

**Raising Standardized Achievement Test Scores and the Origins of Test Score Pollution**



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# Raising Standardized Achievement Test Scores and the Origins of Test Score Pollution

THOMAS M. HALADYNA    SUSAN BOBBIT NOLEN    NANCY S. HAAS

*In the current climate of dissatisfaction with public education, the standardized achievement test score has been the operational definition for educational achievement, and raising test scores has been equated with educational improvement. The pressure to raise test scores has resulted in practices which pollute the inferences we make from these scores. We examine two major sources of test score pollution: (a) how public school personnel prepare students to take the standardized test and (b) nonstandard practices and conditions under which tests are administered. We also examine the apparent causes of this pollution and its effects on testing practices in American education.*

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**T**he coin of the realm in public education in the United States is the standardized achievement test score. This score is universally and uncritically accepted by the public and many educators as a valid measure of educational accomplishment (Haertel & Calfee, 1983). In a review of testing practices related to standardized achievement testing, Haladyna, Haas, and Nolen (1989) listed 29 possible uses of standardized tests (see Table 1). These uses range from policy analysis at the national level to parental review of their child's achievement. For instance, test scores are used to rank states by the United States Department of Education in its annual "Report Card," and by legislators and other government officials to assess educational effectiveness of states and school districts. School boards and school district personnel use test scores to determine the effectiveness of their districts and schools within each district. Newspapers rank school districts by test scores to bemoan the failure of education. Test scores are used by some school district personnel to determine merit pay and to make other personnel decisions. Real estate agents use test scores to rate neighborhoods in terms of the "quality of schools."

Until recently, these test scores were used for a rather limited set of purposes. Scores were used to group students for instruction, evaluate and modify school district curricula,

plan instruction, diagnose achievement deficits, place students into special programs (e.g., gifted, handicapped), and help parents understand the general achievement levels of their children. The considerable increase in the use of these test scores might be attributed to the onset of the "age of accountability" and an increased perceived need to evaluate education at virtually all units of analysis (i.e., individuals, classes, schools, school districts, states, and even the nation).

With the increased use of standardized achievement tests has come pressure to raise scores, which in turn leads to increased test score pollution. This pollution seriously affects the truthfulness of test score interpretations and calls into doubt the reasonableness of many of the uses listed in Table 1.

In this paper we will (a) define test score pollution, (b) describe the nature and extent of two major sources of test score pollution (student preparation and test administration practices), (c) discuss factors leading to polluting practices, and (d) suggest ways to combat test score pollution. But first, validity of test score use should be discussed as a context for the problem of test score pollution as it exists today.

## The Validity Context

To validate a particular test use or interpretation, one should provide evidence supporting the truthfulness of that use. This fundamental principle is stated in standard 1.1 in the *Standards for Educational and Psychological Testing* (1985, p. 13)

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**Table 1**  
**Consumers and Uses of Standardized Test Information**

Consumer	Unit of analysis
National level	
Allocation of resources to programs and priorities	Nation, state
Federal program evaluation (e.g., Chapter I)	State, program
State legislature/state department of education	
Evaluate state's status and progress relevant to standards	State
State program evaluation	State, program
Allocation of resources	District, school
Public (lay persons, press, school board members, parents)	
Evaluate state's status and progress relevant to standards	District
Diagnose achievement deficits	Individual, school
Develop expectations for future success in school	Individual
School districts—central administrators	
Evaluate districts	District
Evaluate schools	Schools
Evaluate teachers	Classroom
Evaluate curriculum	District
Evaluate instructional programs	Program
Determine areas for revision of curriculum and instruction	District
School districts—building administrators	
Evaluate school	School
Evaluate teacher	Classroom
Grouping students for instruction	Individual
Placement into special programs	Individual
School districts—teachers	
Grouping students for instruction	Individual
Evaluating and planning the curriculum	Classroom
Evaluating and planning instruction	Classroom
Evaluating teaching	Classroom
Diagnosing achievement deficits	Classroom, individual
Promotion and graduation	Individual
Placement into special programs (e.g., gifted, handicapped)	Individual
Educational laboratories, centers, universities	
Policy analysis	All units
Evaluation studies	All units
Other applied research	All units
Basic research	All units

and more completely discussed in chapters on validity in the second and third editions of *Educational Measurement* (Cronbach, 1971; Messick, 1989). For the present purposes, the validity of any standardized achievement test score use is conceptualized in terms of a unified approach which embodies both content and construct considerations (Messick, 1989). In this validity context, any standardized achievement test score represents a generalized measure of accomplishment of school curricula (Waldrop et al., 1982). As Mehrens and Kaminski (1989) observed, the makers of standardized achievement tests hold that their tests are merely a sample from a broad achievement domain of knowledge and skills, a view consistent with the conception of validity we are using.

Cronbach addressed this issue and its relationship to test preparation: Whenever it is critically important to master certain content, the knowledge that it will be tested produces a desirable concentration of effort. On the other hand, learn-

ing the answer to a set of questions is by no means the same as acquiring understanding of whatever topic that question represents (Cronbach, 1963, p. 681)

No single standardized achievement test represents a complete mapping of the content of the school achievement domain, nor is it so intended by its publishers. Indeed, many critics of standardized testing seek test use reform through the use of multiple indicators that better represent the complexity of school achievement. The December 1989 issue of the *Educational Researcher* is devoted to this idea of expanding the scope of educational achievement measurement.

Like the achievement domain, the causes of school achievement are varied and complex, a fact that further complicates the interpretation of achievement test scores. In Walberg's productivity model (1980) of school learning, for example, school achievement is a function of a variety of factors, only some of which are under the influence of schools. Schools can influence the quality and quantity of instruction,

motivation, and the learning environment, but they have little or no effect on family and home environment, maturity, and mental ability. Although researchers may disagree as to the relative degrees of influence of these factors or to the extent they interact, there is little disagreement that all are important.

Unfortunately, the consumers of school achievement test scores have often used test results without considering the complexity of achievement and its causes. Waldrop et al. (1982) maintain that standardized tests typically lack the "inference systems" necessary for many intended uses. For instance, erroneously attributing the level of achievement test scores to the influence of a single teacher, school, or school district grossly oversimplifies the nature of these scores. This misrepresentation seems to contribute to the growing fear and loathing that teachers and administrators feel toward standardized testing (Haas, Haladyna, & Nolen, 1989; Nolen, Haladyna, & Haas, 1989; Smith, with others, 1990).

There have been an increasing number of critics of this inappropriate use of test scores (Haertel, 1986; Madaus, 1988; Shepard, 1989). We believe that this increasing pressure to produce high test scores, combined with a lack of understanding of the complexities of achievement and its causes, has led to widespread practices that we have termed *test score pollution*.

### Test Score Pollution

*Test score pollution*, a concept based on the work of Messick (1984), refers to factors affecting the truthfulness of a test score interpretation. Specifically, pollution increases or decreases test performance *without connection to the construct* represented by the test, producing construct-irrelevant test score variance. Interpretations of these biased scores influence public opinion and policy and thus affect American education at all levels. There is reason to believe that the problem of test score pollution is pervasive in American education.

Three main sources of test score pollution are (a) the way schools and its personnel prepare students for tests, (b) test administration activities or conditions, and (c) exogenous factors representing forces beyond the control of schools and school personnel. Although this third factor is not part of the present discussion, we mention it briefly here. There are many factors believed to be causative agents of educational achievement. The reporting of test scores without acknowledging the influence of family, family mobility, economic environment, proficiency with the English language, and other such factors can lead both lay persons and educators to draw invalid inferences from these test scores. In this article however, we shall restrict the discussion of pollution to two factors under the control of school personnel.

#### *Polluting Practices*

Researchers have documented a number of activities aimed at preparing students for tests (Haladyna et al., 1989; Mehrens & Kaminski, 1989). These practices include (a) teaching test-taking skills, (b) promoting student motivation for the test, (c) developing a curriculum to match the test, (d) preparing teaching objectives to match the test, (e) presenting items similar to those presented on the test, (f) using commercial materials specifically designed to improve test

performance, and (g) presenting before the test the actual items to be tested.

Polluting practices also occur during the actual administration of the tests. These include (a) "cleaning" answer sheets by darkening responses and erasing stray marks, (b) dismissing low-achieving students on test days, and (c) interfering with responses (e.g., giving hints or answers to students or altering response sheets). Other conditions exist in and around the testing situation that are known to influence test scores. These include students' anxiety, stress, fatigue, and motivation, as well as the pace of performance on the test as a function of the time available. This latter factor is also known to interact with anxiety and to yield predictably poor results (Matarazzo, 1972).

Table 2 provides our appraisal of the ethics of these practices. It must be emphasized that our views on which student preparation and test administration practices are ethical and unethical are not shared universally. Mehrens and Kaminski (1989) suggest that, to some extent, the acceptability of test preparation practices varies somewhat, depending on the purpose of testing. Our views, summarized in Table 2, are based on the assumption that scores are and will continue to be used to compare the educational effectiveness of teachers, administrators, classes, schools, districts, states, and nations.

Despite the fact that some practices may be considered ethical and others unethical, it must be noted that even ethical practices are polluting if they are unevenly ad-

**Table 2**  
***A Continuum of Test Preparation Activities***

Test preparation activity	Degree of ethicality
Training in testwiseness skills	Ethical
Checking answer sheets to make sure that each has been properly completed	Ethical <sup>1</sup>
Increasing student motivation to perform on the test through appeals to parents, students, and teachers	Ethical
Developing a curriculum based on the content of the test	Unethical
Preparing objectives based on items on the test and teaching accordingly	Unethical
Presenting items similar to those on the test	Unethical
Using <i>Scoring High</i> or other score-boosting activities	Unethical
Dismissing low-achieving students on testing day to artificially boost test scores	Highly unethical
Presenting items verbatim from the test to be given	Highly unethical

<sup>1</sup>Ethical to the extent that the test publisher recommends it or to the extent that all schools, classes, and students being compared have the same service.

ministered within the unit of analysis being used for a particular test score interpretation. If one school district uses extensive test preparation programs for its students, is it valid to compare the test scores with those of a neighboring district where such test preparation does not take place?

Evidence of polluting test preparation and administration practices has been accumulating. Mehrens and Kaminski (1989) recently reviewed research on the variety of test preparation practices listed in Table 2. They concluded that indeed many of these tactics to improve test scores work quite well, and they also recognized that many of these activities tend to spuriously inflate test scores. Surveys and interviews conducted in Arizona, a state which mandates annual standardized achievement testing of all students in Grades 2 through 11, reveal widespread use of questionable and blatantly unethical practices to boost test scores (Haas et al., 1989; Nolen et al., 1989; Smith, with others, 1990).

#### *Ethical Test Preparation Activities*

Table 2 lists three classes of ethical activities to prepare students for standardized achievement tests. Training in testwiseness skills includes familiarizing students with the formats of answer sheets and test items and teaching general strategies for optimum performance on multiple-choice tests. Sarnacki (1979) provides a useful review of the methods and the effectiveness of these methods on test performance. Most (although not all) of our respondents indicated that such training was routine in their school or district (Haas et al., 1989; Nolen et al., 1989). Most respondents also reported various ethical strategies for increasing performance on these tests, such as demonstrating marking procedures (68.7%), sending notes home to parents about rest and nutrition (70.9%), encouraging attendance (92.6%), and discussing the purpose and importance of the tests (75.0%). It was also reported that some school districts check answer sheets very carefully for proper completion, whereas others do not. Variations in handling answer sheets mean that some schools or districts are disadvantaged by sloppy marking.

These surveys reveal that not all school districts practice the same kinds of ethical test preparation or in equal amounts. Although such practices should be encouraged and continued, as pointed out earlier in this article, the unequal application of these practices within a unit of analysis also pollutes test scores.

#### *Unethical Test Preparation and Administration Activities*

Both survey and interview responses indicated that certain unethical practices which inflate test scores without concurrently raising students achievement level were common in their school or district (Haas et al., 1989; Nolen et al., 1989). The elementary level teachers reported that 41.2% of them used commercial test preparation materials which, in addition to familiarizing students with test formats, teaches or reviews skills to be tested. Use of these materials may start several months prior to the test and may occur on a weekly or even daily basis. Mehrens and Kaminski (1989) have voiced the strongest objection to the ethics of using these test preparation programs, and their review is a most compelling argument against the continuation of this practice.

In addition to commercial packages, many educators reported that district curriculum and objectives had been "aligned" to the particular achievement test given (Haladyna et al., 1989). More informal alignment also occurs: Nolen et

al., (1989) reported 8.5% of secondary level teachers and 10% of elementary school teachers teach students items from the current year's test.

We found evidence of nonstandard administration in both the survey and interview studies (Haas et al., 1989; Nolen et al., 1989). On the survey, 8% of the elementary school teachers reported deviations in reading test directions or increasing testing time, and more than a third stated that they weren't sure if they followed prescribed procedures exactly.

When does nonstandard administration become cheating? Some interviewees discussed helping students select answers for some items during the test, and 14.2% of survey respondents offered rewards for test completion. Some interviewees reported that low-achieving students were excused from taking the test by being dismissed or sent on field trips during test week. Such tactics will increase or ensure a much higher performance than deserved.

Undetected instances of cheating lead to false interpretations of test performance, one source of test score pollution. Collective damage occurs because of cheating. Teaching the items from the test or changing students' responses on the answer sheet leads to gross misinterpretations of student achievement. Less obviously unethical (and so perhaps more insidious) actions such as aligning curricula to the content of a particular achievement test, or extensive practice with alternate forms or commercial preparation packages, have a wider effect and can lead to misinterpretations of differences among schools and districts. By any reasonable standard, the extensiveness of score-polluting practices revealed in the reports reviewed here is staggering. As small as the percentages reported in various studies are, when multiplied by the millions of students taking these tests, the number of flawed results must be quite large.

#### **A Climate for Test Score Pollution**

Many of the current uses of test scores have been characterized as "high stakes" (Madaus, 1988) because tangible consequences depend upon test scores. When teachers' and principals' employment or salary advancement is linked to student performance on such tests, the stakes are indeed high.

As the number of uses for standardized achievement test scores has increased, so has the pressure to raise these scores. In a recent interview, George Madaus said:

When the stakes are high, people are going to find ways to have test scores go up. . . . The school will look better, but the skill levels will not necessarily be going up. You may have succeeded only in corrupting the inferences you wanted to make from the tests. (Brandt, 1989, p. 26)

This point has been made in a number of other contexts and times (e.g., Frederiksen, 1984).

Educators themselves may vary considerably on what preparation and administration practices they see as "cheating." Gonzales (1985, cited in Mehrens & Kaminski, 1989) surveyed teachers in one school district and found that 11% did not consider teaching students by using actual test items to be cheating. Thus some educators may be deluded into thinking that any practice that boosts scores is legitimate.

Cheating occurs in situations where the consequences of success or failure are important and where confidence in a successful outcome is not complete. It is more likely to occur when individuals are self-aware and comparing them-

selves to an external standard of performance (Malcolm & Ng, 1989). Earlier we established that the general public, the media, and politicians view standardized achievement test performance as an important indicator of academic effectiveness. It is clear that results have important consequences for individual teachers and administrators, as well as for districts, and that results (for schools or districts) are likely to be made public.

In high-stakes testing, many school personnel have an opportunity to "optimize" their students' performance, without necessarily increasing achievement. Although most educators who engage in what we have called unethical preparation and administration practices probably do not consider these activities as cheating, it is clear that the result is the same: polluted test scores.

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The fact that our respondents expressed considerable doubt as to the validity of scores obtained under the present system (a finding similar to data reported by Smith and others, 1990) suggests that many are aware of the problem of test score pollution and the external conditions that lead to polluting practices. As one anonymous teacher eloquently wrote (Haas et al., 1989):

They [the tests] do not, in my opinion, reflect a student's progress. I resent the amount of teaching time it takes from my year to prep for the test. I feel that in order for their scores to be competitive, I must use that time, when it could be more effectively used for other learning purposes than test performance. (p. 96)

The majority of our participants stated that they felt pressure to increase student scores, but fewer than 20% felt the scores reflected a single year's learning. The extent of the pressure to raise scores varies from school to school and from district to district (a fact which in itself almost guarantees blatant attempts to boost test scores). It is clear from their comments that many teachers and administrators feel they are "under the gun" (Haas et al., 1989):

It is a shame that people feel the need to evaluate one's achievement from marks on a bubble sheet. We as teachers are pressured to teach to the test. This is an absurd way to go about educating children. I feel that if I am pressured any more to do well on the TEST, then I will do everything I can to make sure my kids do well. . . even cheat. . . . Is the real

world a bubble sheet in which we base our decisions and our moral values? (p. 128)

The moral dilemma presented to teachers and administrators is more complex than it might seem. Smith, with others, (1990) wrote that teachers face the dissonance of matching their daily, intimate observation of each child with test results. This "interpretive context" is unique to the teacher of a classroom of children. Teachers report a consistent lack of belief in these test results and in particular with how the results are used (Haas et al., 1989; Nolen et al., 1989; Smith with others, 1990). Although teachers and administrators participate in efforts to raise test scores, as one elementary school principal commented, "we suffer a collective guilt in the process."

#### **Back to the Standards**

Messick (1975) stated that when one is considering the use of test scores for evaluation, not only the validity of the score interpretation but also the consequences of using the score in a particular way must be considered. The *Standards for Educational and Psychological Testing* makes clear that certain conditions must exist for public use of tests. The most vital of these conditions is that any test use must be supported by evidence attesting to the truthfulness of interpretations and the reasonableness of the use of these scores. The current overemphasis on standardized achievement test scores has created conditions under which they are badly polluted by test preparation activities, administration practices, and other conditions. Further, scores are reported without the context which may be critical to their interpretation. As a result, the uses of test results listed in Table 1 become questionable.

Until there is serious reform in the way schools prepare students to take standardized achievement tests, test results will continue to misrepresent American public education and its accomplishments. However, as long as test scores remain the single most important index of educational effectiveness, such reform is unlikely to take place. The educational research community must do its part to discourage polluting practices, as well as to educate the public about the problems inherent in overreliance upon standardized achievement test scores. More important, researchers, other educators, and policymakers must work together to develop means of evaluating educational effectiveness that accurately represent a school or district's progress toward a broad range of important educational goals. This work is beginning in a number of states, including Arizona, where our research was conducted.

As new evaluation tools are developed, however, their use must also be examined carefully lest the problems we have discussed here continue. New forms of school achievement testing are still subject to the polluting influence we have described. We must look not only at what these new instruments tell us about student achievement but also at the ways in which students are prepared for and participate in the evaluation. As Messick, in his essay on meaning and values in measurement and evaluation (1975), writes,

To judge the value of an outcome or end, one should understand the nature of the processes or means that led to that end, as Dewey (1939) emphasized in his principle of the means-end continuum: it's not just that the means are appraised in terms of the ends they lead to, but ends are appraised in terms of the means that produce them. (p. 963)

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