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ABSTRACT

Two studies are briefly reported here, one concerned with a method for locating high ability inner-city students, and the other dealing with a method of motivating low achieving inner-city students. Both studies drew on a population of black junior high school students, eighth and ninth graders, 14, 15, and 16 years of age. In the first study, four potential screening measures were applied to the eighth grade of an inner-city junior high school. For each measure, those students in the top two percent on that measure were given the Advanced Progressive Matrices test and then the Wechsler Intelligence Scale for Children (WISC). The WISC performance scores were taken as the criterion identifying the top nine students (approximately two percent), who were to be designated "mentally gifted" within this population. The second study investigated a method of motivating low-achieving junior high school students to learn mathematics by using them as tutors for fourth graders. Before each tutoring session, the tutors were coached on the material they were to teach. At the end of this brief pilot study, arithmetic tests were given in the fourth and ninth grade classrooms. Results showed significant gains for the ninth grade tutors. (Author/JM)

IMPROVING PRACTICES IN INNER-CITY SCHOOLS: TWO CONTRIBUTIONS

Carol Taylor Fitz-Gibbon

Paper presented at the annual meeting of the American Educational Research Association, Washington, D.C., April, 1975

Two research studies are briefly reported here, one concerned with a method for locating high ability inner-city students and the other dealing with an innovation which appears to be nothing short of incredibly effective in motivating low achieving inner-city students. So we shall be dealing with both ends of the spectrum: the mentally gifted end and the severely low achieving end. Both studies drew on a population of Black junior high school students, 8th and 9th graders (14, 15, and 16 years of age).

Identification of Mentally Gifted Students in Inner-City Schools*

Identification procedures should be undertaken with some purpose in mind, such as the subsequent provision of special services to the students identified by certain criteria. It is essential that the nature of the treatment or services to be provided be clearly understood before an identification or selection procedure is chosen. For example, if a school wished to select students for a lock-step accelerated math class, the best single selection instrument would probably be a test of current mathematics achievement. If, however, a program was to be planned which was aimed at meeting the individual needs of those students of highest ability, then an ability test, rather than

*This study is fully reported in a Final Report to USOE available through the ERIC system (ED 080 583). See also Fitz-Gibbon, C.T. "The Identification of Mentally Gifted "Disadvantaged"Students at the Eighth Grade Level" The Journal of Negro Education, XLIII, (1), Winter 1974.

achievement test, would be the selection instrument of choice. Among those selected by an ability test would undoubtedly be some students whose high ability was not being currently manifested in their achievement, but the proposed individualized treatment would be designed to handle this problem. Cronbach and Gleser (1957) called this "adaptive treatment" in making this same point about the influence of the proposed program on the selection procedure.

In the present research, the kind of program or treatment envisioned was an individualized program for mentally gifted students, i.e., selection was to be for the purpose of adaptive treatment. What was needed then was a good ability measure.

Such an ability measure was to be used to select the top two percent of a disadvantaged population. The reason for this choice of figure was that an amendment to the California State Code now permits a full 2% of culturally disadvantaged students in a school district to be designated as mentally gifted for funding purposes, regardless of their absolute I.Q. scores. The criteria for selecting the top two percent, as given in the law, are vague. This should be no excuse, however, for poor practice. Ethics demand a fair selection procedure and law suits regarding testing procedures have surely issued healthy warnings to schools, warnings which should encourage the use of a procedure which is defensible as fair and psychometrically valid. The investigator hypothesized that the following process would be efficient in locating the top two percent of a grade level (the process is diagrammed in figure 1):

1. Test all students in that grade level with Raven's Standard Progressive Matrices (SPM) given as a 30-minute test in the various classrooms. This is an eminently fair first step: No assumptions are made that the gifted have, for example, been placed in the top classes. It is also a very easily accomplished first step. The test is easy to administer, instructions are minimal, and the test is very well accepted by students. The 30-minute time limit fits neatly into a class period.

2. Select the top six percent of these scores and administer at one sitting under standardized conditions a more difficult test with the purpose of further discriminating among those students who were at the upper end of the ability scale on the SPM. The Advanced Progressive Matrices test can be used for this purpose and can be given as a power test with no time limit imposed. Good psychometric practice suggests "zeroing in" on that range in which selection is to be made, employing a test which is maximally discriminating within that range.

3. Combine results of these two screening tests to select students to take an individual IQ test, the WISC. Employ the WISC performance score as the criterion. The individually administered intelligence test has long been the instrument considered as yielding the most valid measure of general ability. Since California law specifies an individual performance test score as one possible criterion measure for the "mentally gifted" designation for disadvantaged students, the WISC performance scale was adopted as the criterion for this study.

Before this process could be persuasively recommended, it was necessary to answer the following kinds of questions about the procedure:

1. Could teacher nominations regarding who should take the WISC be used in place of screening tests? Nominations are so easily and cheaply collected.
2. Are the matrices tests in fact valid indicators of school-related ability? In particular, do high matrices scores show satisfactory validity or does a high score perhaps reflect some test-specific ability of no general importance or relevance? (The fact that a test is generally valid across its whole range, as indicated by concurrent validity measures, does not preclude the possibility that this validity might break down somewhat at the extremes.)
3. Since standardized achievement tests are routinely administered, could not these results be used effectively to select students for the individual WISC testing?
4. If an ability test must be used to select students for the WISC, is it necessary to use a culture-fair ability test? Would not a conventional IQ test such as the California Test of Mental Maturity (CTMM) be acceptable if non-language and language scores were examined separately? For example, could not the CTMM non-language test serve adequately as a culture-fair test?

To examine these questions, the following investigation was undertaken: Four potential screening measures were applied to the eighth grade of an inner-city junior high school:

1. Raven's Standard Progressive Matrices
2. California Test of Mental Maturity (language and non-language tests)
3. California Achievement Tests (in math and reading)
4. Teacher Nominations

For each measure, those students in the top 2% on that measure were given the Advanced Progressive Matrices test and then the WISC. The WISC performance scores were taken as the criterion identifying the top nine students (approximately 2%) who were to be designated "mentally gifted" within this population. The previously administered screening measures were then examined to answer the questions posed above.

The results will be described in terms of those questions.

Question 1. Use of teacher nominations

Studies undertaken in non-disadvantaged populations have indicated the ineffectiveness and inefficiency of teacher nominations for the purpose of identifying gifted stucents. These findings were repeated in this study. By requesting nominations from all eighth grade teachers, 62 student names were received, yet four of the nine gifted students were not among this list of 62 students nominated as possibly gifted. Why were these four gifted students overlooked in the teacher's nomination? One was really underachieving, but the other three occupied second, third, and fourth place among the gifted group in the CAT for reading. The students not nominated appeared to be students whose behavior was not reinforcing to the teacher and whose socioeconomic status was low.

The use of teacher nominations at any stage in a selection procedure cannot be considered psychometrically valid, nor is it an efficient or effective or fair method to employ.

Question 2. Are the matrices tests in fact valid indicators of school-related ability, particularly at the upper end of the scale?

Yes. Despite the fact that the matrices tests contain not a word, nor a number, students at the top of the matrices distribution were also at the top of the CAT distribution. Use of this culture-fair test would have identified school achievers. It would also, however, have picked up one severely underachieving young lady: Student G. Her case is instructive; her high reasoning ability was well established by several scores: on the time SPM she ranked 9th; on the untimed APM she ranked 2nd; on the CTMM non-language test, her IQ score was 131, highest in the sample; and on the WISC performance scale, her IQ was 131. Yet on the CTMM language test, her IQ was only 85. On the reading subtest of the CAT, she was at the 25th percentile nationally, a score about average for the school. Since this student was one of only two in the sample who scored in the range considered gifted in the non-disadvantaged population (130 +), any procedure failing to identify this student would seem to be deficient.

As for the use of the Advanced Progressive Matrices test, this measure showed up, in discriminant analysis, as the measure which best differentiated the gifted from the non-gifted students in this study.

Question 3. Could not achievement tests be used for screening?

They would be efficient and reasonably effective, but might exclude a student like Student G. Actually, the math problems subtest of the CAT, consisting of 15 word problems, proved to discriminate well between high and low WISC performance scores (see table 1). (Student G actually ranked ninth in the sample on this test, and was pulled down on total math score only by the concepts part which is heavily verbal.)

Question 4. Could not the CTMM non-language test serve as a selection test?

Yes, it probably could for the purpose of selecting from the top of the distribution within a fairly uniformly disadvantaged population. However, it is much less pleasant to administer and less well received by students (see figure 2) than the SPM. An example of possible cultural bias arose during testing: several students asked what one of the CTMM illustrations was. It was clear to the investigator that the illustration showed a rural valley viewed from atop a hill. Students in this flat urban area had probably never looked down into a valley.

Conclusion

The proposed selection procedure was substantially supported by the investigation. The Matrices tests, although requiring no school-learned skills such as reading or arithmetic, were nevertheless as good as conventional measures at picking up outstanding students. Moreover, the Matrices test can also pick up students with strong reasoning abilities, but with poorly developed verbal abilities, a problem ascribable to cultural deprivation.

Second Study: An Innovation to Motivate Low-Achieving Students to Learn Arithmetic

Junior high school students in general and low-achieving junior high school students in particular are not noted for cooperativeness or maturity. They are, in a word, "adolescents" and, as was once aptly stated, "The first thing to remember about adolescents is that they are sick." (Richard Armour) Junior high school teachers know this to be true. It is not the rare incidents with drugs, or fights which drive teachers out of inner-city schools. It is the "She's got my pencil syndrome" and the "He said, 'Your mother...'" syndrome, the adolescent behavior. Is there some way to persuade these hot-headed, loud-mouthed, ebullient junior high school adolescents to sit quietly working on something as unimmediate as fractions? Further, is there some pleasant way to accomplish this, some way short of becoming a policewoman, a martinette, a strident authoritarian?

There is almost no way in the regular classroom. What happens, however, if you abandon the regular classroom and instead sit the junior high school student down next to an elementary school child and ask the adolescent to teach fractions to the little one? There has been a drastic change in the social-psychological context. The adolescent is now cast in the role of tutor. What happens?

A true experiment was conducted on a small scale. Following pre-testing with the SPM, an experimental group was randomly selected, stratified by sex and ability. The experimental group met with the investigator in the school library to be shown, in a session lasting about an hour, how to start teaching multiplication tables and fractions.

They were somewhat incredulous at being asked to teach mathematics. "My mother will never believe it!," "I always get a D or an F in math," "Do we have to?," etc. However, all but one student did participate. These eight tutors worked with 24 tutees putting in three teaching sessions a day for four or five days during a two-week period. During this time, the investigator occasionally gave quick reviews of the kind of fractions they were to teach, reviews received with unprecedented attentiveness. There was nothing less than an eagerness among these randomly selected, low-achieving students to learn the fractions they were to teach. There was not a single incident of disruptive behavior. Comments from the tutors expressed their sense of responsibility and their valuing of the activity: "More of us should come here (to the elementary school) so we can help more students." "How should I teach this?" "I can explain it till he gets it -- my teacher never does that."

At the end of this brief pilot study, arithmetic tests were given in the fourth and ninth grade classrooms. Results showed significant gains for the ninth grade tutors (figure 3 and table 3). The scores on fractions were dramatic. Students randomly selected to tutor from the lower half of the class now achieved significantly higher average scores than those in the upper half of the class who had not tutored (figure 4).

Major limitations of the study

1. External validity. Programs implemented with eight students could easily fall short when enlarged. Given present personnel practices, one must experiment in classrooms containing about 30 students to

obtain adequate generalizability to usual classroom situations.

2. Lack of control for time spent. Tutors spent about twice as much time per day on mathematics as did non-tutors. Any comparisons of the effectiveness of two kinds of treatments (e.g., classroom instruction vs. acting as a tutor) must control for time spent.

A larger study is now underway which avoids these and other limitations of this pilot study.

1. Administer SPM to all students as a 30 minute classroom test.

2. Administer APM as a power test to the top 6% on the SPM. Include also students strongly recommended by teachers.

3. Administer WISC to
   a) top 50% of APM sample
   b) students who were in the top 2% on the SPM.

4. The top students on the WISC performance scale are the gifted group.

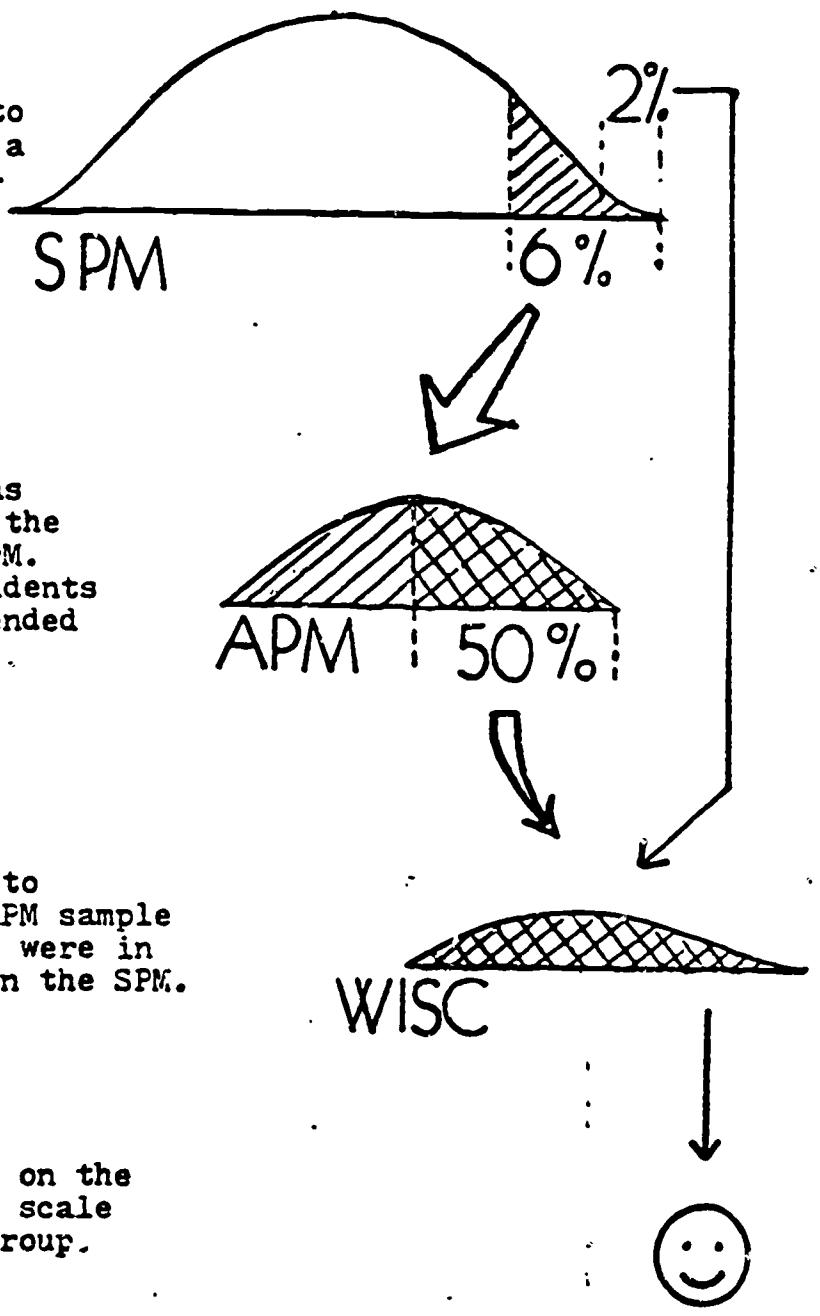

Figure 1

Recommended Procedure for Identifying Mentally Gifted Disadvantaged Students

TABLE 1

MEAN SCORES OF THE HIGH-WISC AND LOW-WISC GROUPS ON OTHER MEASURES

Test		Mean Score of High-WISC Group	Mean Score of Low-WISC Group	F
SPM		51.0	45.0	5.12*
~~SPM~~ AdvPM		22.1	17.7	13.56**
CTMM	Lang.	35.9	34.4	0.14
	Nonlang.	47.3	43.5	1.66
CAT Math	Concepts	21.0	22.1	0.47
	Problems	11.1	7.8	6.69*
CAT Reading	Vocabulary	32.7	29.2	3.19
	Comprehension	32.3	29.2	0.92

NOTE: $F_{.01,1,16} = 8.53$; $F_{.05,1,16} = 4.49$

*$p < .05$

**$p < .01$

NAME_____

TEST_____

DATE_____PERIOD_____

1. How much did you like this test?

not at all		OK		very much

2. Were the instructions clear to you? Did you always know what to do?

instructions were hard. I didn't know what was wanted.		OK		instructions were clear. I always knew what to do.

3. How well did you understand this test?

not at all		OK		very well

4. If the test were graded, what grade do you think you would get?

F	D	C	B	A

5. Did you have enough time?

needed a lot more time	needed a little more time	had just enough	had time to finish easily	too much time was given

6. Do you generally like taking tests?

I hate tests	no, not really	OK	yes	I love tests

Questionnaire completed subsequent to the administration of the CTMM and again after the SPM. (Results are shown in table 2.)

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Fig. 2

TABLE 2

PERCENT RESPONSES TO THE POST-TEST QUESTIONNAIRE

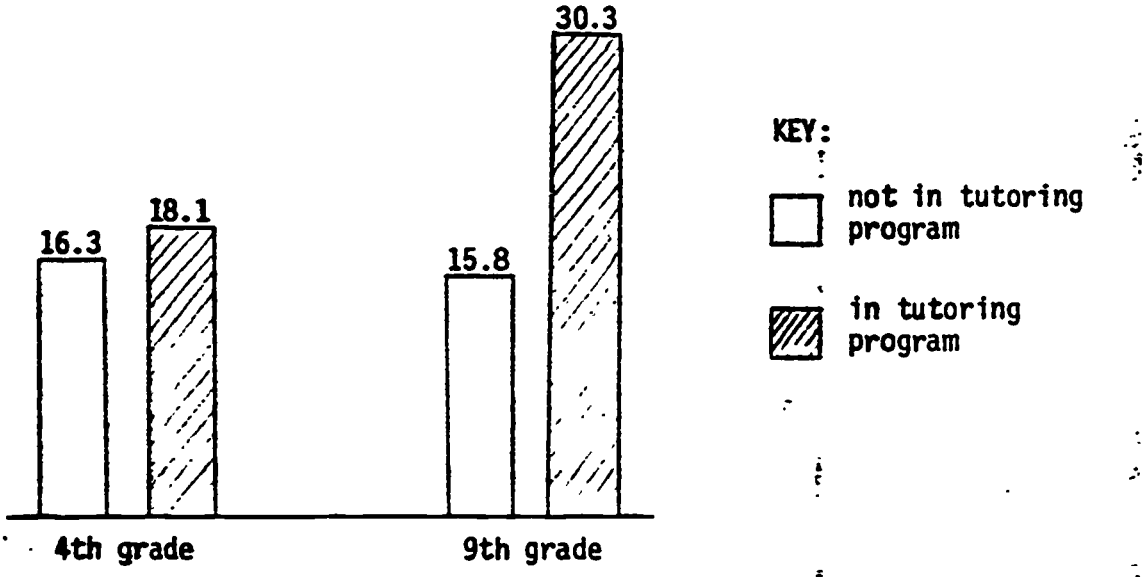
Question	Response on a Five Point Scale					Mean
	Strongly Negative				Strongly Positive	
	1	2	3	4	5	
1. How much did you like this test?						
after SPM	5	3	55	14	23	3.5
after CTMM	14	8	56	8	14	3.0
2. Were the instructions clear?						
after SPM	4	2	29	12	53	4.1
after CTMM	5	5	44	12	33	3.6
3. How well did you understand this test?						
after SPM	2	2	29	17	51	4.1
after CTMM	4	6	37	22	31	3.7
4. If the test were graded, what grade do you think you would get?						
after SPM	1	14	28	42	15	3.9
after CTMM	11	36	27	25	1	3.4
5. Did you have enough time?						
after SPM	1	14	28	42	15	3.6
after CTMM	11	36	27	25	1	2.7
6. Do you generally like taking tests?						
after SPM	10	32	37	19	2	2.7
after CTMM	10	29	42	18	1	2.7

TABLE 3

Pretest (the Standard Progressive Matrices, sections A, B, and C) and posttest scores of fourth and ninth grade students who had or had not been randomly selected for the tutoring program

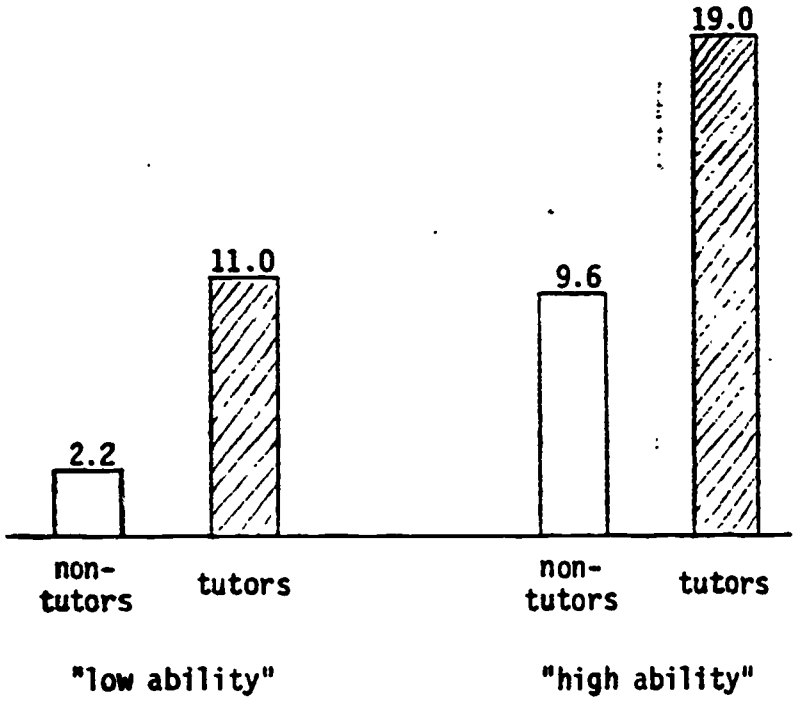
	N	PRETEST-Ability $\bar{X}$	S	t	POSTTEST-Arithmetic $\bar{X}$	S	t
Fourth Grade							
Tutees	26	17.7	(5.2)	1.45	18.1	(7.1)	1.04
Others	24	20.2	(6.8)		16.3	(4.8)	
Ninth Grade							
Tutors	8	24.0	(7.25)	0.25	30.3	(5.05)	4.16*
Others	14	24.86	(7.12)		15.79	(8.61)	

* $p < .001$ (one tailed test)



Mean score on arithmetic posttest

FIG. 3



Mean scores on fractions for
high ability and low ability tutors and non-tutors

FIG. 4