DOCUMENT RESUME

ED 267 867 JC 860 171

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TITLE	The Effects of Increased Time-Limits on a College-Level Achievement Test. Research Report No. 84-12.
INSTITUTION	Miami-Dade Community Coll., Fla. Office of Institutional Research.
PUB DATE	Apr 84
NOTE	25p.
PUB TYPE	Reports - Research/Technical (143)
EDRS PRICE	MF01/PC01 Plus postage.
DESCRIPTORS	*Achievement Tests; Community Colleges; *Comparative Testing; Ethnic Groups; Females; Group Testing; Males; *Minimum Competency Testing; Test Results; *Timed Tests; Two Year Colleges; Two Year College Students
IDENTIFIERS	*College Level Academic Skills Test; *Native Language

ABSTRACT

A study was conducted to determine whether increased test-taking time on a college-level achievement test would differentially increase scores for selected subgroups of community college sophomores. The study sample consisted of 181 Miami-Dade Community College (MDCC) students who were classified on the basis of native language, ethnic group, and sex. An analog of the College-Level Academic Skills Test (CLAST) was developed according to CLAST specifications and administered to the subjects. For each group, three time-limit conditions were examined; i.e., 70 minutes, 75 minutes, and 80 minutes. The findings clearly indicated that increased time limits did not result in statistically significant increases in test scores for any of the groups examined. Based on study findings, it was concluded that the analog instrument was functioning as a power test and that increased time limits would probably not result in higher test scores on the CLAST. (Author/LAL)

THE EFFECTS OF INCREASED TIME-LIMITS ON A COLLEGE-LEVEL ACHIEVEMENT TEST

Research Report No. 84-12

April 1984

Institutional Research

Miami-Dade Community College

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ABSTRACT

The purpose of the present study was to determine if increased test-taking time on a college-level achievement test would differentially increase scores for selected subgroups of community college sophomores. The sample consisted of 181 Miami-Dade Community College students who were classified on the basis of native language, ethnic group, and sex. While the focus of the study was on the Reading and Writing sections of the College-Level Academic Skills Test (CLAST), no experimentation was permitted directly with the instrument. An analogue of the CLAST (Mid-Level CLAST), which was developed by faculty at Miami-Dade Community College according to CLAST specifications, was administered to the subjects. For each group, three time-limit conditions were examined: 70 minutes (control group), 75 minutes (Treatment 1), and 80 minutes (Treatment 2). The findings clearly indicated that increased time limits did not result in statistically significant increases in test scores for any of the groups examined. The author concludes that the instrument is functioning as a power test and that increased time limits will probably not result in higher test scores for students writing the Mid-level CLAST or the CLAST.

The Effects of Increased Time-Limits on a College-Level Achievement Test

Introduction

Minimum Competency Testing (MCT) is being increasingly used to deal with the problem of declining academic achievement and the lack of academic standards in this country (Resnick, 1980). The State of Florida is clearly at the forefront of this movement and is continuing to tighten its embrace on MCT as a form of educational accountability. As a result of legislative mandate, the State has attempted to raise academic standards by imposing minimum competency requirements at several levels (Turlington, 1979). For example students must now pass the Statewide Student Assessment Test (SSAT) in order to receive a regular high school diploma (Turlington, 1981). Further, graduates of teacher education programs must demonstrate specific skills in order to be eligible for certification (Robinson and Mosrie, 1979). The most recent addition to the statewide testing program is the College-Level Academic Skills Test (CLAST), a measure intended to improve student performance and to insure that students completing their sophomore year possess competencies expected of juniors at the upper-division level of the State University System (SUS) (State of Florida, 1984).

According to the statewide committee that developed the CLAST, the instrument is a valid measure of academic achievement because a general plan was followed which "...ensures that each form of CLAST is representative of the domain of skills being tested." (State of Florida, 1982, p. 17). This claim is clearly one of content validity. Further, the CLAST Technical Report states that fixed time limits allow at least 90 percent of all examinees to complete all four subtests. However, a survey of 1,428 students at Miami-Dade Community College who wrote the CLAST in October of 1983 revealed that 45 percent felt that more time would have enabled them to do better on the Reading and Writing subtests, and that approximately 40 percent would have benefited from extra time on the Computation and Essay sections (Wright, 1983). This is of significant concern given that Miami-Dade students represent approximately 20 percent of all community college examinees (Losak and Morris, 1983; McCabe, 1983) and that the

results of the CLAST will determine who may transfer to the upper-division of the SUS beginning in August 1984 (State of Florida, 1984).

Instruments measuring academic ability generally represent a compromise between power and speed. However, in most cases a test is considered a power measure if sufficient time is allowed for all students to finish, while a test may be considered speeded if less than 80 percent complete all items (ETS, 1977, p. 19). Given the responses of Miami-Dade students who wrote the CLAST, it appears that the instrument may be functioning as a speeded test for some groups even though the purpose of the test clearly suggests an emphasis on power. A power test would be consistent with the view of Henrysson (1971) who notes that "most tests of educational achievement are not highly speeded but are administered with liberal time limits so as to place the major emphasis on level or power rather than rate of work" (p. 133). To the extent that the CLAST may determine the educational opportunities of so many, there is an urgent need to investigate the relationship of power and speed in the instrument, and to determine if any population subgroups would better demonstrate their academic abilities given more time.

While there is considerable literature spanning the decades on the difference between power and speed tests (Mcleod, 1929; Paterson and Tinker, 1930; Baxter, 1941; Cattell, 1943; Davidson and Carroll, 1945; Lord, 1956; Morrison, 1960; Rindler, 1979), speed and/or power parameters are usually developed as tests are designed and normed. It is rare to investigate whether, in fact, a power test is functioning as a speeded measure for some population subgroups.

Early research did focus, however, on the interaction of power and speed variables. For example, it was shown that scores based on time limit conditions may differ significantly in factor content from scores obtained from the same test under no-time-limit conditions (Baxter, 1941; Davidson and Carroll, 1945). In another study, age was found to impact the speed of performance more adversely than the level of performance (Cattell, 1943). Finally, after reviewing an extensive body of research which focused on power and speeded tests, Morrison (1960) concluded that "...the popularity of time-limit tests is due more to their practical administrative advantages and their demonstrated usefulness than to any

experimentally-supported rational governing the imposition of time limits on performance" (p. 231).

More recent research has focused on the effects of extending test-taking time on the performance of demographic subgroups writing graduate level admissions tests. Evans and Reilly (1972a, 1972b) conducted two such studies which focused on reading comprehension questions from the Law School Admissions Test (LSAT). In both studies it was found that increasing test-taking time did not differentially increase test scores among minority and majority groups. The same researchers (Evans and Reilly, 1973) conducted a similar study which involved a special quantitative section of the Admissions Test for Graduate Study in Business and again reported no significant interactions between ethnic groups and test time. In 1982, a study was undertaken to determine if extra test-taking time affected group performance on the Graduate Record Examination (GRE) (Wild, Durso, and Rubin, 1982). In this investigation, examinee subgroups were defined by race, sex, and the number of years elapsed since the subject received the baccalaureate degree. The researchers reported no significant interactions between subgroups and extra test-taking time, although it was found that a larger proportion of examinees in each of the experimental conditions (i.e., extra test time) did complete more test items. These findings led the authors to conclude that increased test-taking time does not differentially affect the performance of any of the subgroups studied.

In each of the investigations cited, the researchers examined the effects of increased test-taking time on aptitude tests. The purpose of the present study was to examine the relationship of power and speed in the CLAST, a college-level achievement test. By allowing selected subgroups extra time to write an analogue of the CLAST (i.e., the Mid-level CLAST), the study was designed to assess whether the CLAST was functioning as a speeded test for some groups of Miami-Dade sophomores Given the large proportion (approximately one-half) of Miami-Dade students for whom English is a second language, and the fact that the ethnic composition of the student body departs dramatically from the statewide distribution of CLAST examinees (McCabe, 1983), the subgroups selected for the study were based

on native language, ethnic group membership, and sex. A second purpose of the study was to determine the correlation (predictive validity) of the Mid-level CLAST to the CLAST itself, and to examine student performance on both instruments in order to compare test difficulty.

Research Hypotheses

In order to examine group differences related to increased test-taking time, the following null hypotheses were tested in the present study at the $p \leq .05$ level of significance:

Hypothesis I	For all students, there is no significant difference between the mean scores for those allowed 70 minutes, 75 minutes, or 80 minutes to write the Reading/Writing subtests or the Mid-level CLAST.
Hypothesis II	For native English-speaking students, there is no significant difference between the mean scores for those allowed 70 minutes, 75 minutes, or 80 minutes to write the Reading/Writing subtests of the Mid-level CLAST.
Hypothesis III	For non-native English speaking there is no significant difference between the mean scores for those allowed 70 minutes, 75 minutes, or 80 minutes to write the Reading/Writing subtests of the Mid-level CLAST.
Hypothesis IV	For white non-Hispanic students, there is no significant difference between the mean scores for those allowed 70 minutes, 75 minutes, or 80 minutes to write the Reading/Writing subtests of the Mid-level CLAST.

Hypothesis V	For black non-Hispanic students, there is no significant difference between the mean scores for those allowed 70 minutes, 75 minutes, or 80 minutes to write the Reading/Writing subtests of the Mid-level CLAST.
Hypothesis VI	For Hispanic students, there is no significant difference between the mean scores for those allowed 70 minutes, 75 minutes, or 80 minutes to write the Reading/Writing subtests of the Mid-level CLAST.
Hypothesis VII	For male students, there is no significant difference between the mean scores for those allowed 70 minutes, 75 minutes, or 80 minutes to write the Reading/Writing subtests of the Mid-level CLAST.
Hypothesis VIII	For female students, there is no significant difference between the mean scores for those allowed 70 minutes, 75 minutes, or 80 minutes to write the Reading/Writing subtests of the Mid-level CLAST.

METHOD

Subjects

The sample consisted of 181 students who sat for the first nine administrations of the Mid-level CLAST in February, 1984. In each case, the student had been categorized as a potential graduate by earning at least 45 credits toward the Associate in Arts degree. The nine administrations were given on three campuses (three administrations per campus). On each campus, each administration group was randomly assigned to one of three conditions; no extra time, five extra minutes, or ten extra minutes. As a result of the random assignment, 69 students wrote the Mid-level CLAST as a control group (no extra time), 46 were included in the

treatment group which received five extra minutes, and the remaining 66 students constituted the treatment which received ten extra minutes. Demographic characteristics of subjects are presented in the results section.

Procedures

Miami-Dade Community College scheduled the first administrations of its Mid-level CLAST approximately one month before the CLAST was administered to the same group of students. The purpose of the Mid-level CLAST was to allow students the opportunity to experience an examination/test situation very similar to the CLAST. In this way, students would have some indication of their skill levels and could presumably "brush-up" on their weak areas prior to writing the CLAST. Since the administration of the Mid-level CLAST was within the purview of test administrators at Miami-Dade, experimental control of the test situation was made available to the investigator.

The students who registered for the CLAST were informed that they would also be required to sit for the Mid-level CLAST: there were, however, no penalties for declining to write the analogue test. Registration procedures varied from campus-to-campus and, for the most part, students attended sessions at their own convenience. Nevertheless, test administrators had fairly even numbered groups for each administration. The self-selection of examinees which resulted makes this study valid only with the assumption that subjects in this study were representative of the CLAST examinee population at Miami-Dade.

Since the purpose of the study was to determine if extra time would benefit selected groups of students, the first three administrations on each of three campuses (nine administrations in all) were randomly assigned to the three conditions of the study, one control group and two treatment groups. Insofar as the test was intended to simulate the CLAST, it was decided that treatments should not go dramatically beyond the standardized conditions of the CLAST and, therefore, the testing times on only the Reading and Writing sections of the Mid-level CLAST were manipulated in the study. As a result, the findings are limited to only those sections of the CLAST. Treatments consisted of allowing either five extra minutes (Treatment 1) or ten extra minutes (Treatment 2) to be added to the normal 70 minutes (Control) allowed to complete both sections.

Raw Scores from the Mid-level CLAST were electronically processed and recorded on a computer file along with other student information. The variables for each student consisted of the test administration date, campus location, Reading and Writing raw scores, native language code, race, and gender. Data were also collected from the CLAST itself and thus, scores were recorded from both tests for those who wrote the CLAST (N=159). Data analyses were performed utilizing the Statistical Analysis System (SAS) and consisted of re-coding test administration dates and campus locations into the three conditions of the study and combining raw scores from the two subtests into a single raw score. SAS was also employed for the statistical analysis of the raw data.

Instruments

The Mid-level CLAST was developed by faculty at Miami-Dade Community College according to item specifications (Appendix) from the College-Level Academic Skills Test (CLAST). The instrument was designed to assess the same domain of skills as the CLAST, with the exception of those measured by the CLAST Essay subtest. It consists of three subtests (i.e., Reading, Writing, and Computation) which parallel the CLAST in both the number of items and test administration standards. For the sections included in the present study, the total number of items was thirty-five for Reading and thirty-six for Writing. Reliability coefficients based on the Kuder-Richardson (KR-20) formula were above .80 for both subtests of the Mid-level CLAST. According to the CLAST Technical Report, the reliability of the CLAST is measured at .85 for the Reading subtest and .69 for the Writing subtest based on the same formula. The arrangment of items in both the Mid-level CLAST and the CLAST is mixed in terms of difficulty.

Statistical Analysis

The first statistical analysis examined differences between the control and treatment groups. Since the dependent measure (the Mid-level CLAST Reading/Writing score) was interval scaled, means were computed and subjected to a one-way analysis of variance for the following groups: total sample, native English-speakers, non-native English-speakers, white non-Hispanics, black non-Hispanics, Hispanics, males, and females. A Scheffe post-F test was also employed in each case. The investigator

initially attempted an analysis of covariance design by introducing grade point avereage as a covariate to remove pre-treatment variance between groups. However, it was found that the assumption of homogeneity of regression was violated due to significant differences between native and non-native English speakers. The covariance analysis was, therefore, abandoned. To address the question of correlation between the two instruments, a Pearson's Product-Moment Coefficient of Correlation was employed. For those students who wrote both the Mid-level CLAST and the CLAST, a paired-comparisons T-test was used in a quasi-pre test-post-test analysis for the purpose of comparing the instruments in terms of difficulty.

RESULTS

The data presented in Table 1 show the demographic characteristics of the sample (N=181) within each of the treatments. It should be noted that the proportions of examinees within the demographic subcategories are very similar to the Miami-Dade College-wide distributions for native language, ethnic groups, and sex. The distribution within each condition of the study reveals that fewer students comprised the groups given five extra minutes to write the Mid-level CLAST compared to the control groups and the groups given ten extra minutes.

Since the purpose of the study was to determine if increased test-taking time resulted in differences between groups, control and treatment group means were computed and subjected to a simple analysis of variance. The results indicated that increasing test time on the Mid-level CLAST does not significantly increase the scores of any group of students examined in the present study. Group means are presented in Figures 1 through 4, and the analysis of variance results for each group are provided in Tables 1 through 9.

Table 1

Demographic Characteristics of Sample by Treatment (N=181)

Variable	Treatment			Total
	Control	75 Minutes	80 Minutes	
Native Language				
English	36	22	33	91
Other	33	24	33	90
Ethnic				
White Non-Hispanic	26	18	20	64
Black Non-Hispanic	7	7	7	21
Hispanic	36	21	38	95
Other	0	0	1	1
Sex				
Male	37	19	27	83
Female	32	27	39	98
Total Sample	69	46	66	181

Figure 1 presents the graphed means for the total sample by treatment. For the control group, the mean was 39.29 while the group means for five extra minutes and ten extra minutes were 41.76 and 41.85 respectively. Although the means increased in the same direction as the extra time treatments, the analysis of variance results in Table 2 reveal no significant difference. This indicates that increasing test time on the Mid-level CLAST does not result in higher scores and thus, the null hypothesis for the total sample was accepted.

In Figure 2, the Mid-level CLAST means for native English and non-native English subgroups are graphed for each treatment. The means for native English students were 41.22 (control group), 44.45 (75 minutes), and 43.72 (80 minutes) while for non-native English test-takers, the means were 37.18 (control group), 39.29 (75 minutes), and 39.96 (80 minutes). These data reveal that although the means for each of the English-speaking groups were higher than those of the non-native English speakers, the difference

between treatment groups was not large enough to reject the null hypothesis of no difference. In other words, increasing test time did not differentially affect the scores of either subgroup. The analysis of variance results for each native language subgroup are presented in Tables 3 and 4.

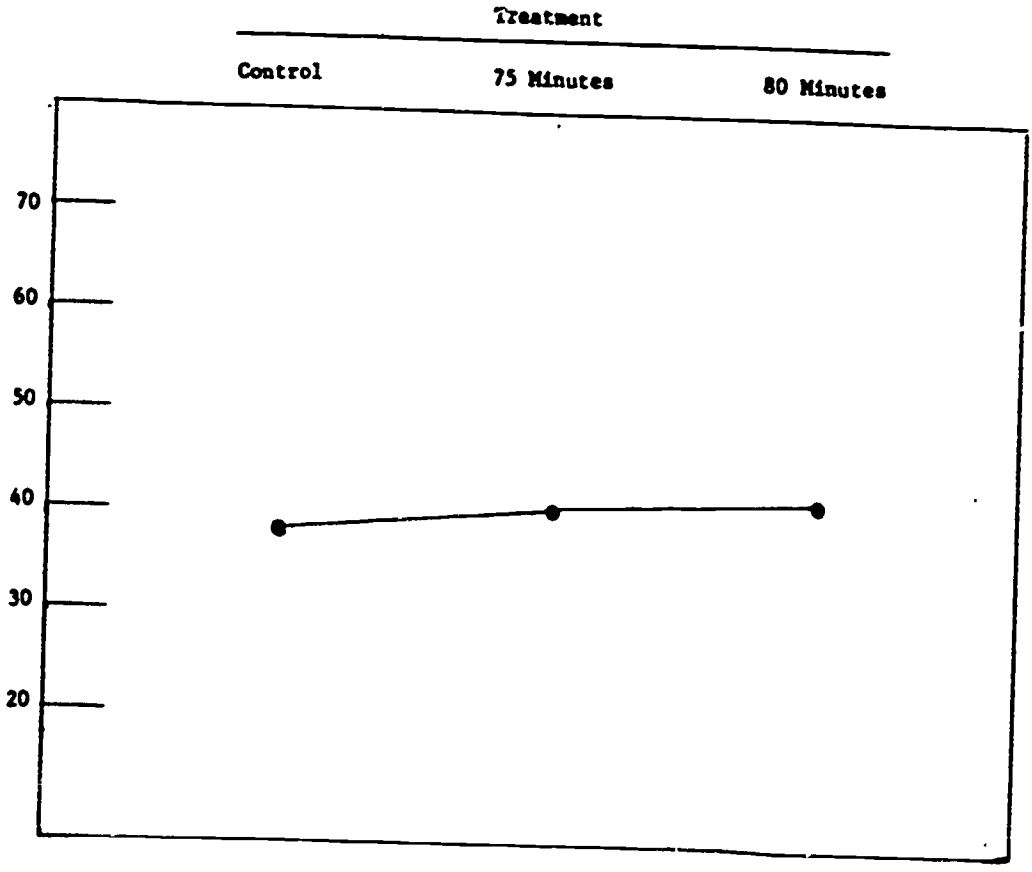

Figure 1

Graphed Means of Mid-Level CLAST Scores by Treatment (N=181)

Table 2

Total Sample Analysis of Variance for Mid-Level CLAST Scores (N=181)

Source	Sum of Squares	df	Variance Est.	F
Between Groups	271.91	2	135.96	N.S.
Within Groups	16,131.06	178	90.62	
Total	16,402.97	180		

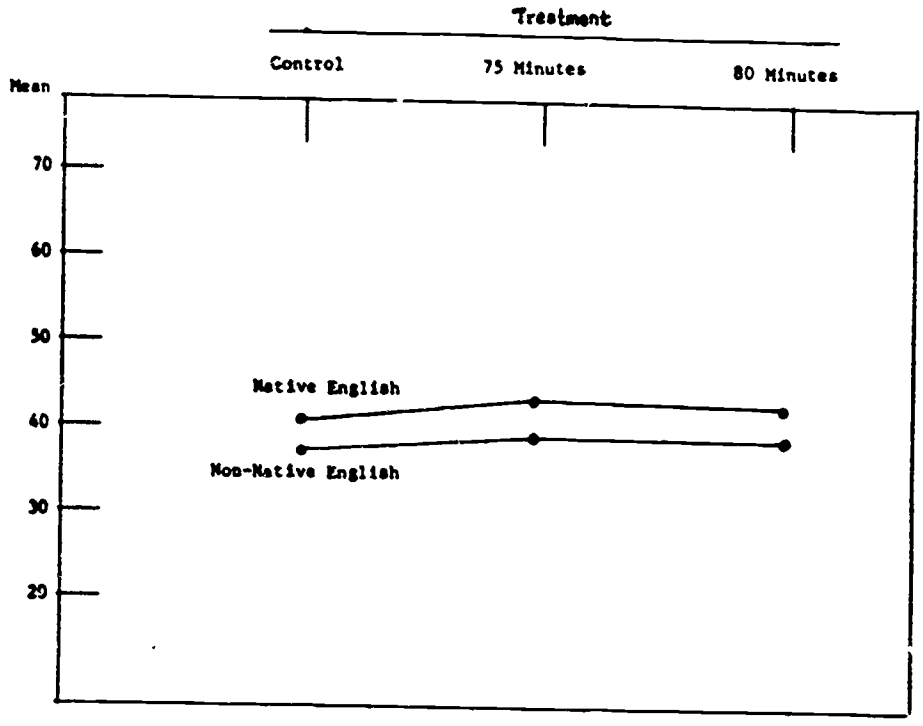

Figure 2

Graphed Means of Mid-Level CLAST Scores by Native Language and Treatment (N=181)

Table 3

Native English Speaking Student Analysis of Variance for Mid-Level CLAST Scores (N=91)

Source	Sum of Squares	df	Variance Est.	F
Between Groups	171.07	2	88.53	N.S.
Within Groups	8,574.22	88	97.43	
Total	8,751.29	90		

Table 4

Non-Native English Speaking Student Analysis of Variance for Mid-Level CLAST Scores (N=90)

Source	Sum of Squares	df	Variance Est.	F
Between Groups	137.26	2	68.63	N.S.
Within Groups	6,736.84	87	77.43	
Total	6,874.10	89		

Ethnic group means from the Mid-level CLAST are illustrated in Figure 3 and the analysis of variance results are shown in Tables 5 through 7. For the control groups, the means were 42.38 (white non-Hispanic), 39.38 (Hispanic), and 27.28 (black non-Hispanic). The 75 minute treatment means were 46.44 (white non-Hispanic), 41.04 (Hispanic), and 31.85 (black non-Hispanic) while the 80 minute treatment means were 43.50 (white non-Hispanic, 42.26 (Hispanic), and 36.14 (black non-Hispanic). Inasmuch as the graphed means reveal a similar pattern for white non-Hispanic and Hispanic examinees to that seen in Figure 2 (native language), it is interesting to note that the group means for black non-Hispanic subjects would suggest a significant difference due to treatments. However, given the within group variance of black non-Hispanics in each treatment group, the differences between groups were not large enough to reject the null hypothesis. Thus, it is concluded that increased time limits did not result in higher scores for any of the ethnic subgroups.

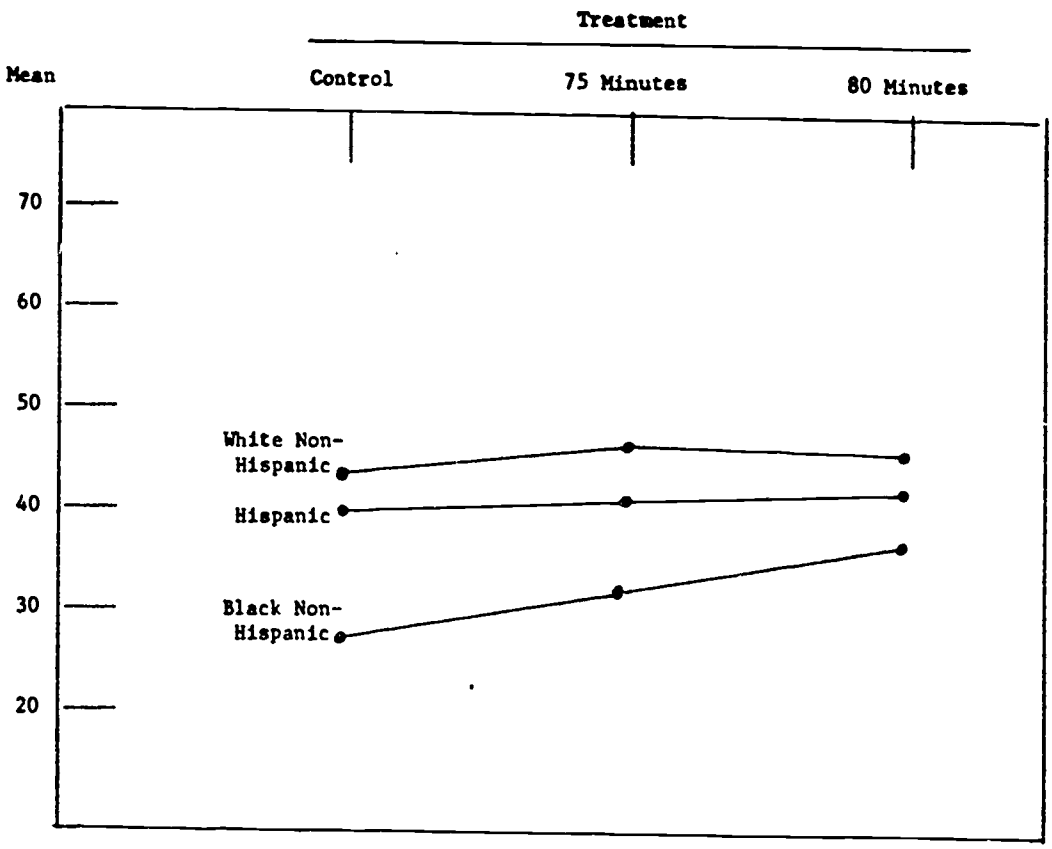

Figure 3

Graphed Means of Mid-Level CLAST Scores by Ethnic and Treatment (N=180)

Table 5

White Non-Hispanic Student Analysis of Variance for Mid-Level CLAST Scores (N=64)

Source	Sum of Squares	df	Variance Est.	F
Between Groups	179.40	2	89.70	N.S.
Within Groups	4,051.60	61	66.41	
Total	4,231.00	63		

Table 6

Black Non-Hispanic Student Analysis of Variance for Mid-Level CLAST Scores (N=91)

Source	Sum of Squares	df	Variance Est.	F
Between Groups	274.66	2	137.33	N.S.
Within Groups	2,039.14	18	113.28	
Total	2,313.80	20		

Table 7

Hispanic Student Analysis of Variance for Mid-Level CLAST Scores (N=91)

Source	Sum of Squares	df	Variance Est.	F
Between Groups	153.27	2	76.63	N.S.
Within Groups	7,322.87	92	79.59	
Total	7,476.14	94		

The comparison of group means for males and females is presented in Figure 4. As may be seen in the illustration, mean scores for the female subgroup were higher than those for the male subgroup in each of the study conditions, i.e., 40.75 (female control group) compared to 38.02 (male control group), 43.00 (female, 75 minutes) compared to 40.00 (male, 75 minutes), and 44.07 (female, 80 minutes) compared to 38.62 (male, 80 minutes). However, as was the case for each of the other subgroup examinees, differences between treatment groups were not great enough to produce a significant F value and the hypothesis of no difference was accepted. The analysis of variance results are shown in Tables 8 and 9.

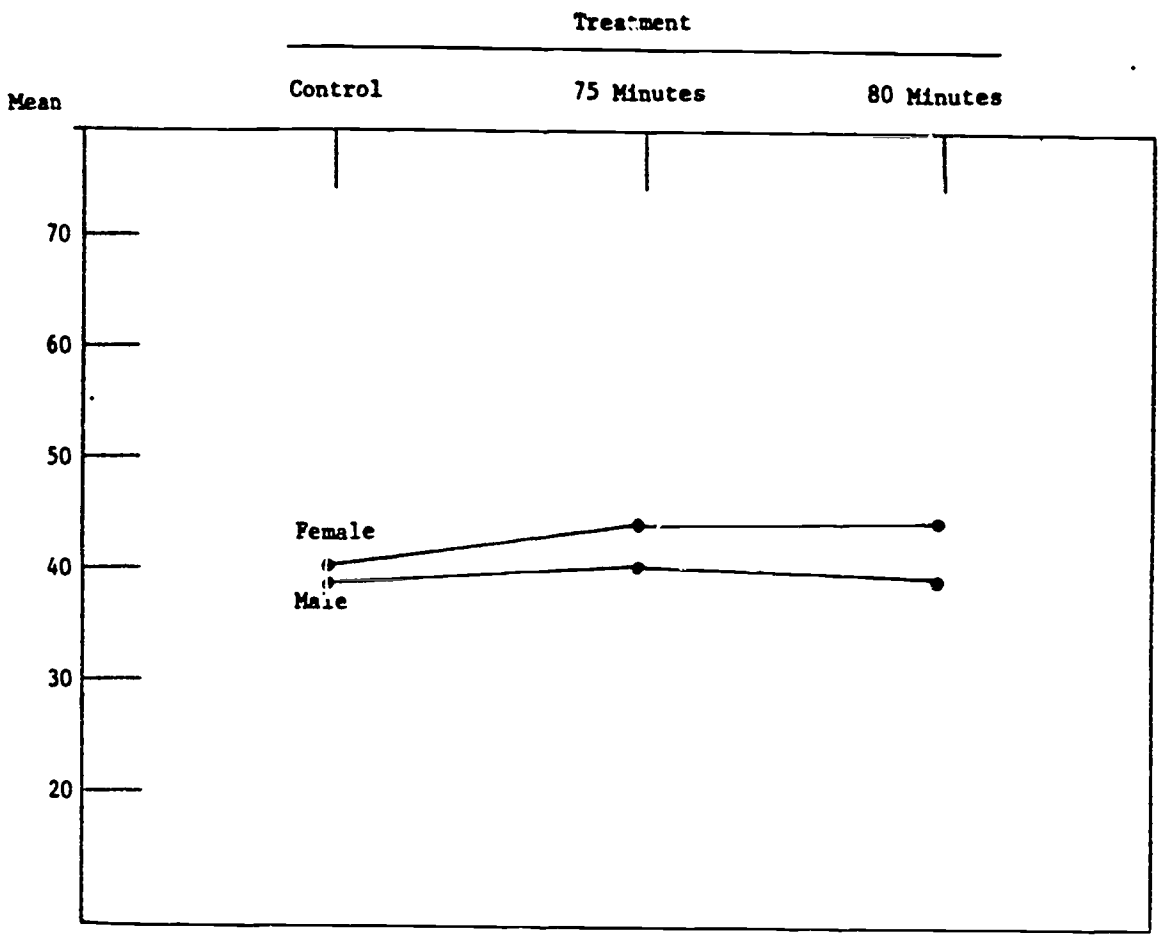

Figure 4

Graphed Means of Mid-Level CLAST Scores by Sex and Treatment (N=181)

Table 8

Male Student Analysis of Variance for Mid-Level CLAST Scores (N=83)

Source	Sum of Squares	df	Variance Est.	F
Between Groups	48.95	2	24.47	N.S.
Within Groups	7,737.26	80	96.71	
Total	7,786.21	82		

Table 9

Female Student Analysis of Variance for Mid-Level CLAST Scores (N=98)

Source	Sum of Squares	df	Variance Est.	F
Between Groups	198.05	2	99.02	N.S.
Within Groups	7,692.76	95	80.97	
Total	7,890.81	97		

Of the 181 students who wrote the Mid-level CLAST, 159 sat for the March 1984 administration of the CLAST. The raw scores from the Reading and Writing subtests of the CLAST were combined and correlated with the combined raw scores from the Mid-level CLAST for those students. As a result, a Pearson Product-Moment coefficient of $\underline{R} = .709$ was obtained indicating a very high correlation between the two instruments ($\underline{p} < .0001$). The mean scores from both tests were subjected to a paired-comparisons t-test to determine if there was a significant difference in student performance on the two examinations. It was found that for the 159 students who wrote both tests, the mean score on the Mid-level CLAST was lower ($\underline{M} = 40.86$, S.D. = 9.62) than the mean score on the CLAST ($\underline{M} = 49.79$, S.D = 10.51). The t-test ($\underline{t}$ (158) = 14.58, $\underline{p} < .0001$) was highly significant and confirmed that the difference in means between the two tests represented actual differences in student performance levels. In other words, students who wrote both tests tended to do better on the CLAST than on the Mid-level CLAST.

DISCUSSION

The results of the present study clearly do not support the notion that increasing test time on the Reading and Writing sections of the Mid-level CLAST will result in higher test scores. The instrument does, in fact, appear to be functioning as a power measure for all students. Those individuals who reported a desire for extra time on the CLAST in October 1983 may have simply been reflecting a cautious approach, with a desire to re-read and/or re-work items already answered. Given that no significant improvement occurred for any of the groups in the present study, the findings suggest that examinees are able to complete the items within the time limit allowed. If the test was, in fact, speeded, at least some improvement should have occurred simply because more items would be answered. In that the items were not arranged in order of increasing difficulty, this interpretation seems to be reasonable.

With regard to the relationship between the Mid-level CLAST and the CLAST, the results of the study offer some interesting possibilities. The comparison of the means between the two instruments would seem to suggest one or more of the following: (1) the tests were of equal difficulty, but students tried harder on the CLAST: (2) the tests were of equal difficulty, but students had improved their skills in the month between the two tests; and (3) the CLAST was an easier examination. The score differences between the two tests, however, has little bearing on the question of extra time. Since the CLAST items (like their Mid-level CLAST analogues) are not arranged in order of increasing difficulty, any of the possibilities regarding the relationship between the two instruments would suggest that students were able to read all of the CLAST items within the standardized time period. Insofar as students did not benefit from extra time on the Mid-level CLAST, the present study strongly suggests that students would not benefit given extra time on the CLAST.

Admittedly, the design of the present research is somewhat flawed by the use of one instrument to draw conclusions about another, even though the tests are highly correlated. Since the analogue was an achievement test, whatever its relationship to the CLAST, the findings clearly demonstrate that the absence of significant difference between

demographic subgroups is not limited to aptitude tests alone. While further research is necessary to determine why scores from the Mid-level CLAST and the CLAST were significantly different, the results for the Mid-level CLAST alone are a substantial contribution to analyses of subgroup differences in test-taking and replicate prior research findings for ability tests in the area of achievement measures.

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