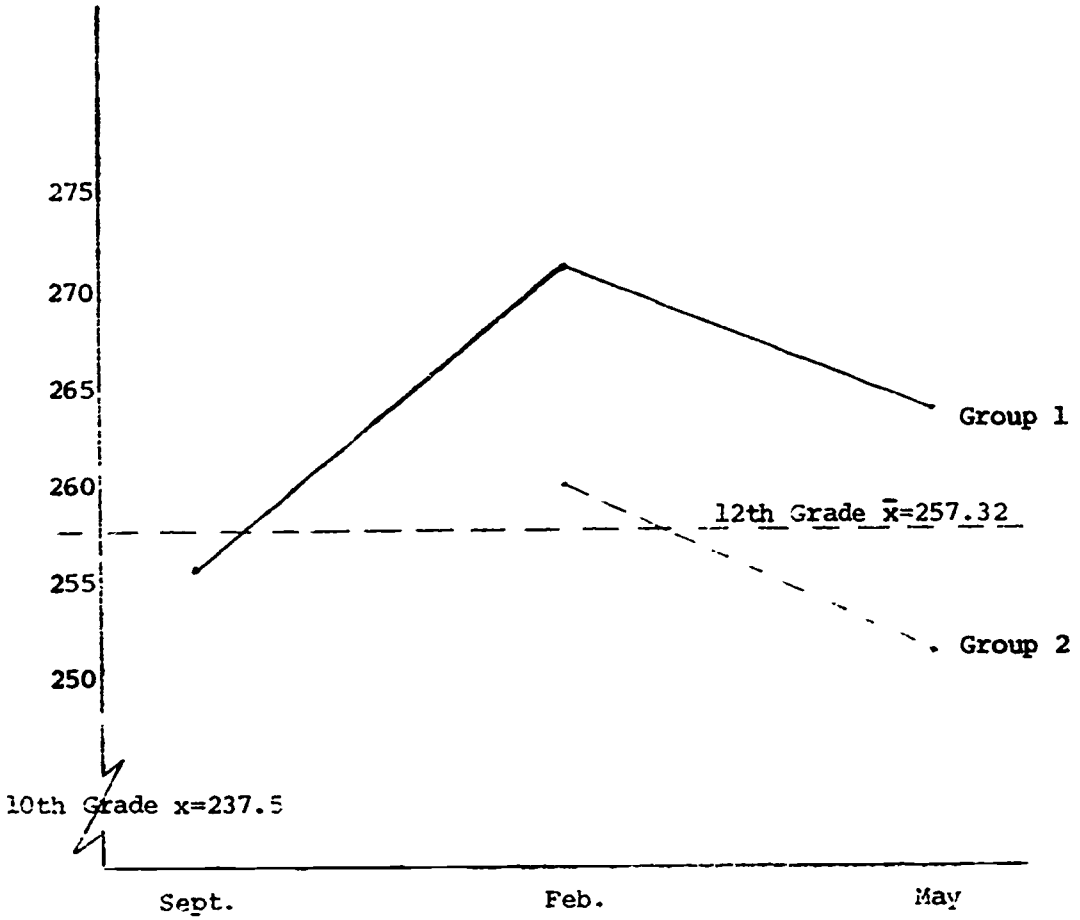

Figure 2

Scores on CDI - Part B by Group and Date

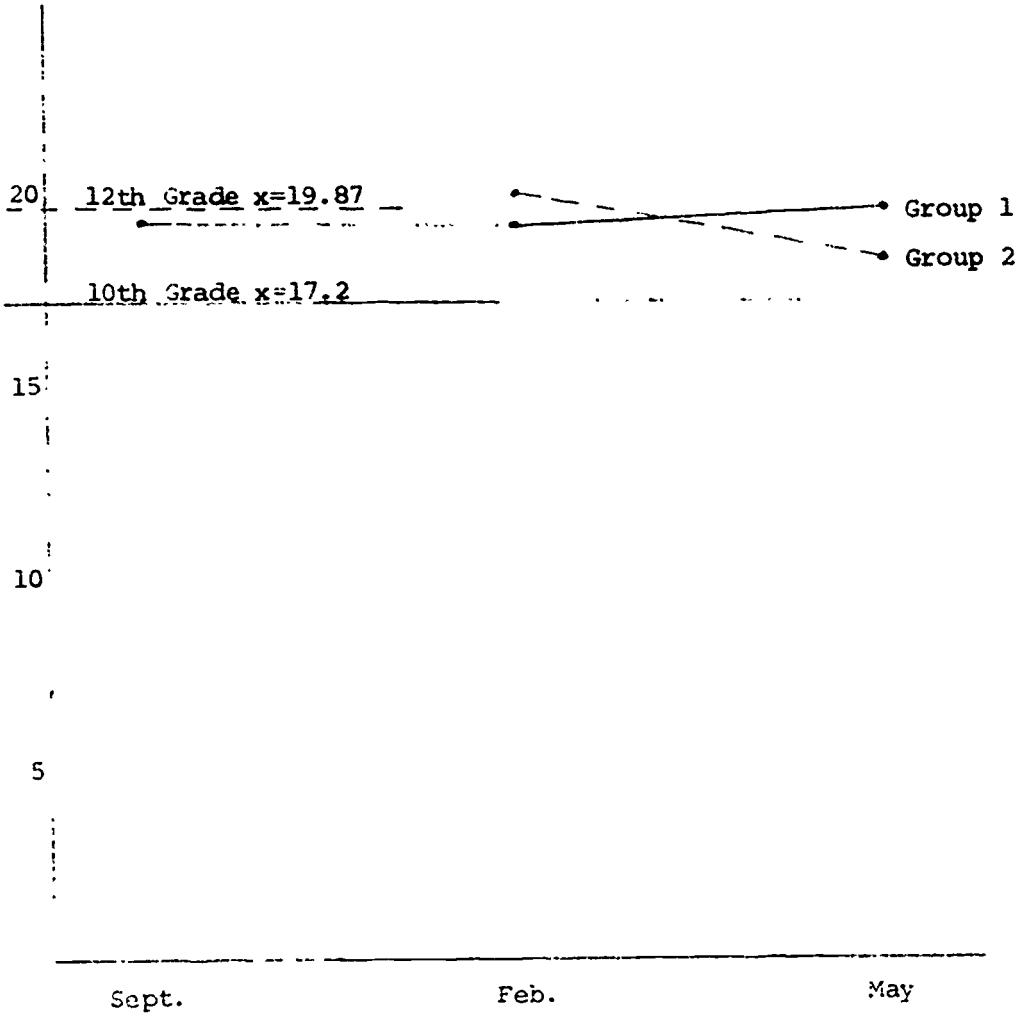

Figure 3

Scores on CDI - Part C by Group and Date

Table 3

Initial CDI Scores by EBCE Students (Group I) Compared with Norms for Tenth Grade Students

Percentile	Part A	Part B (Frequencies)	Part C	Total
99	2	2	2	1
95	1	1		2
90		2	4	1
85		1	3	1
80	1			1
75	1	3		1
70		1	2	
65	3			1
60		1	1	2
55	1	1	1	1
50		1		1
45			5	2
40	3	1		
35		3	1	2
30	3	1		
25	1	1		3
20		1		
15	3			
10			1	1
5	1		1	1
1	1	1		
Median percentile	40	60	70	55

Table 4

Initial CDI Scores by EBCE Students (Group II) Compared with Norms for Tenth Grade Students

Percentile	Part A	Part B	Part C	Total
		(Frequencies)		
99		4	4	
95	1	1	2	4
90	2	2	1	1
85		2	3	3
80	3		4	1
75	2	2		1
70		2		1
65	2			1
60		1	1	
55	1		1	1
50		1	1	1
45	1		1	1
40	4			
35	1	1	1	1
30				1
25		2	1	1
20	1	1	1	2
15	1	2		2
10	3	2	1	1
5	1		1	
1				
Median percentile	45	70	80	65

Table 5

Comparison of Scores of EBCE Students and Other Twelfth Graders on Subtests and Total

	EBCE (May)			Other	
Scale	Group	Number	Mean	Number	Mean
A	I	21	119.10	74	116.60
	II	23	108.00		
B	I	21	263.57	78	257.32
	II	23	251.30		
C	I	21	19.81	74	19.87
	II	23	18.52		
Total	I	21	402.48	70	395.97
	II	23	377.39		

administration of the CDI could be presumed to reveal a measure of the program effects for Group I between September and February. This is what Campbell and Stanley[6] refer to as a static group comparison. The results appear in Table 6. Group I scored higher than Group II on Parts A and B but slightly lower on Part C. None of the t-test values were significant at the .05 level of comparison.

One of the items on Part A of the CDI asked, "How would you rate your plans for 'after high school'?" Possible responses were: (1) Not at all clear or sure; (2) Not very clear; (3) Some not clear, some clear; (4) Fairly clear; and (5) Very clear, all decided. Scale values ranging from 1 to 5 as shown were assigned to the responses.

Overall, Group I respondents rated themselves fairly clear about their post-high school plans in May; the mean score for 19 members of that group was 4.00. Two individuals did not respond. The mean for Group II was 3.78, indicating somewhat more uncertainty. When scores were compared with the same group mean on the item at an earlier time (September for Group I and February for Group II) slight but statistically insignificant gains were found. These results appear in Table 7.

Summary and Conclusions

The students in the EBCE program are probably not typical of high school seniors as a group if for no other reason than that their decision to apply for and enter the program represents evidence of more interest in or greater concern about choice of career.

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[6]Donald T. Campbell and Julian C. Stanley. Experimental and Quasi-Experimental Designs for Research. (Chicago: Rand McNally and Company, 1963), p. 12.

Table 6

Static Group Comparison (Group I vs. Group II)
on February Test

	N	Part A	Part B	Part C
Group I Mean	21	117.52	271.43	19.19
Group II Mean	23	103.43	259.83	20.09
Difference		14.09	11.60	-.90
t		.41	.14	.14

Table 7

Mean Responses and Differences on Certainty of Post High School
Plans Using Five-Point Self-Rating Scale

	N	First Testing	Second Testing	Difference	P
Group I	21	3.33	4.14	.81	N.S.
Group II	23	3.57	3.78	.21	N.S.

NOTE: Group I first scores are from the September testing; for Group II the February scores are first. May scores are second for both groups except two individuals in Group I who omitted the item and for whom February scores were substituted.

Compared with a tenth grade norm group, the EBCE students' entering scores on the CDI were low (Tables 3 and 4), and the expected rank of the subtest scores was the reverse of the expected order. (In May the students in EBCE scored near or above the mean scores for a smaller group of twelfth grade students.)

Group I (21 students who entered in September and were in the program all year) made significant progress during both test periods on Part A and in one test period on Part B. Group II had a slight but statistically significant loss during the period from February to May on Part C. These findings can be interpreted in one of two ways: either greater exposure to the program results in cumulatively larger gains, or treatment effects present during the September-February period were not present in the subsequent months. The latter interpretation is supported by the fact that a counselor with wide-ranging knowledge of vocational development theory and a variety of career experiences was available to students during the early months of the program but not during the latter months. There were other changes in personnel about the middle of the year which appear to have affected students' morale somewhat and may account for some of the findings.

If, as is argued in the opening paragraph of this section, it cannot be assumed that the EBCE students are typical of the population of twelfth graders, then the question must be raised whether the CDI or any other instrument of its type is suited for use as an evaluation tool with the program. Without comparing the EBCE students to norm groups, some useful information can be derived from these instruments. They reveal, for example, the extent of change from one testing to the next in the various skills measured by the instrument.

The concept of vocational maturity is generally accepted, but the evidence supporting the particular development theory of Super and others is sparse. In particular, the idea that the order of development follows the sequence of the subtests on the CDI needs substantiation. Comparisons with EBCE students who were high and low on Part A showed mean gains on Part B favoring those with low Part A scores. The theory suggested that students with high Part A scores should have done better on Part B.

A partial listing of student-related objectives of the EBCE program appeared in the Introduction to this report. The results on the CDI will be examined as they relate to various EBCE objectives.

One of the objectives of the EBCE program is to prepare students to make realistic career choices based on their abilities and interests and the requirements of particular occupations. It is generally agreed that realistic decisions are more likely to occur if an individual has had access to several sources of information. Part B of the CDI is titled Resources for Exploration and asks students to report the extent to which they have received or expect to receive information from a variety of sources (father, mother, friends, minister, teachers, counselors, etc.). Students in the EBCE program achieved statistically significant gains between September and February on Part B (Table 2).

Part A of the CDI has to do with planning, and one of the objectives of the EBCE program is "to develop acceptable problem-solving, planning, and decision-making skills". Group I showed statistically significant gains during both test periods on Part A (Table 2). A sample item from CDI-Part A asks students to report whether they have "given thought to" or "made definite plans" for such activities as going to the library to research various occupations, talking about career decisions with an adult, taking

courses which lead in a particular career direction, or getting a part-time job to help the student decide what kind of work he might go into.

Part C of the CDI measures students' familiarity with various sources of information about occupations and their knowledge of occupational trends in the United States. Several of the items in that subtest pose hypothetical situations concerning relating academic interests and aptitudes to occupational options. The kinds of information tested by Part C appear to be related to several of the objectives of the program (realistic career choice, knowledge of variety of opportunities, etc.). Neither group showed statistically significant gains on Part C during either test period.

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