

FORENSIC ANALYSIS OF STANDARDIZED SCHOOL ASSESSMENTS

AN ISSUE BRIEF FROM LEGISLATIVE BUDGET BOARD STAFF

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OBJECTIVE

Statistical analysis may be used to detect misconduct by teachers and administrators on standardized tests.

KEY FACTS

- ◆ Common data forensics methods include statistical analysis of answer sheet erasures, student response patterns, actual vs. predicted performance, score comparisons between subjects, comparisons between class grades and assessment scores, and changes in test participation rates.
- ◆ Pearson, TEA's testing company, provides erasure analysis files for all test administrations. TEA analyzes the files on a case-by-case basis and does not use the data to proactively identify cheating.
- ◆ Cheating may undermine the validity and reliability of state tests, prevent at-risk students from receiving needed interventions, and erode public trust in educational institutions.

BUDGETARY IMPACT

TEA's five-year contract with Pearson includes \$259,000 for data forensics work.

STATUTORY REFERENCES

Texas Administrative Code, Title 19 Section 101.65

Allegations of educator misconduct on standardized assessments have surfaced recently in several large urban school districts nationwide. In response to these concerns, some states including Texas have incorporated statistical analysis to monitor test security.

BACKGROUND

In accordance with the federal Elementary and Secondary Education Act, every state administers standardized assessments to public school students. Test results are used for accountability purposes at the campus, district, state, and federal level. Additionally, students may be required to earn a passing score on state tests to graduate or be promoted to the next grade. The State of Texas Assessments of Academic Readiness (STAAR) exam includes this type of high-stakes component. Some states and districts also incorporate students' results on standardized tests into metrics for evaluating teachers and administrators. Student test results may inform personnel decisions, including compensation, retention, and termination.

Several school districts nationwide recently have faced allegations of teacher and administrator misconduct on state tests. The most wide-scale cheating allegations occurred in Atlanta Public Schools (APS). The Georgia Bureau of Investigation issued a 2011 report documenting "organized and systemic misconduct" in APS stretching back a decade. Individuals who confessed said they were motivated to cheat because they faced intense pressure to meet untenable testing targets.

Texas school districts including Houston, Dallas, El Paso, and San Antonio have found evidence of educator test misconduct in prior years. A 2012 analysis by the Atlanta Journal-Constitution newspaper reported that 16 Texas school districts exhibited test score patterns from 2009 to 2011 similar to those found in Atlanta.

METHODS OF CHEATING

Investigations have identified several methods used to artificially increase test scores:

- breaching test security to obtain advance copies of the test;
- giving answers to students via verbal or written cues, voice inflection, or pointing;
- erasing and rebubbling students' incorrect responses on the answer sheet;
- withholding testing from students who are anticipated to perform poorly; and
- miscategorizing test takers as belonging to an incorrect subgroup, such as having a learning disability.

DETECTING CHEATING

Statistical analysis, including psychometric data forensics techniques, may be used to detect cheating on standardized tests. While such analysis does not provide proof of cheating, statistically unlikely results may indicate that further investigation is warranted. In addition to analyzing statistical data, investigators typically conduct interviews and review witness reports in an attempt to determine whether or not cheating occurred.

Statistical methods of detecting cheating may include:

- **Erasure analysis:** Erasure analysis counts the number of erasure marks on a student's answer sheet. Improbably large numbers of wrong-to-right erasures in a classroom may indicate tampering.
- **Projected score/pass rate analysis:** Statistical analysis of prior year test results can predict future performance. Unexpected spikes in aggregated test scores or passing rates may indicate cheating, especially when large gains evaporate in the next year or in carefully controlled testing settings. By contrast, educational gains made from a highly effective teacher tend to be smaller and more persistent.
- **Analysis of student response patterns:** Classrooms in which students miss large numbers of easy questions but correctly answer an unlikely number of difficult questions may be flagged. Similarly, testing companies may look for statistically significant strings of similar answers across tests.
- **Score comparisons across subjects:** Among subjects for which performance is highly correlated, an unlikely high score in one subject, aggregated at the classroom or grade level, may indicate cheating.
- **Mismatch between test scores and class grades:** Large numbers of students who earn high test scores despite performing below grade level or dropping out may raise red flags.
- **Changes in participation:** School districts and campuses must meet Annual Yearly Progress (AYP) as a group, and also within subpopulations based on race, language status, and income. Statistical analysis may uncover surprising changes in subgroup participation rates.

STATES USING DATA FORENSICS

The prevalence of misconduct by teachers and administrators on state tests is not well-established. U.S. Secretary of Education Arne Duncan issued a policy letter in June 2011 urging state education agencies to strengthen efforts to protect assessment and accountability data, including implementing forensics analyses. However, the expense of data forensics may deter their use. A relatively small number of states, including New York and New Jersey, recently have contracted with testing companies to perform erasure analysis or other data forensics techniques.

DATA FORENSICS TECHNIQUES USED IN TEXAS

The testing company Pearson's five-year (2010–2015) contract with the Texas Education Agency (TEA) includes \$259,000 for forensic analysis of test results. Pearson generates erasure analysis files for all hard-copy test administrations. The analysis shows the number and percent of total erasures and wrong-to-right erasures. Results are disaggregated by campus, grade, and subject, resulting in approximately eight million records annually. However, TEA does not analyze erasure files to proactively identify possible instances of cheating, citing a lack of available staff. Instead, analysis is performed on a case-by-case basis as part of existing test security investigations. Erasure files are kept confidential from the public and media.

Additionally, Pearson has begun initial pilot work on two other data forensics methods: projected score residual analysis and pass rate analysis (see Detecting Cheating, above).

ISSUES WITH CHEATING

Beyond the inherent ethical concerns, cheating on standardized tests may produce a number of negative outcomes:

- Widespread cheating may undermine the validity and reliability of assessment results.
- At-risk students may appear to be performing adequately and miss the opportunity for remediation or supplemental instruction.
- In districts that utilize value-added methods of teacher evaluation, teachers who do not cheat may appear to perform poorly, especially if their students' prior-year test scores were artificially inflated. These teachers may face personnel consequences, including termination.
- In districts with pay-for-performance incentive systems, taxpayers may financially reward teachers and administrators for cheating.
- Cheating allegations typically receive widespread media coverage and may erode public trust in educational institutions.

USEFUL REFERENCES

TEA Test Security web page: http://www.tea.state.tx.us/index3.aspx?id=3206&menu_id=793

Policy letter from Education Secretary Arne Duncan on testing security: <http://www2.ed.gov/policy/elsec/guid/secletter/110624.html>

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