Research Report

Accommodations on High-stakes Writing Tests for Students With Disabilities

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Abstract

With the addition of a writing component to many high-stakes tests (e.g., college admission tests and high school exit exams), a review of writing accommodations for students with disabilities becomes critical. This paper reviews the accommodation policies of 20 states with high school exit exams of writing and three testing organizations that administer high-stakes tests that assess writing. In addition, this paper reviews existing research on testing accommodations, specifically those that focus on writing assessments. A section on assistive technologies for writing is also included, because these technologies are becoming more widely used and are likely to be requested as testing accommodations. Finally, recommendations for needed research are provided.

Key words: Writing accommodations, assistive technologies, disabilities

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Introduction

In 1990, the Americans with Disabilities Act (ADA) was enacted to prohibit discrimination against individuals with disabilities and mandated equal access to public services and facilities. The ADA also placed responsibility on the test administrator for ensuring that test scores accurately reflect the construct being measured and not the test taker's disability, unless the skills affected by the disability are those being assessed. The legislation referred to an accommodation as any variation in the specified assessment environment or process that does not alter in any significant way what the test measures or the comparability of scores. Accommodations include variations in test scheduling, setting, response, and presentation format without which the assessment may not accurately measure the test taker's knowledge or skills.

Currently, all testing organizations that administer admission tests provide accommodations. Most states were slow to include students with disabilities in state assessments. Before the reauthorization of the Individuals with Disabilities Education Act (IDEA) in 1997, states' policies on testing students with disabilities were less clearly defined than they are today, and many students with disabilities were excluded from state assessments. The Individuals with Disabilities Act (IDEA, 1997) states that all students should participate in assessments (Section 300.138a). The law also mandates that decisions regarding testing accommodations be supported by the student's Individualized Education Plan (IEP) (Section 300.342b). Decisions regarding how a student will be assessed (e.g., alternate assessment, general assessment with accommodations) are typically made by the IEP team using guidelines provided by the state department of education and information about the student and the test.

With the addition of a writing component to many high-stakes tests (e.g., college admission tests and high school exit exams), a review of writing accommodations for students with disabilities becomes critical. This paper reviews the accommodation policies of 20 states with high school exit exams of writing, and three testing organizations that administer high-stakes tests that assess writing. In addition, this paper reviews existing research on testing accommodations, specifically those that focus on writing assessments. A section on assistive technologies for writing is also included, because these technologies are becoming more widely used and are likely to be requested as testing accommodations. Finally, recommendations for necessary research are provided.

Accommodations

The guidelines regarding testing students with disabilities vary by state and testing program, but most policies differentiate between testing accommodations and testing modifications. Accommodations are sometimes referred to as "allowable accommodations" or "standard accommodations" and do not alter the construct of the test. Modifications do alter the test's construct and are sometimes referred to as "nonallowable accommodations" or "nonstandard accommodations." Each state or testing program determines what accommodations and modifications are permitted and how test scores will be reported and used when modifications are allowed.

Testing accommodations (and modifications) are commonly grouped into four categories: presentation, response, timing, and setting. Presentation accommodations provide test takers with an alternative presentation of testing materials, such as Braille, large print, and audiocassettes. Response accommodations give test takers alternative options for responding to the assessment, and include the use of a scribe or computer to record responses on multiple-choice and essay tests. Timing accommodations include extended time, the most widely requested accommodation, as well as frequent breaks and multiple testing sessions. Setting accommodations consist of a private room, screens to block out distractions, and other changes to the test taker's surroundings. Any one of these accommodations may be considered a test modification, depending on the construct the test is measuring (e.g., spelling, composition, grammar, creativity). Most states differentiate between accommodations and modifications, and provide a list of each in their guidelines for testing students with disabilities.

Phillips (1994) argues that measurement specialists should consider the impact of modifications on the constructs measured and the test's validity. Once modifications have changed test constructs for some individuals, the users of the test can no longer rely on its ability to determine qualifications for graduation, admission, employment, certification, or licensure. Phillips also argues that, even if an examinee with a disability is incapable of adapting to the standard testing administration, any change to testing conditions should be avoided if the change would (a) alter the skill being measured, (b) preclude the comparability of scores between examinees that received accommodations and those that did not, or (c) allow examinees without disabilities to benefit (if they were granted the same accommodation). This last criterion is debatable; in fact, several researchers have recently argued that accommodations should only be

provided if they offer a "differential" boost to students with disabilities (Elliott & McKevitt, 2000; Fuchs & Fuchs, 1999, Pitoniak & Royer, 2001). Differential boost indicates that both students with disabilities and those without disabilities benefit from an accommodation, but that students with disabilities benefit more from the accommodation than students without disabilities.

Current Policy on Accommodations for Students With Disabilities

Most states and testing organizations use Phillips' first criterion (i.e., alter the skill being measured) to determine whether a test accommodation is an allowable accommodation or a nonallowable modification. However, because the testing constructs vary, there is some inconsistency between what each state and testing organization considers an accommodation and what they consider to be a modification.States with high school exit exams that did not test writing (e.g., Florida and North Carolina) were excluded from this review, but 7 states (California, Indiana, Louisiana, Maryland, Massachusetts, Mississippi, and New York) that assessed writing as part of another construct (e.g., writing an essay as part of the language arts or science exam) were included. The remaining 13 states that included writing in their exit exams used a stand-alone writing examination to assess students. Of the 20 states reviewed, 9 states had graduation tests that were not required for the class of 2003, but will be required for students graduating in the future. The writing test questions varied from only multiple-choice questions (Alabama) to a combination of multiple-choice, short constructed-response, and longer essay questions (Alaska, Arizona, and Washington). Table 1 provides the type of test questions by state and specific test, while Table 2 provides the type of test questions included in admission, placement, and professional examinations. The remainder of this section reviews the state and testing organization policies on the most commonly requested accommodations from each category (i.e., presentation, response, timing/scheduling, and setting) for tests that assess writing.

Table 1

High-stakes State Writing Tests, by Item Type

State/testing program	Multiple-choice	Short constructed response	Essay	Name of test
Alabama	X			Alabama High School Graduation Exam (AHSGE)
Alaska	X	X	X	High School Graduation Qualifying Examination
Arizona[a]	X	X	X	Arizona Instrument to Measure Standards (AIMS)
California[a]	X		X[1]	California High School Exit Exam (CAHSEE)
Delaware			X	Delaware Student Testing Program (DSTP) Assessment
Georgia			X	Georgia High School Writing Test (GHSWT)
Indiana		X	X[1]	Indiana Graduation Qualifying Exam
Louisiana	X		X[1]	Graduation Exit Examination for the 21st Century (GEE21)
Maryland[a]		X	X[1]	Maryland High School Assessment
Massachusetts[a]			X[1]	Massachusetts Comprehensive Assessment System (MCAS)
Minnesota			X	Basic Skills Tests
Mississippi			X[1]	Subject Area Testing Program (SATP)
New Jersey			X[1]	High School Proficiency Assessment (HSPA)
New Mexico			X	New Mexico High School Competency Examination (NMHSCE)
New York			X[1]	Regents Competency Tests
Tennessee[a]			X	Tennessee Comprehensive Assessment Program (TCAP)

(Table continues)

Table 1 (continued)

State/testing program	Multiple-choice	Short constructed response	Essay	Name of test
Texas [a]	X		X	Texas Assessment of Academic Skills (TAAS) or End-of-Course Examinations
Utah [a]	X		X	Utah Basic Skills Competency Test (UBSCT)
Virginia [a]			X	Standards of Learning (SOL) End-of-Course Assessments
Washington [a]	X	X	X	Washington Assessment of Student Learning (WASL)

Note. These tests require an essay component on another test (e.g., English II or Language Arts) but do not have a stand-alone writing assessment.

[a] Indicates that the exit exam was not a graduation requirement for students who graduated in 2003, but will be a requirement in the future.

Table 2

High-stakes Admission, Licensure, and Placement Writing Tests, by Item Type

Testing program	Multiple-choice	Short constructed response	Essay	Name of test
ACT Tests:				
ACT Assessment	X			ACT Assessment: Writing (administration to begin in fall 2004)
CAAP	X		X	Collegiate Assessment of Academic Performance Writing Skills and Essay
COMPASS/ESL	X		X	COMPASS/ESL: Writing Skills
WorkKeys			X	WorkKeys:Business Writing
College Board Tests:				
AP®			X[a]	Advanced Placement Test (variety of subject-matter tests)
PSAT/NMSQT®	X			PSAT/NMSQT: Writing Skills
SAT® I	X		X	SAT I Reasoning Test: Writing (administration to begin in fall 2004)
SAT II	X		X	SAT II: Writing
ETS Tests:				
GMAT®			X	GMAT: Analytical Writing Assessment Section
GRE®			X	GRE: Analytical Writing Section
PRAXIS™	X		X	Pre-Professional Skills Test: Writing; some PRAXIS II™ subject tests
TOEFL®	X		X	TOEFL: Structure/Writing

[a]This test requires an essay component on another test (e.g., English II or Language Arts) but does not have a stand-alone writing assessment.

Presentation

Altering the presentation format of a writing test results in a wide variety of presentations that vary in terms of changes to the construct of the test. Table 3 displays presentation accommodations and modifications by state and testing organization. None of the states or testing organizations reviewed in this paper considered visual aids, large-print test format, or Braille test format as a testing modification. One state listed orientation aides (e.g., providing masks or markers to block out unnecessary information and to help the test takers maintain their place, or highlighting key words in the directions) as modifications; the other states either made no mention of orientation aids or considered them to be accommodations. Eleven states identified allowing a test administrator to paraphrase test content as a modification, one state termed it an accommodation, and eight states did not mention paraphrasing. Paraphrasing of test directions was more likely to be an accommodation (eight states) than a modification (four states). For all ETS and College Board tests, paraphrasing of test content is not allowed, but reducing the number of test items per page and orientation aids are allowable accommodations. Currently, ETS does not have an official policy on paraphrasing test directions, but it is not allowed on College Board tests. ACT makes no mention of paraphrasing test content or directions.

Audio (or signing) presentation includes reading the entire test aloud, signing the test (items and directions), providing an audiocassette of the test material, and allowing the use of screen reader software. Most states determined which audio/signing accommodations were appropriate based on the content of the test. Of the 20 states reviewed, 18 considered audio or signing presentations (e.g., a reader, audio tape, or translation via American Sign Language) accommodations for test questions that assessed writing, 3 states consider these to be modifications, and 1 state did not specify. Only 2 states identified the audio/signing presentation of directions as a modification. The College Board, ACT, and ETS consider audio presentation of written material an allowable accommodation, but ETS and the College Board do not allow for the signing of test content because it may change the meaning of test questions. ETS is considering revising its policy on signing test content, for the writing prompts only, on essay tests. Signing of test directions is an allowable accommodation on College Board tests as well as other ETS-administered tests.

Table 3

Presentation Accommodations and Modifications

State/testing program	Audio/signing presentation of text		Visual accommodations					Other	
	Test content	Directions	Visual aids	Large print	Braille	Orientation aids	Reduce # of items per page	Paraphrasing items	Paraphrasing directions
Alabama	A	A	A	A	A	A			
Alaska	A	A	A	A	A	A			
Arizona[a]	M	M	A	A	A	M		M	M
California[a]	A			A	A	A	A		
Delaware	A	A	A	A	A	A			
Georgia	A		A	A	A		A	M	A
Indiana	A	A	A	A	A			M	M
Louisiana	A	A	A	A	A	A	A	A	A
Maryland[a]	A	A		A	A				
Massachusetts[a]	A	A	A	A	A	A	M	M	A
Minnesota	A	A	A	A	A	A	A	M	M
Mississippi	M	M	A	A	A	A			
New Jersey	A	A		A	A	A		M	A
New Mexico	A	A	A	A	A	A		M	M
New York	A	A	A	A	A	A		M	A
Tennessee[a]	A	A		A	A	A			

(Table continues)

Table 3 (continued)

State/testing program	Audio/signing presentation of text		Visual accommodations					Other	
	Test content	Directions	Visual aids	Large print	Braille	Orientation aids	Reduce # of items per page	Paraphrasing items	Paraphrasing directions
Texas[a]	A	A	A	A	A				
Utah[a]	A	A	A	A	A	A	A	M	A
Virginia[a]	A	A	A	A	A	A	A	M	A
Washington[a]	M	ALL	A			ALL		M	A
ACT tests	A	A	A	A	A				
College Board tests	A[b]	A	A	A	A	A	A	M	A
Other ETS-administered tests	A[c]	A	A	A	A	A		M	

Note. A=accommodation; M=modification; P=modification for some, but not all, test items; ALL=allowed for all test takers, regardless of disability.

[a]Indicates that the exit exam was not a graduation requirement for students who graduated in 2003, but will be a requirement in the future. [b]Does not allow signing of test content, but does allow a reader for test content. [c]Policy on signing writing test items is currently under development.

Response

Table 4 displays response accommodations and modifications by state and testing organization. All of the state guidelines on accommodations mentioned at least one oral response, such as dictating to a scribe, dictating into a tape recorder, or using voice recognition software. The most common oral response was dictating to a scribe. On multiple-choice test items, all 20 states determined that dictating to a scribe was an accommodation. The pattern was similar for writing composition test items (18 determined dictating to a scribe to be an accommodation and 2 considered it a modification). States did vary, however, in what an examinee was required to dictate on composition test questions. For example, some states required test takers to speak what they wanted written, while other states required examinees to spell every word and indicate all punctuation marks. Examples of state guidelines for a scribe can be found in the appendix. All of the admission tests reviewed consider a scribe an accommodation for essay, constructed-response, and multiple-choice items, despite the absence of any guidelines requiring examinees to demonstrate knowledge of spelling, grammar, and punctuation.

All states identified a word processor or typewriter as an accommodation, but most states identified supporting software (i.e., word prediction, spell checker, and grammar checker) as a modification for tests of writing. Two states that do not allow spell-check software do allow examinees to use a dictionary or spell-check book. Several assistive technologies, including Braillers, communication boards, and closed-captioned television, were considered accommodations because they were not considered likely to change the construct of the test. Currently, the College Board does allow the use of a computer as an accommodation on the SAT II: Subject Tests (including the SAT II: Writing Test), but supervisors are told to prohibit students from using spell check, grammar check, thesaurus, or any other assistive software programs. On ETS-administered computer-based tests that have an essay component (i.e., GRE®, GMAT®, and TOEFL®), all test takers are provided with a simplified word processing program. On the paper-based PRAXIS™ essay tests, examinees with disabilities are allowed to use a standard word processor. A spell check program is an available accommodation for PRAXIS, GRE, GMAT, and TOEFL, but it is infrequently allowed because of the strict guidelines for approval. When spell check is approved as an accommodation, a basic spell check program is sent to the test administrator for use; all other assistive programs (e.g., grammar check,

Table 4

Response Accommodations and Modifications

State/testing program	Oral response			Assistive devices/technologies					Other		
	Voice recognition software	Tape recorder	Scribe	That do not alter construct[b]	Word processor or type-writer	Spell check software	Grammar check software	Word prediction software	Point to answers	Mark answers in test booklet	Spell check or regular dictionary
Alabama			A	A						A	
Alaska			A	A	A					A	
Arizona[a]		A	A		A	M				A	M
California[a]			A	A							
Delaware			A	A	A	M	M	M		A	A
Georgia			A	A					A	A	
Indiana	A	A	A	A	A	M	M		A	A	
Louisiana	A	A	A	A	A				A	A	
Maryland[a]		A	A	A	A	M	M		A	A	
Massachusetts[a]			A	A	A	A	A	P	A	A	A
Minnesota		M	P	A	A	M				A	M
Mississippi			A	A	A			M		A	M
New Jersey			A	A	A					A	
New Mexico			A	A	A	M				A	A
New York			A		A	A	A			A	A
Tennessee[a]			A	A						A	

(Table continues)

Table 4 (continued)

State/testing program	Oral response			Assistive devices/technologies					Other		
	Voice recognition software	Tape recorder	Scribe	That do not alter construct[b]	Word processor or typewriter	Spell check software	Grammar check software	Word prediction software	Point to answers	Mark answers in test booklet	Spell check or regular dictionary
Texas[a]			A	A	A	M					
Utah[a]		A	A	A	A				A	A	
Virginia[a]		A	P	A	A	A	A			A	
Washington[a]		A	A	A	A	M	M		A		M
ACT Tests		A	A						A	A	
College Board tests	M	A	A	A	A	M	M	M	A	A	M
Other ETS-administered tests		A	A	A	A	A	M	M	A	A	M

Note. A=accommodation; M=modification; P=modification for some, but not all, test items; ALL=allowed for all test takers regardless of disability.

[a]Indicates that the exit exam was not a graduation requirement for students who graduated in 2003, but will be a requirement in the future. [b]Assistive technologies that do not alter construct includes communication boards or devices, speech synthesizers, speech recognition software, close-captioned or video materials, test-talk converters, auditory trainer, Braille writers.

thesaurus, word prediction) are not allowed. ACT does not provide any guidelines for determining which assistive technologies will be allowed.

Other response accommodations and modifications that were identified in the state guidelines include pointing to answers (7 states defined as an accommodation) and marking answers in test books (17 states defined as an accommodation; 3states did not specify). For all tests administered by the College Board, ACT, and ETS, pointing to answers and marking answers in the test booklet are allowable accommodations.

Setting

All 20 states identified at least one change to setting as an accommodation, but none of these changes were viewed as modifications. A summary of setting accommodations specified by each state can be found in Table 5. Accommodations included special adaptive tools or furniture, special acoustics or lighting, individual testing, small-group testing, individual enclosure (e.g., study carrel), alternative test site (e.g., home or hospital), preferential seating (e.g., facing the examiner or the front of the room), and using a familiar test administrator. The College Board, ACT, and ETS consider most of these changes to setting to be testing accommodations; on ETS and College Board tests, however, examinees are not allowed to have a familiar test administrator (e.g., family, friend, personal tutor), and ACT does not specify.

Timing and Scheduling

A summary of the accommodations and modifications of test timing or scheduling can be found in Table 6. Many high school exit exams have liberal timing allotments for all students, and none of the states in this study identified extra time, frequent breaks, different test day or time, or changing the order of test sections as a test modification. One state (Minnesota) identified multiple testing days as a modification. Until recently, ETS, ACT, and the College Board "flagged" test scores if a test taker received extra time. Flagged test scores were identified with an asterisk and a notation indicating that the test was taken under nonstandard conditions, but did not specifically identify the test taker as disabled. This policy was discontinued in October 2003 for all College Board and ACT tests; it was discontinued in October 2001 for all other ETS-administered tests.

Table 5

Setting Accommodations and Modifications

State/testing program	Adaptive furniture or tools	Special lighting or acoustics	Individual carrel or study enclosure	Separate room with direct supervision	Individual or small-group setting	Alternative test site	Preferential seating	Familiar test administrator
Alabama	A	A	A	A	A	A	A	A
Alaska	A	A	A	A	A			A
Arizona[a]	A	A	A	A	A			
California[a]	A	A	A	A				
Delaware	A	A		A	A		A	
Georgia	A	A	A	A	A		A	
Indiana	A	A			A		A	
Louisiana				A	A			
Maryland[a]			A	A	A	A	A	A
Massachusetts[a]	A	A	A	A	A	A	A	A
Minnesota	ALL	ALL	ALL	ALL	ALL			
Mississippi	A	A	A	A	A	A	A	A
New Jersey	A	A	A	A	A		A	A
New Mexico	A	A	A		A	A		A
New York	A	A	A	A	A			

(Table continues)

Table 5 (continued)

State/testing program	Adaptive furniture or tools	Special lighting or acoustics	Individual carrel or study enclosure	Separate room with direct supervision	Individual or small-group setting	Alternative test site	Preferential seating	Familiar test administrator
Tennessee[a]			A	A	A	A	A	
Texas[a]				A				
Utah[a]	A	A	A	A	A		A	A
Virginia[a]	A	A	A	A	A	A	A	
Washington[a]	ALL	ALL	ALL	ALL	ALL	A	ALL	
ACT tests	A			A		A	A	
College Board tests	A	A	A	A	A	A	A	M
Other ETS-administered tests	A	A	A	A	A	A	A	M

Note. A=accommodation; M=modification; P=modification for some, but not all, test items; ALL=allowed for all test takers regardless of disability.

[a]Indicates that the exit exam was not a graduation requirement for students who graduated in 2003, but will be a requirement in the future.

Table 6

Timing and Scheduling Accommodations and Modifications

	Timing		Scheduling	
State/testing program	Extra time	Breaks	Multiple test days	Optimal time of day/week
Alabama		A		A
Alaska	A	A	A	
Arizona[a]	ALL	A	A	A
California[a]	ALL	A	A	
Delaware	A		A	
Georgia	A	A		A
Indiana	A	A	A	A
Louisiana	A	A	A	A
Maryland[a]	A	A	A	A
Massachusetts[a]	ALL	A	A	A
Minnesota	ALL		M	ALL
Mississippi	A			A
New Jersey	A	A		
New Mexico		A		A
New York	A		A	A
Tennessee[a]	ALL	A	A	A
Texas[a]				
Utah[a]	ALL	A	A	A
Virginia[a]	ALL	A	A	A
Washington[a]	ALL	ALL	ALL	ALL
ACT tests	A	A	A	
College Board tests	A	A	A	A
Other ETS-administered tests	A	A	A	A

Note. A=accommodation; M=modification; P=modification for some, but not all, test items; ALL=allowed for all test takers regardless of disability.

[a]Indicates that the exit exam was not a graduation requirement for students who graduated in 2003, but will be a requirement in the future.

Research on Accommodations for Students With Disabilities

Although the intention behind each accommodation is to provide equal access by removing unnecessary challenges that create construct-irrelevant variance, some types of accommodations appear to change the construct of tests and alter the validity of test scores. Research should be conducted to determine whether these sorts of accommodations do alter test constructs and, if they do, under what conditions. However, research in this area is difficult to conduct due to the (a) multiple types of accommodations, (b) variety of disabilities and the differing levels of severity, (c) controversy regarding how each accommodation may or may not change a test's construct, and (d) inability to aggregate data across administrations because of database shortcomings. Although a variety of research has been conducted on testing accommodations (Tindal & Fuchs, 2000), very little research has been specific to accommodations on writing tests. For this reason, all of the published research on writing accommodations has been included in this paper. It should be noted, however, that some of these studies have very small sample sizes and strict experimental designs were not universally followed, so generalizations to other testing programs may not be possible.

Presentation

Braille and large print. No research studies were found that examined the impact of large-print or Braille accommodations on writing tests. However, three studies were found that examined the impact of large-print or Braille on nonwriting tests for high school and adult test takers (Bennett, Rock, & Jirele, 1987; Bennett, Rock, & Kaplan, 1987; Burk, 1998). In all three studies, examinees with visual disabilities performed worse than those without disabilities, even when appropriate accommodations were provided. Results indicated that an accommodation of large print (or Braille) with extended time improved the performance of students with low vision. Since the large-print and Braille accommodations were always administered with extended time, researchers were unable to separate out the impact of extended time from the changes to printing format.

Audio presentation. No studies have been published that examined the effect of audio presentation on writing tests. Before 1998, however, four studies were conducted on audio presentation (i.e., human reader, audiocassette, or text-to-speech conversion software) for nonwriting tests and are described in a review by Tindal and Fuchs (2000). These studies indicated that students with learning disabilities benefit from the audio presentation

accommodations, but Tindal and Fuchs advised caution when making any firm interpretations from these studies. Since 1998, three additional studies have been conducted examining the impact of various forms of audio presentation accommodations on mathematics tests (Calhoon, Fuchs, & Hamlett, 2000; Fuchs, Fuchs, Eaton, Hamlett, Binkley, & Crouch, 2000; Helwig, Rozek-Tedesco, & Tindal, 2002). Results of these three more recent studies indicate that students received higher test scores with the audio presentation accommodation than without the accommodation.

Another research study, conducted at the University of Delaware, examined whether or not assessment items administered using screen reading software measured student learning better than assessment items administered in a paper-based format (Brown & Augustine, 2000). In this study, two National Assessment of Educational Progress (NAEP) science assessments were administered to 96 high school seniors and two NAEP social studies assessments were administered to 110 high school seniors. One test was administered in a paper-based format and the other was administered with a computer utilizing screen reading software (i.e., Authorware 5.0). The test forms, order, and format were counterbalanced to reduce the influences of confounding variables. All test forms had a combination of multiple-choice and constructed-response items. Results indicated that poor readers performed better on the computer-based test than on the paper-based test; however, the overall analyses found no significant difference when controlling for reading ability.

Response

Word processor. Findings on how word processors affect writing test scores are inconclusive. Research on test takers without disabilities indicates that highly experienced computer users tend to write better with a computer than by hand (Owston, Murphy, & Wideman, 1992; Russell & Haney, 1997; Russell & Plati, 2001). In all of these studies, the handwritten essays were transcribed to a typed format, so that raters only viewed typed essays. The most recent research on students without disabilities (Russell & Plati, 2001) was conducted with 8th- and 10th-grade students taking the language arts portion of the Massachusetts Comprehensive Assessment System (MCAS). This study indicated that the paper-based writing tests underestimate the performance of students who are accustomed to using a computer when writing (by 4 to 8 points on an 80-point scale).

Several studies have examined the impact of computers or word processor on writing tests for students with disabilities. Although these studies provide some information about the impact these assistive technologies have on the impact of writing accommodations, the results may not be generalizable to exit exams and other high-stakes tests because of differences in the population of test takers and the assessments used. One early study that compared the handwritten and word-processed essays of 5th- and 6th-grade students with learning disabilities found no significant difference in scores (MacArthur & Graham, 1987). In another study, researchers at the University of Oregon examined the difference in essay quality on a statewide writing test for 7th-grade students with and without disabilities (Hollenbeck, Tindal, Harniss, & Almond, 1999). Students were asked to write an essay over a three-day period. Classes were randomly assigned to one of three conditions: (a) handwritten on all three days, (b) computer on all three days, or (c) handwritten for two days and computer for one day. Results indicated that students without disabilities performed equally well in all three writing conditions, but that students with disabilities performed significantly worse when composing with a computer than when handwriting their essays.

In addition to the above mentioned studies, two studies examined the impact of a computer-based administration of the Test of Written Spelling (TWS). The first study was conducted by Hasselbring and Crossland (1982) and included 28 summer school students, ages 9 to 14 years, who had learning disabilities. Results indicated that the computer version of the test was faster to administer than the written version, but no significant differences were found in student accuracy. This study had two major limitations. First, students took the test in either the written or the computer version, but not both, so comparisons could not be made at an individual level. Second, the study did not include a comparison group of examinees without disabilities, so the findings do not provide a baseline for comparing students with and without disabilities.

Varnhagen and Gerber (1984) conducted the second study of the TWS. This study included 18 students who did not have learning disabilities (6 of these students had limited English proficiency) and 9 students who had learning disabilities. Results indicated that, although students in the nondisabled group and students who had learning disabilities performed worse and took more time on the computer version of the test, they indicated that they would prefer to take future spelling tests on the computer. This study improved on the earlier study of the TWS by including students with and without disabilities and by having subjects take both the

computer and the handwritten versions of the test. A limitation of this study was that comparisons between the subgroups are difficult because the students with learning disabilities were older than the students without a disability (11 years, 5 months, versus 9 years, 3 months, respectively).

Spell check. A study conducted by Hollenbeck, Tindal, Harniss, and Almond (2002) examined the impact of spell check on essay quality. In this study, 50 7t^{h}-grade students were administered the statewide writing assessment under one of two conditions: (a) word processor without spell checker and (b) word processor with spell checker. Results indicated that students in the word processor with spell checker group received significantly higher scores on the Oregon Statewide Writing Assessment composite score and on three traits: organization, sentence fluency, and conventions. No significant scoring differences were found for three other traits: ideas and content, voice, and word choice.

Rater bias against typed essays. Three studies were found that compared the difference between test scores on handwritten and word-processed essays. Two of these were conducted using essays written by college students without disabilities. The first of these two studies, conducted by Arnold et al. (1990), was based on preliminary findings that students who hand wrote their essays received lower scores than students who used a word processor with a spell checker to write their essays. Arnold et al. conducted this study to determine if these differences were a result of scoring bias or of differences in the writing ability of students who choose to use a word processor. In this study, 300 student essays were originally handwritten and were then typed into a word processor. The essays, which were written as part of a placement test, were scored by two raters (when necessary, a third rater resolved any disagreement). Each composition was given a holistic score from 1 to 6; scoring followed rating guidelines similar to those used by ETS. Results indicated that, in general, handwritten papers received higher scores than the same essays transcribed to a computer. In addition, survey responses indicated that raters preferred to read handwritten papers.

Researchers at ETS also conducted a study comparing scoring of handwritten and word-processed essays (Powers, Fowles, Farnum, & Ramsey, 1994). Subjects in this study wrote one essay by hand and a second essay on a computer. All handwritten essays were transcribed into a computer, and all word-processed essays were transcribed by hand. Initial results confirmed earlier research indicating a rater bias against typed essays. This study was replicated after

changes were made to the training of raters. These changes included using both handwritten and word-processed essays in training, emphasizing that handwritten and word-processed essays may make different impressions, acknowledging the influences of perceived length on essay scoring, and checking for differences in the scoring standards. After the revised training, the difference between scores on the handwritten and word-processed essays was smaller, but raters were still biased against the typed essays.

A third study, conducted by Hollenbeck, Tindal, Stieber, and Harniss (1999), compared the ratings of 80 essays that were originally handwritten as part of a middle school statewide writing assessment. All essays were transcribed into word-processed essays, with no changes being made for grammar or spelling errors. All 80 essays were rated by trained statewide raters from the Oregon Department of Education in both formats (handwritten and typed). Each essay was rated based on six traits: ideas and content, organization, voice, sentence fluency, word choice, and conventions. Each essay was scored by two raters; disagreements of more than one point occurred 5% of the time and exact agreement occurred 45% of the time. Results indicated that scores on three of the traits (ideas and content, organization, and conventions) were significantly lower for the typed essays than for the hand-written essays. The researchers argued that these inconsistencies indicate that the scoring rubric lacked stability, and that using multiple response modes introduces construct-irrelevant variance and should therefore not be used.

Scribe. Several studies have been conducted to examine the impact the use of a scribe has on test performance. A study conducted by Trimble (1998) examined operational data from the Kentucky Instructional Results Information System (KIRIS). The KIRIS data included constructed-response and essay questions. This research focused on the performance of examinees who used a variety of accommodations (e.g., reader, scribe, cueing, paraphrasing, interpreter). Test results from over 4,000 students with disabilities from each of three grades (4, 8, and 11) were included in the analyses. Results indicated that test takers who used a scribe or the paraphrasing accommodation performed significantly better than their nondisabled peers. Students who used the other accommodations performed worse than the general population. One limitation of this research was that the data used for this study was operational testing data, so students were not randomly assigned to a testing condition.

Two experimental studies conducted at the California State University – Northridge examined the impact of writing accommodations on composition or editing of essays for college

students with learning disabilities. In the first study (Higgins & Raskind, 1995), 29 college students with learning disabilities were asked to write three essays, one for each of the following conditions: using a speech recognition system, dictating the essay to a human scribe, and without any assistance. Under the no assistance condition, students were allowed to handwrite or word-process their essay without using the spell check function. Essays were holistically scored on a scale of 1 to 6. Research findings indicate that speech recognition assists students with learning disabilities in compensating for their difficulties in written composition. Holistic scores for essays that were composed using speech recognition were significantly higher than the holistic scores achieved under the no assistance condition. The scribe condition was not significantly different from either the no assistance or speech recognition conditions. Limitations of this study are the small sample size and inconsistencies between formats (handwritten versus typed) that were scored.

The second study (Raskind & Higgins, 1995) focused on a student's ability to edit a previously written document. In this study, 33 college students with learning disabilities were asked to write an essay either by handwriting or word processing without spell check, and then return for a second session to proofread and locate errors in their essays under three conditions. These conditions included using (a) text-to-speech conversion technology, (b) a human reader, or (c) no assistance. The text-to-speech condition allowed the student to select text on a computer screen and hear the words spoken as they were simultaneously highlighted. Students were allowed to modify the rate of speech, volume, pitch, and background colors. No time constraints were place under any of the three conditions. Results indicated that subjects found significantly more of the total errors in the text-to-speech condition (36% of errors were found) than in either the human reader condition (32%) or the no assistance condition (25%).

Setting

No studies have been conducted on setting accommodations for writing assessments. However, one study explored the impact of background music being played during individually administered math and vocabulary tests (Abikoff, Courtney, Szeibel, & Koplewicz, 1996). Subjects included 20 elementary school students with attention deficit hyperactivity disorder (ADHD) and 20 students without a disability. The results on this study indicated that students with ADHD had higher math scores when the music was played and the music condition was

presented first, than when no music was played, but no differences were found on the vocabulary test or for students without a disability.

Timing

Extra time on writing tests. No research studies were found that examined the impact of extended time on writing tests for students with disabilities. However, a study conducted by Powers and Fowles (1996) examined the impact of extended time on a writing essay test for students without disabilities. In this study, 304 test takers wrote two essays, one with a 40-minute time limit and one with a 60-minute time limit. Subjects were selected from a pool of GRE test takers, and the order of administration was counterbalanced to eliminate any order effect. Essays written under the longer time limit (60 minutes) received moderately higher scores, on average, than the essays that were written under the 40-minute condition.

Extra time on nonwriting tests. Although no studies have been conducted to examine the impact of extended time for test takers with disabilities on writing tests, several studies have been conducted on the impact of extended time on reading and math content tests for students with and without disabilities. These studies indicate that students with disabilities, particularly learning disabilities, receive a differential performance boost from extended testing time when compared to students without disabilities (Alster, 1997; Camara, Copeland, & Rothschild, 1998; Fuchs, Fuchs, Eaton, Hamlett, & Karns, 2000). One study on the SAT (Centra, 1986) found that students without disabilities received a greater boost during the extended time condition (compared to standard time) than students with learning disabilities.

Five studies conducted on the predictive validity of admission tests for students with disabilities found that the predictive validity of scores from test takers who receive extra time is slightly weaker than the test scores of nondisabled test takers (Braun, Ragosta, & Kaplan, 1988; Cahalan, Mandinach, & Camara, 2002; Ragosta, Braun, & Kaplan, 1991; Thornton, Reese, Pashley, & Dalessandro, 2002; Ziomek & Andrews, 1996). In all cases, the tests scores obtained with extended time tended to overpredict first-year grade point average.

Summary of Research

While the research on writing accommodations is limited, several tentative conclusions can be drawn from the available research. First, it appears that rater bias against typed essays is a consistent finding across a wide variety of settings. Second, extended time may increase performance on writing tests, but no research is available comparing differential boost from

extended time between students with and without writing disabilities on writing tests. Third, although there is some evidence that highly experienced computer users benefit from writing their essays on a computer, research on the benefits of computer use by test takers with disabilities is inconclusive.

Current and Future Assistive Technologies for Writing

Technological advances have opened new doors to higher education for students with disabilities. These technologies are referred to as assistive technologies and include both commonly used technologies (e.g., word processors, spell check software, and calculators) and technologies that are used exclusively or primarily by students with disabilities (e.g., voice recognition software, screen readers, word prediction, and Braille output technologies). As the numbers of students with disabilities using assistive technologies grow, the requests for assistive technology accommodations will increase. This section reviews assistive technologies that are currently used for writing. Since assistive technology is a constantly changing and growing area, it is highly likely that new technologies will be developed in the future.

In addition to the commonly used assistive technologies (e.g., word processors) that were discussed in the previous section, several new technologies are becoming more widely used. A growing area of assistive technologies is in software for writing. Many of the commonly used word processing programs have assistive technology features. These features include grammar check, spell check, thesaurus, dictionary, outlining features, templates of commonly used documents, and automatic correction of commonly made errors (e.g., QuickCorrect for WordPerfect and AutoCorrect for Microsoft Word).

There are also software programs that support writing through word prediction and abbreviation expansion. Word prediction software works with word processing programs to offer a list of words from which to choose when a letter or sequence of letters is typed. For example, if "ap" is typed, the software generates a list of words that start with "ap" (e.g., apple, appendix, appropriate, apron) that the user can select. Some of these programs only provide words that would make grammatical sense. Two commonly used word prediction software programs are Telepathic and Co:Writer 4000. These programs were initially designed to speed typing for students who have physical disabilities that make typing and writing laborious; however, they are being used increasingly by students with learning disabilities. Abbreviation expansion software is also used in conjunction with word processing programs and allows users to create their own

abbreviations for frequently used words and phrases. For example, an abbreviation such as "at" can be expanded to "assistive technology." Telepathic offers word expansion capabilities, as does KeyREP, Instant Text, and TypeIT4Me.

Another rapidly growing assistive technology is voice (speech) recognition. Voice recognition technology converts individual voices into a digital format and then stores the individual voice file to be retrieved on demand to translate speech into the application of a command or written text. Commonly used voice recognition programs include Dragon Dictate, Dragon Naturally Speaking, ViaVoice by IBM, and iListen. Although voice recognition software has made tremendous advances in the past decade, there are still problems that require the user to personalize the software for their specific needs. For this reason, most students would not find an off-the-shelf voice recognition program as useful as a scribe or word processor during standardized testing. This may change in the future as the software advances. Currently, individuals with physical disabilities and certain learning disabilities (e.g., dysgraphia and dyslexia) are the primary users of voice recognition software.

Supportive reading software programs provide numerous enhancements that assist students in comprehending text. These features include highlighting, definitions, note-taking capabilities, and text-to-speech conversion. Popular supportive reading programs include Authorware 5.0, eReader, Kurzweil 3000, WYNN, TextHELP!, WordSmith, ReadPlease 2002, and PlainTalk. Students with visual and learning disabilities are the primary users of this type of software. Although some of the features in these programs (specifically, the text-to-speech conversion and screen reader capabilities) could compromise the validity of reading assessments, the features can be scaffolded to provide support while still requiring the student to read. Since reading is not being assessed on most writing assessments, it is likely that this type of software could be used to help students proofread their essays.

Currently, very little research has examined the impact of assistive technologies on learning or test performance. The earlier described research, conducted at the California State University – Northridge and the University of Delaware, provides evidence that specific assistive technologies (i.e., screen reader and voice recognition software) improve the writing performance of college students with learning disabilities (Brown & Augustine, 2000; Higgins & Raskind, 1995; Raskind & Higgins, 1995). More research is necessary in this area to determine if assistive technologies affect the reliability and validity of assessments.

Conclusions

While federal regulations mandate the inclusion of students with disabilities in statewide assessments, the guidelines on how these students will participate and subsequently graduate vary by state. Variations in guidelines on appropriate accommodations for test takers with disabilities are a result of differences in state policy, individual students' IEPs, and the constructs being measured by each state's test. The policies on accommodations for standardized admission tests of writing are fairly consistent, but some variation exists depending upon the needs of the test taker and the constructs being measured by the test. Even though accommodation policies vary between states and testing programs, most hold uniform positions on allowing a majority of testing accommodations. Research on accommodations for students with disabilities is available, but studies that are specific to high-stakes writing assessments are lacking. The only consistent finding is that rater bias against typed essays exists. Other research indicates that, for students without disabilities, extended time may increase test scores on essay tests, and that highly experienced computer uses may benefit from writing their essay on a computer. In order to answer questions that are specific to an individual test and students with writing-based disabilities, it may be advisable to conduct studies that (a) examine the predictive validity of the given writing test for students with and without disabilities, (b) determine if students with writing-based disabilities receive a differential boost from extended time and/or spell check software on essay tests, (c) investigate potential sources of rater bias against typed essays, and (d) explore the impact of newer types of assistive technologies on test validity.

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Appendix
Examples of State Guidelines for a Scribe

Delaware

Scribing Process

- Student will dictate sentences or paragraphs in the same manner used during instruction. Student is responsible for punctuation and may indicate punctuation in several ways.
    - Student may punctuate as they dictate. For example, when stating the sentence "The cat ran," the student will say, "The cat ran period."
    - Student may dictate more than one sentence at a time and add punctuation after the fact when given the scribed sentences to proofread.
    - Scribe may read back the dictation for proofreading if the accommodation of reading the text is an allowable accommodation for the student.
- When ASL is being used during scribing, the scribe may ask clarifying questions regarding the use of classifiers.
- Scribe will write exactly what is heard. Probing or clarifying questions are not allowed except in the case of classifiers for students using ASL.
- Scribe will use correct spelling and capitalize as they transcribe in what they deem are the intended sentence breaks. Students may proofread to add punctuation, and may change any capitalization or spelling they wish, even if it is incorrect. Scribes may not question or correct student choices.
- If reading the text aloud is an allowable accommodation, scribe may read the text, voicing the capitalization and punctuation. The student may make changes, and scribe will make those changes exactly as dictated by the student.
- If the technology is available, a scribe may type or use a laptop to type the student's work. However, all writing entries must be transcribed into the official test booklet.

- If the student is using a tape recorder or videotape for later transcription by a scribe, it is advisable to have two people listen or view the recording as a reliability check for accuracy.

Source: Delaware Department of Education, 2001.

Massachusetts

Allowing a student to dictate to a scribe, record on audiotape (for transcription by a test administrator), or use and electronic "speech-to-text" conversion device for the ELA Composition. When the student dictates to a scribe, the scribe may not edit or alter student responses in any way, and must record word-for-word exactly what the student has dictated. Scribes should request clarification from the student regarding the use of punctuation, capitalization, and the spelling of key words, and must allow the student to review and edit what the scribe has written. Use of this accommodation should be considered when either of the following conditions apply:

- The student dictates virtually all written compositions to a scribe; or records these on audiotape for transcription by an adult; or routinely uses and electronic "speech to text" conversion device to generate written compositions during routine instruction.
- The student does not have sufficient manual dexterity at the time of testing to produce legible written work."

Source: Massachusetts Department of Education, 2002.

Minnesota

Word processor or similar devices may be used if the IEP or 504 team determines it would be appropriate. Students may not have access to the following features of word processing programs: spell check, thesaurus, grammar check, or other reference or preparation materials.

Voice-activated computers may be used by students who are trained to use them. Students may not have access to the following features of word processing programs: spell check, thesaurus, grammar check, or other reference or preparation materials. For the Written Composition, the student must spell out every word and give punctuation to the scribe. Scribes must write exactly what the student dictates. Students may be given scripted responses for editing purposes.

Scribes may be provided for students whose visual or motor responses inhibit their ability to write answers. Scribes must be impartial and should be experienced in transcription. They must write exactly what the student dictates. Students must spell out every word and give punctuation for the scribe to write following the dictation of the composition. Students may be given scripted responses for editing purposes.

Source: Minnesota Department of Education, 2003.

Tennessee

Scribe – As a Special Conditions Accommodation- TCAP Writing Assessment

Special Conditions Accommodation code I may be used by students when indicated on the IEP or due to short-term physical inability to write. The following guidelines must be observed when this accommodation is used. Test Administrators must verify that SPECIAL CONDITIONS ACCOMMODATION code I is darkened on the student answer grid to signify that the student is using an accommodation.

1. The Test Administrator must complete the student's information grids on the writing folder.
2. Students using this accommodation should be tested in a quiet room apart from other students to avoid confusion while testing.
3. The Test Administrator should read the prompt aloud only once.
4. Time limits must be observed — twenty-five (25) minutes for the 11^{th}-grade test.
5. The Scribe must not correct what the student dictates.
6. The Scribe should remain silent throughout the testing process.

7. The student is to dictate his or her essay to the Scribe by spelling out each word, letter-by-letter.
8. The student must dictate all punctuation.
9. The Scribe must not alert the student of mistakes during testing.
10. The Scribe must not use vocal inflection to indicate correct or incorrect responses.
11. If the student requests to go back to a certain passage, the Scribe should either show the student the written page or spell back what the student dictated. The Scribe is not permitted to point out misspelled words, confusing organization, or missing punctuation.
12. The essay should be completed on the answer document provided for the TCAP Writing Assessment.

Source: Tennessee Department of Education, 2001.

Texas

If an examinee has a disabling condition that interferes with his or her ability to write the composition, the examinee may (a) dictate the composition directly to a test administrator, spelling out all words and indicating all capital letters and punctuation marks as the essay is composed, or (b) tape-record the essay while composing it an then play it back to the test administrator, spelling, capitalizing, and punctuating it. Afterward the examinee must be allowed to read over the composition and indicate where he or she would like to make corrections. The test administrator must record these responses verbatim on a standard answer document. Administrators should write "Transcribed by (NAME) because (REASON)" at the top of the written composition page. Test responses cannot be scored unless they appear on the answer document. All tape recording should be returned to the scorable shipment with any voided materials."

Source: Texas Education Agency, 2001.