# Motivational Effects on Test Scores of Elementary Students

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ABSTRACT **A total of 406 heterogeneously grouped students in Grades 3, 4, 6, 7, and 8 in three K through 8 Chicago public schools were assigned randomly to two conditions, ordinary standardized-test instructions (control) and special instructions, to do as well as possible for themselves, their parents, and their teachers (experimental). On average, students given special instructions did significantly better ($p < .01$) than the control students did on the criterion measure, the mathematics section of the commonly used Iowa Test of Basic Skills. The three schools differed significantly in achievement ($p < .05$), but girls and boys and grade levels did not differ measurably. The motivational effect was constant across grade levels and boys and girls, but differed significantly ($p < .05$) across schools. The average effect was moderately large, .303 standard deviations, which implies that the special instructions raise the typical student's scores from the 50th to the 62nd percentile.**

Parents, educators, business people, politicians, and the general public are greatly concerned about U.S. students' poor performance on international comparisons of achievement. Policy makers are planning additional international, state, district, and school comparisons to measure progress in solving the national crisis. Some members of those same groups have also grown concerned about the effects of students' high or low motivational states on how well they score on tests.

One commonly expressed apprehension is that some students worry unduly about tests and suffer debilitating anxiety (Hill, 1980). Another concern is that too much testing causes students to care little about how well they do, especially on standardized tests that have no bearing on their grades. Either case might lead to poorer scores than students would attain under ideal motivational states; such effects might explain, in part, the poor performance of U.S. students relative to those in other countries or in relation to what may be required for college and vocational success.

Experts and practicing educators have expressed a variety of conflicting opinions about motivational effects on learning and test scores (Association for Supervision and Curriculum Development, 1991, p. 7). Given the importance of testing policies, there is surprisingly little research on the topic. The purpose of the present study is to determine the effect of experimentally manipulated motivational conditions on elementary students' mathematical scores.

As conceived in this study, the term *motivation* refers to the commonsense meaning of the term, that is, students' propensity to engage in full, serious, and sustained effort on academic tests. As it has been measured in many previous studies, motivation refers to students' reported efforts to succeed or to excel on academic tasks. It is often associated with self-concept or self-regard in a successful student or test taker. A quantitative synthesis of the correlational studies of motivation and school learning showed that nearly all correlations were positive and averaged about .30 (Uguroglu & Walberg, 1979).

### *Previous Research*

The National Assessment Governing Board (NAGB, 1990) recently characterized the National Assessment of Educational Progress (NAEP) as follows:

> . . . as a survey exam which by law cannot be reported for individual students and schools. NAEP may not be taken seriously enough by students to enlist their best efforts. Because it is given with no incentives for good performance and no opportunity for prior study, NAEP may understate achievement (NAGB, p. 17).

To investigate such questions, NAEP is adding items to ask students how hard they tried in responding to future achievement tests.

Motivation questions can be raised about nearly all standardized commercial tests, as well as state-constructed achievement tests. The content of those tests is often unrelated to specific topics that students have been recently studying; and their performance on such tests ordinarily does not affect their grades, college, or job prospects. Many students know they will not see how well they have done.

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Some students admit deficient motivation, but surveys show reasonably favorable attitudes toward tests by most students. Paris, Lawton, and Turner (1991), for example, surveyed 250 students in Grades 4, 7, and 10 about the Michigan Educational Assessment Program. They found that most students reported that they tried hard, thought they did well, felt the test was not difficult or confusing, and saw little or no cheating. However, Karmos and Karmos's (1984) survey of 360 sixth- through ninth-grade student attitudes toward tests showed that 47% thought they were a waste of time, 22% saw no good reason to try to do well, and 21% did not try very hard.

Kellaghan, Madaus, and Arisian (1982) found various small fractions of a sixth-grade Irish sample disaffected by standardized tests, even though they are uncommon in Ireland. When asked about their experience with standardized tests, 29% reported feeling nervous, 19%, unconfident; 16%, bored; and 15% uninterested. Twenty-nine percent reported that they did not care whether they took the tests, and 16% said they did not enjoy the experience.

Paris, Lawton, and Turner (1991) speculated that standardized tests may lead both bright and dull students to do poorly: Bright students may feel heightened parental, peer, or self-imposed expectations to do well on tests, which makes them anxious. Slower, disadvantaged students may do poorly, then rationalize that school and tests are unimportant and, consequently, expend less effort preparing for and completing tests. Either case might lead to a self-reinforcing spiral of decelerating achievement.

Surveys, however, cannot establish causality. Poor motivation may cause poor achievement, or vice versa, or both may be caused by other factors such as deficiencies in ability, parental support of academic work, or teaching. To show an independent effect of motivation on achievement requires an experiment, that is, a randomized assignment of students to conditions of eliciting different degrees of motivation. Such was the purpose of our study.

## Method

### *Sample*

The subjects for the study included students from three K through 8 public schools in Chicago. The student populations of the schools are generally lower-middle, working class, mostly Hispanic and African-American. Two normal heterogeneous classes within the schools were sampled from Grades 3, 4, 6, 7, and 8; because of exigencies, we did not sample Grade 5 classes.

### *Instrument*

We chose Form 7 of the Mathematics Concepts subtest of the Iowa Basic Skills (ITBS) 1978 edition, Levels 9–14, because it is a commonly used, highly reliable test. An earlier-than-contemporary edition was used so it would not interfere with current testing programs. In a review of the 1978 ITBS, Nitko (1985) judged that the reliability of its subtests is generally higher than .85 and that it contains content generally representative of school curriculum in Grades 3 though 9. "The ITBS," he concluded, "is an excellent basic skills battery measuring global skills that are likely to be highly related to the long-term goals of elementary schools" (p. 723).

### *Procedure*

Pairs of classes at each grade level from each school were randomly chosen to participate. Classes were selected for experimental and control conditions by a flip of a coin.

The first author (Brown) met with all participating teachers in each school to explain the instructions from the ITBS test manual (see Appendix A). Then, the experimental teachers were retained for the following further instructions:

> We are conducting a research study to determine the effects of telling students that the test they are going to take is very important. It is extremely important that you read the brief script I have for you today EXACTLY as it is written to your students.

The following script was provided:

> It is really important that you do as WELL as you can on this test. The test score you receive will let others see just how well I am doing in teaching you math this year.
>
> Your scores will be compared to students in other grades here at this school, as well as to those in other schools in Chicago.
>
> That is why it is extremely important to do the VERY BEST that you can. Do it for YOURSELF, YOUR PARENTS, and ME.
>
> (Now read the instructions for the test.)

Following the administration of the test, teachers and the first author asked students for their reactions to the script that was read to them.

### *Analysis*

An analysis of variance was run to test the effects of the experimental and normal conditions; the differences among the three schools and five grades; between boys and girls; and the interactions among the factors.

## Results

The analysis of variance showed a highly significant effect of experimental condition ($F = 10.59, p < .01$), a significant effect of school ($F = 3.35, p < .05$), and an interaction between condition and school ($F = 5.01, p < .05$). No other effects, including grade level, were significant. The means and standard deviations of selected factors are shown in Table 1.

**Table 1.—Normal Curve Equivalent Means and Standard Deviations**

| Grade | Condition | *M* | *SD* |
|---|---|---|---|
| 3 | Control | 32.77 | 19.57 |
| | Experimental | 42.55* | 16.59 |
| 4 | Control | 33.07 | 13.93 |
| | Experimental | 39.42* | 13.12 |
| 6 | Control | 40.84 | 17.77 |
| | Experimental | 39.64 | 14.66 |
| 7 | Control | 43.21 | 16.07 |
| | Experimental | 41.21 | 16.48 |
| 8 | Control | 31.12 | 14.06 |
| | Experimental | 44.66** | 15.94 |

*$p < .01$; **$p < .001$.

The mean normal curve equivalent test score of the 214 students in the experimental group was 41.37 (*SD* = 15.41), and the mean of the control group was 36.25 (*SD* = 16.89). The motivational effect is moderately large, .303 standard deviations, which implies that the special instructions raised the typical student's scores from the 50th to the 62nd percentile. The special instructions are comparable to the effects of better (though not the best) instructional practices over conventional classroom instruction (Walberg, 1986). If American students' average achievement in mathematics and science could be raised that much, it would be more comparable to that of students in other economically advanced countries.

The motivational effect was the same for boys and girls and constant across grade levels, but it differed among schools. Figure 1 shows a very large effect at School A, a large effect at School C, and the control group somewhat higher than the experimental group at School B.

Only 62 students (15% of the total sample) were tested at School B, which may account for the lack of effect in this school. At any rate, although the overall effect is moderately large and constant across grade levels and for boys and girls, the size of the effect varies from school to school. Such differences may depend on test-taking attitudes of teachers and students in the schools, motivational and cultural differences in the student populations, variations in conditions of administration, and other factors.

Several comments made by students and teachers during debriefing sessions illuminate the statistical findings. Student Comments 1, 2, and 3 illustrate students' motivation to do well to please their parents and teachers. Teacher Comments 1 and 2 also confirm the reasons for the effect. The last student and teacher comment, however, illustrate motivational states and conditions that diminish or vitiate the effect. When students are unthoughtful or when teachers keep constant pressures on for testing, special instructions may have little effect.

## Conclusion

The results show that motivation can make a substantial difference in test scores. Students asked to try especially hard did considerably better than those who were given the usual standardized test instructions. The special conditions raised the typical student's score .303 standard deviation units, corresponding to a 12 percentile-point gain from the 50th to the 62nd percentile. Although the effect was the same for boys and girls and for students in different grade levels, it varied in magnitude among the three schools.

The results suggest that standardized commercial and state-constructed tests that have no bearing on students' grades may be underestimating U.S. students' real knowledge, understanding, skills, and other aspects of achievement. To the extent that motivation varies from school to school, moreover, achievement levels of some schools are considerably more underestimated than in others. Such motivational differences would tend to diminish the validity of comparisons of schools and districts.

We would be heartened to conclude that U.S. students' poor performance on achievement relative to students in other countries is attributable to the test-motivation effect. That conclusion is overly optimistic, however, because the effect may also operate to a greater or lesser extent in other countries. Further research is obviously in order.

The motivation effect might be reduced in several ways. Highly motivating instructions could be given to all students. The content of school lessons and standardized tests could be brought into closer correspondence, making the tests more plausible to students, and perhaps justifying their use in grading. Some students, moreover, may be unmotivated because they never see the results. Providing timely, specific, and useful feedback to stu-

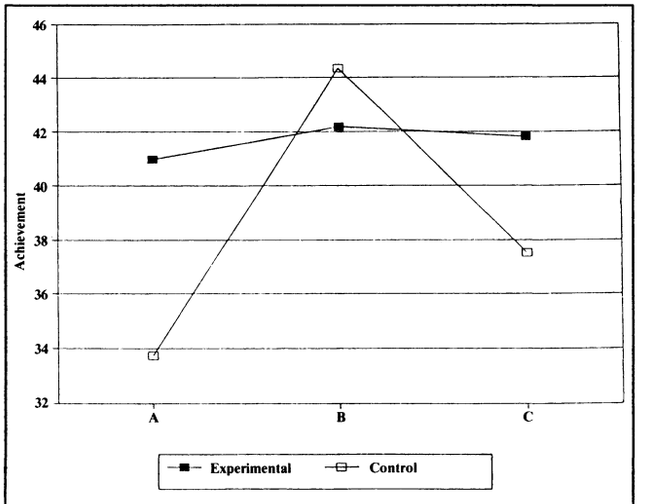


**Figure 1. Means by Condition and School**

dents, parents, and teachers on how well they have done might lead students to try harder.

## APPENDIX A

### Directions for Administering the Mathematics Concepts Subtest of the Iowa Test of Basic Skills (1979)

Now we are ready for the first mathematics test. Open your test booklets to page 73. (Pause) Find the section of your answer sheet for Test M-1: Mathematics Concepts. (Pause) Read the directions on page 73 silently while I read them aloud.

This is a test of how well you understand the number system and the terms and operations used in mathematics. Four answers are given for each exercise, but only one of the answers is right. You are to choose the one answer that you think is better than the others. Then, on the answer sheet, find the row of the answer numbered the same as the exercise. Fill in the answer space for the best answer.

Do not make any marks on the test booklet. Use your scratch paper for figuring. You will have 25 minutes for this test. If you finish early, recheck your work. Don't look at the other tests in the booklet. If you have questions, raise your hand, and I will help you after the others have begun. Now find your place to begin. (Pause)

Does everyone have the correct place? (Pause) Ready, BEGIN.

## APPENDIX B

### Selected Anecdotal Comments

*Students*

1. Third-Grade Girl: My teacher always tells us to get good scores on tests. I wanted to make her happy and my parents happy.

2. Fourth-Grade Boy: I think I did well. My teacher works hard with us. I also want my school to be the best.

3. Eighth-Grade Boy: I wanted to do really well for my teacher. She does a great job, and I didn't want to let her down.

4. Seventh-Grade Girl: I just took the test, and really didn't think much about the instructions she gave.

*Teachers*

1. I don't know what the results will show but my gut feeling is that students in the experimental groups will do better. I think it's probably because of motivational reasons.

2. The script gives me a feeling of *family*. I think if we told students just how much we want them to do well, and that it will not only benefit themselves but the whole school, they will probably do better.

3. I think all the students (control and experimental) will probably do equally well, because we always stress how important the tests are.

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