
Recommendations for Accommodations

Implications of (In)consistency

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ABSTRACT

When accurately assigned and administered appropriately, testing accommodations help ameliorate the effects of personal characteristics that limit access to critical information and prevent a person from demonstrating his or her true abilities in the tested domain. Inaccurate assignment or misuse of accommodations may counteract the benefits of accommodations and introduce sources of measurement error. In this study, we investigated the consistency of accommodation assignments across 38 third-grade students' Individualized Education Programs (IEPs), teacher recommendations, and student performance data. We found inconsistencies between the accommodations listed on the IEP and the teachers' recommendations. Similar results were observed when comparing either IEP or teacher recommendations with students' performance. These inconsistencies are interpreted in light of federal mandates and best practices.

quate yearly progress toward mastering content standards by 2013–2014. Although districts are allowed to measure up to 3% of their student population using alternate assessments (1% measured against alternate achievement standards, and 2% measured against modified achievement standards), the remainder of the student body must take the same general education standardized test, heightening the focus on testing accommodations at local, state, and federal levels.

Test accommodations play a critical role in enabling students with disabilities to meaningfully participate and demonstrate their skills and knowledge on tests. Accommodations represent changes in the medium through which information is presented, the response formats, the external environment, or the timing of the testing situation that are designed to mediate the effects of a student's disability that inhibit understanding or expression of domain-specific knowledge (Haladyna & Downing, 2004). Although researchers have been studying the effects of accommodations for years (see, e.g., S. N. Elliott, Kratochwill, & McKeivitt, 2000; Helwig & Tindal, 2003; Tindal & Fuchs, 1999), the NCLB requirement to expand the range of students being tested on statewide assessments has resulted in a corresponding increase in questions related to accommodations: What accommodations are appropriate, who is most qualified to make accommodation decisions, and how do classroom-based accommodation practices influence student performance on accommodated large-scale tests?

Researchers have been addressing these and other questions by investigating the differential benefit of accommodations (see Sireci, Li, & Scarpati, 2003; Tindal & Fuchs, 1999;

STUDENTS WITH DISABILITIES IN THE UNITED States are being tested in unprecedented numbers as states move to comply with the No Child Left Behind Act (NCLB) of 2001. This federal legislation mandates annual reporting of student performance on large-scale assessments in reading and math for all schools receiving Title I funds. In a dramatic shift from previous requirements, NCLB stipulates that student performance be disaggregated by gender, race, participation in the free or reduced-price lunch program, English language learner status, and special education status. To avoid sanctions, schools must show that students in these subgroups as well as in their overall student population are making ade-

Tindal & Ketterlin-Geller, 2004, for literature reviews) and the effects of varying item characteristics on accommodation use (see Helwig, Rozek-Tedesco, & Tindal, 2002; Ketterlin-Geller, Yovanoff, & Tindal, 2007). Although advances in research have led to a better understanding of the practical applications of accommodations, for the most part, reliable systems are not in place to ensure that appropriate accommodations are being assigned and that these accommodations are consistently applied to classroom instruction and assessments. These systemic limitations run counter to the fundamental goals of test accommodations by *introducing* barriers to student success.

Adequate support for students with disabilities on assessments requires accurate assignment of accommodations and consistent implementation of accommodations in instruction and on classroom tests. Inappropriate assignment or inconsistent use of accommodations may significantly jeopardize student achievement by withholding necessary format changes or by providing distracting or confusing changes that are not required for success. Many factors contribute to the misassignment or misuse of test accommodations. Test accommodation decisions may be influenced by the definitions of accommodations (and what is allowed), by teachers' knowledge (or lack thereof) of accommodations and measurement principles, and by classroom practices (and the alignment between accommodations in teaching versus those in testing). Moreover, these factors not only influence the accommodation decisions made by Individualized Education Program (IEP) teams, but they also influence classroom practices.

IEPs represent both a process and a document designed to provide best practices to students with disabilities (Shriner & DeStefano, 2003). They are intended to provide a road map for curriculum and assessment practices for individual students with special needs: The general education curriculum is evaluated in light of the student's characteristics and current levels of performance, and access is provided through formative assessment. In the end, the IEP should be the source of information on the accommodations or modifications necessary for the student to succeed. Yet IEPs have become a legal form that often acts more like an artifact than a vital guiding document (Yell & Stecker, 2003).

In this article, we investigate three distinct but related issues influencing the assignment and use of appropriate testing accommodations for students with disabilities. First, we discuss the legal basis for accommodations by reviewing the legislation that establishes schools' obligations to support students with disabilities. Second, we investigate the correspondence between legal mandates and teachers' local practices by examining the relationship between accommodations as listed on students' IEPs and classroom teachers' recommendations for accommodations. Finally, we analyze the concordance between IEP and teacher accommodation recommendations and student performance on a series of basic skill tests. Although the scope of this study is not broad enough to suggest widely generalizable results, our findings

support the need to address the validity and reliability of the current assessment accommodation decision-making process. Furthermore, the current study brings to light an often perceived but undocumented assumption that little correspondence exists between the accommodations listed on student IEPs and the accommodations that teachers' provide in their classrooms. By presenting evidence about the nature of this relationship, this study provides the groundwork for policy discussions about accommodation assignment procedures to allow meaningful participation of students with disabilities in large-scale assessment systems.

THE LEGAL SKELETON

The Individuals with Disabilities Education Improvement Act of 2004 (IDEIA) mandates the use of IEPs to guide instructional decisions for all students who qualify for special education services. IEPs are legally binding contracts between school districts and the students (and parents) they serve. The designated purpose of an IEP is to develop an individualized and meaningful educational program. To satisfy the legal mandates set forth by Congress, an IEP must meet certain procedural and substantive requirements. Procedural requirements include a set of steps that must be followed during the planning, development, and review of the IEP, thereby making it legally correct. Substantive requirements make the IEP educationally meaningful by providing information about the schools' obligations to serve the students. IEPs must include (a) information about the students' level of educational performance; (b) a description of the ways in which the students' disabilities adversely affect their involvement and progress in the general education curriculum; (c) an outline of measurable annual goals, including academic and functional goals; (d) a statement indicating how annual goals will be measured and when reports will be provided; (e) an explanation of necessary educational services, including dates of commencement, duration, and frequency of services; and (f) specific information about accommodations and modifications in curriculum, instruction, and assessment to which students are entitled (IDEIA, 2004). Specifically, IDEIA stipulates that IEPs must include "a statement of any appropriate accommodations that are necessary to measure the academic achievement and functional performance of the child on state- and district-wide assessments" (IDEIA, 2004, p. 118). For this article, we focus on the guidance provided by the legislation on the ways in which IEPs should address accommodations.

Charged with the responsibility of documenting the appropriate instructional and assessment supports for students with disabilities, the IEP team must first consult the list of test accommodations allowed by the state and other testing systems in which the student will participate, such as the National Assessment of Educational Progress (NAEP). Considerable variation exists among states in what is considered an allowable accommodation (Thompson & Thurlow, 2003).

Furthermore, with the proliferation of research studies on the effects of accommodations, it is conceivable that allowable test accommodations may vary from year to year, not only affecting students' eligibility for specific accommodations, but also requiring teachers to be conversant with changing state policies. In a study of teachers' general knowledge of accommodations that were allowable in their state's large-scale assessment, Hollenbeck, Tindal, and Almond (1998) found significant confusion in general education and special education teachers' understanding of which test changes were modifications instead of accommodations. Teachers correctly identified just over 50% of the test changes, indicating that they were unable to distinguish between what accommodations were and were not allowable by state policy. Thus, teachers may be assigning accommodations that are in actuality modifications as defined by state policy. This confusion compromises the integrity of state policy.

Contributing to the confusion, although states must provide guidelines about what accommodations are permitted, both state and federal legislation are generally silent about providing a framework for making accommodation and modification decisions for individuals (J. Elliott, Ysseldyke, Thurlow, & Erickson, 1998), leaving the task of selecting valid accommodations to IEP teams (S. N. Elliott, McKeivitt, & Kettler, 2002). Interesting enough, although federal legislation requires the use of assessment results when making programmatic decisions, such as eligibility and goal setting, no specification exists that assessment results also should drive the determination of accommodations or modifications in classroom work or assessments of any sort (Shriner & DeStefano, 2003). Recently, several systems have emerged to address these concerns. Researchers such as Fuchs and Fuchs (2001) and Ketterlin-Geller (2003) have examined the effectiveness of data-driven models for making accommodation decisions. Furthermore, the Assessing Special Education Students (ASES) subgroup of the Council for Chief State School Officers (CCSSO) drafted a document specifying a 5-step process for assigning accommodations (Thompson, Morse, & Sharpe, 2004). Until these systems are widely disseminated and put into practice, however, educators are forced to develop local procedures to meet their responsibilities.

With the lack of systemic guidelines for selecting and implementing allowable accommodations, it follows that decisions about accommodations for instruction and about assessments are based on inconsistent and often unreliable sources of information, including but not limited to (a) teacher's prior experience, (b) parent preference, (c) ease of providing the accommodation, and (d) inferences about student performance (Fuchs & Fuchs, 1999). The *Standards for Educational and Psychological Testing* (American Educational Research Association, American Psychological Association, & National Council on Measurement in Education, 1999) have recognized that educators' "professional judgment necessarily plays a significant role in decisions about test ac-

commodations" (p. 102). Therefore, the assumption that the IEP provides the best reflection of students' justifiable accommodations may be more imagined than actual. Even if the team responsible for writing a student's IEP has followed the procedural requirements mandated by IDEIA, it is conceivable that they will not arrive at an appropriate accommodation decision.

THE PRACTICAL REALITIES

Teacher knowledge and, by extension, the knowledge of the IEP team, plays a significant role in the assignment and use of accommodations. The IEP team is composed of members of the educational community who are familiar with the student, including the special education case manager, a person who can make instructional recommendations based on student evaluations, a general education teacher, and a parent representative (IDEIA, 2004). Although members of the IEP team are responsible for evaluating the student's characteristics to determine the appropriate instructional settings and assessment supports, the members' qualifications for making accommodation and modification decisions can vary significantly from one setting to another (J. Elliott, Ysseldyke, Thurlow, & Erickson, 1998). This lack of consistency calls into question the trustworthiness and reliability of accommodation decisions that are listed on the IEP.

A number of studies have documented the inconsistency in teachers' knowledge of accommodations. In a study of 200 students with and 200 without disabilities, Fuchs and Fuchs (2001) found that teachers overidentified students for accommodations on both reading and mathematics tests. Specifically, teachers recommended accommodations to a large proportion of students who, upon actual testing, did not differentially benefit from them. Furthermore, teachers were unable to accurately predict who would or would not benefit from an accommodation. Frequently, teachers overrecommended for a specific subgroup of students, many of whom did not profit from accommodations. This finding suggests that teachers' subjective judgment plays a role in accommodation decisions and often leads to flawed evaluations of justifiable accommodations.

In another study examining the accuracy of teachers' assignment of accommodations on mathematics tests, Fuchs, Fuchs, Eaton, Hamlett, and Karns (2000) reported that on computations and problem-solving questions, "teachers erred by overidentifying accommodations. Specifically, teachers granted accommodations to large numbers of students with LD [learning disabilities] who failed to profit from those accommodations more than would be expected among nondisabled students" (p. 83). Similarly, Helwig and Tindal (2003) examined the correlation between teachers' recommendations of the read-aloud accommodation and students' performance with this recommendation. Teachers were accurate at

assigning the read-aloud accommodation approximately 50% of the time; in other words, teachers were unable to predict who would benefit from the read-aloud accommodation for half of the students sampled. Overrecommendation has been the most common cause of this problem.

WHAT CAUSES THIS CONFUSION?

Appropriate assignment and consistent implementation rely not only on teacher knowledge of accommodations; they are also influenced by teachers' familiarity with and acceptance of accommodations, understanding of basic measurement principles, and awareness of the implications of misassignment or misuse of accommodations. Schulte, Elliott, and Kratochwill (2000) reported that teachers' perceptions of the degree to which accommodations are helpful, fair, and feasible influence both the accommodations listed in IEPs and the accommodations used with students, even when no information related to assessment accommodations is specified in the IEP. To further complicate the situation, teachers' perceptions of ease of use and helpfulness of particular accommodations may depend on the grade level at which the teachers work, with elementary teachers more likely than secondary teachers to indicate that accommodations are easy to enact and beneficial to students (Jayanthi, Epstein, Polloway, & Bursuck, 1996).

Teachers' confusion about accommodations may also be due in part to a lack of measurement knowledge. Most teachers' knowledge of testing and measurement is attained through a process of "trial-and-error learning in the classroom" (Wise, Lukin, & Roos, 1991, p. 39). It has also been found that special educators and school psychologists may similarly lack knowledge that enables them to make reliable and valid decisions about assessment uses and procedures (Siskind, 1993). The findings of Wise et al. are also supported by Schafer's (1991) review of research that found "only about half of the teacher education programs in the nation require a course in measurement for initial certification" (p. 3). Eight years later, Stiggins (1999) confirmed that the issues identified by Schafer were still relevant, noting that teacher preparation programs in the United States are lacking in assessment training. Thus, many teachers entering the profession lack sufficient measurement training (O'Sullivan & Johnson, 1993). In a study of 65 preservice teachers' lesson plans, Campbell and Evans (2000) reported that "preservice teachers' attention to the fundamental, yet abstract concepts of reliability and validity was generally absent" (p. 354). Because accommodations are designed to increase the validity of the inferences made from test scores for students with disabilities, the lack of emphasis on these basic principles in teacher education programs and the subsequent confusion may influence teachers' understanding of the importance of appropriate assignment and use of accommodations.

Given the variety of factors that influence teachers' assignment and use of accommodations, it is not surprising that teachers are unclear about the importance of appropriate and consistent administration of accommodations for ensuring trustworthy and meaningful interpretations of student test scores. Test accommodations may allow valid interpretations and uses of assessment results by allowing students with disabilities to demonstrate their knowledge and skills, but only if they are used consistently and appropriately. Misassignment of accommodations can "inflate scores and inadvertently reduce pressure on schools to increase expectations and outcomes for students with disabilities" (Fuchs & Fuchs, 2001, p. 175).

In summary, test accommodations play a critical role in making it possible for students with disabilities to participate and demonstrate their skills and knowledge on large-scale tests. However, this participation is influenced by how those responsible for making the decisions about the use of accommodations interpret federal and state policies, understand and accept accommodations, and apply measurement principles to promote valid interpretations of test results for students with disabilities. Teachers, as members of the IEP team and as the individuals responsible for delivering accommodations, are perhaps the most important participants in this complex situation. Our study investigates general education teachers' role in interpreting and implementing IEP recommendations and poses two questions about the differences between legislative expectations and local practice:

1. Do general education teachers' perceptions of local accommodation decision-making procedures match federal mandates?
2. To what degree are the accommodations listed on the IEP consistent with (a) teachers' recommendations and (b) students' performance data?

METHOD

Setting and Participants

This study was conducted in six elementary schools in two school districts in the Pacific Northwest. The schools varied in setting from urban to rural, with a range of 41.1% to 73.3% of students at the schools eligible for free or reduced lunch. All schools were eligible for Title I funds. Students and teachers from 14 third-grade classrooms participated. Records from 38 students with disabilities were analyzed. Each student had an IEP on file and was receiving special education services in addition to general education instruction. Sixteen students were identified as having communication disorders, 11 were labeled with a specific learning disability, 3 were classified as having a behavioral disorder, and 8 students had

a combination of learning disabilities with communication or behavioral disorders. The majority of students were White (95%) and male (65%). Of the 14 teachers, 12 were female and all were White, with their primary assignment in a general education classroom.

Instruments

Survey of Teacher Recommendations for Accommodation. As part of this study, we developed a survey to capture teachers' recommendations for accommodations for individual students. The test accommodations included on the survey were selected from the National Center on Educational Outcomes' (2003) list of possible accommodations, which spanned a variety of physical and cognitive disabilities. Furthermore, an open-ended question probed teachers' perspectives about how accommodation decisions were made in their school building. Prior to its use, two experienced researchers and two third-grade teachers reviewed the survey and evaluated the appropriateness of its content and format to provide evidence for content-related validity.

Teachers completed one survey for each of their students. The survey included 16 questions on a 5-point Likert-type scale ranging from *low* to *high*. Teachers provided a judgment about their students' proficiencies in basic skills such as reading, writing, and mathematics from *not at all proficient* (1) to *very proficient* (5). Teachers evaluated the benefit that each student would receive from taking a mathematics test using specific accommodations. See Figure 1 for sample questions from the survey.

Individualized Educational Program Documents.

We analyzed the IEPs of the 38 students receiving special education services in our sample. We catalogued the areas for which the students were found eligible for special services and the specific accommodations or modifications listed on their IEPs for classroom instruction as well as classroom-, district-, and state-level assessments. Moreover, we confirmed that the general education teachers who filled out the surveys had also signed the IEP form, indicating their participation on the IEP team.

Reading Competency Measures. Reading competence was assessed using two measures of reading: silent reading fluency and maze task. *Silent reading fluency* was measured by calculating the number of words read per minute from a passage that was displayed on the computer. A grade-appropriate narrative passage of 224 words was selected from a set of published passages with known validity and reliability (Children's Educational Services, 1987). Prior to this study, the measure was evaluated for content and concurrent validity. Grade-level teachers evaluated the readability and appropriateness of the measure and found that it aligned with grade-level expectations. Evidence for concurrent validity was evaluated by comparing silent reading fluency with oral

reading fluency for a small sample of third-grade students. The results revealed a strong positive correlation between oral reading rates and silent reading rates ($r = .83$), with performance on the silent reading task being at a slightly faster rate.

A *maze task* containing 12 selection response items was administered on the computer to measure reading comprehension. The maze has a long history of research on its technical adequacy for students in the elementary grades (Fuchs & Fuchs, 1992; Parker, Hasbrouck, & Tindal, 1992; Shin, Deno, & Espin, 2000). In a maze task, words are omitted from sentences embedded in a reading passage, and students are provided with four possible answer choices to fill in the blank. The maze task for this study was created from a 147-word passage. No words were deleted from the first and last sentences. Twelve lexical words—nouns, main verbs, modifiers, and function words—were purposely omitted to leave a sufficient amount of text intact to allow readers to use context clues from adjacent sentences when making a selection. The set of possible answer choices was embedded in the sentence using a computerized drop-down selection process. Three syntactically and semantically appropriate distractors accompanied the correct answer choice in randomized order. Three experienced grade-level teachers reviewed the task to assess the suitability of the content and format. The reviewers noted that the deleted words were aptly placed within the passage and that the distractors were appropriate in vocabulary and grammar and reflected consistent meaning within the sentence.

Procedure

Teachers were given the teacher surveys prior to student testing, with one survey to be completed for each student. Teachers were given approximately 2 weeks to complete the surveys for all of their students. Two to 4 weeks following their initial recommendations, teachers completed additional surveys for a randomly selected sample of 20% of their students to allow us to check the reliability of their responses. Each student in the study completed the silent reading fluency task and maze task after the initial teacher survey had been completed. To avoid unintentional contamination of the survey results, teachers did not receive feedback on their students' performance on any of the student tasks.

Data Analysis

To examine the relationship between local practices and federal mandates for making accommodation placement decisions, we analyzed the data from the open-ended surveys to determine how accommodation decisions were made. Furthermore, we reviewed five accommodations for consistency between IEP team, teacher recommendations, and student performance data. These accommodations included read-aloud (verbatim oral presentation of material), linguistically

1. How proficient is the student in *reading* when reading grade-level material?

Very low proficiency	Low proficiency	Fair proficiency	High proficiency	Very high proficiency
1	2	3	4	5

2. How proficient is the student in *math computation*?

Very low proficiency	Low proficiency	Fair proficiency	High proficiency	Very high proficiency
1	2	3	4	5

3. How proficient is the student in *math problem solving*?

Very low proficiency	Low proficiency	Fair proficiency	High proficiency	Very high proficiency
1	2	3	4	5

4. How often does this student use a computer in your classroom for instructional activities or tests?

Rarely	Infrequently	Sometimes	Frequently	Daily
1	2	3	4	5

5. How often does this student receive instructional materials or tests that are read aloud?

Rarely	Infrequently	Sometimes	Frequently	Daily
1	2	3	4	5

6. How often does this student receive instructional materials or tests that use simplified language?

Rarely	Infrequently	Sometimes	Frequently	Daily
1	2	3	4	5

Evaluate the appropriateness of each testing accommodation for this student:

Would the student benefit from taking a math test under the following accommodations?	No benefit	Minimal benefit	Some benefit	Strong benefit	Do not know
7. Read problems and directions aloud	1	2	3	4	
8. Simplify language in problems and directions	1	2	3	4	
9. Present in a language other than English	1	2	3	4	
10. Extend length of testing session	1	2	3	4	
11. Administer test in multiple short testing sessions	1	2	3	4	
12. Complete test alone in a separate testing location	1	2	3	4	

FIGURE 1. Sample questions from *Survey of Teacher Recommendations for Accommodation*.

simplified text (reduction of the linguistic complexity of the items), extended time (extra time to complete the tasks), multiple testing sessions (short testing sessions with only part of the material presented in a session), and isolated test setting (taking the test alone or outside of the general education classroom). We used contingency tables and odds ratios to determine if the proportions of students being recommended for accommodations were equal to the hypothesized values (see Note for the cross-tabulations and equations used for calculating sensitivity, specificity, and kappa statistics).

First, we evaluated correlations to determine the degree of relation across the recommendation procedures. Second, we calculated kappa statistics to adjust for chance agreement. To evaluate the level of agreement, we considered kappa values of .40 to .60 to be fair, values of .61 to .75 to be good, and values greater than .76 to be excellent (Fleiss, 1981). To better understand the kappa statistic, we calculated p_{positive} and p_{negative} to indicate the consistency of the direction of the agreement (Cicchetti & Feinstein, 1990). Similar values as for kappa were used to evaluate the p_{positive} and p_{negative} statis-

tics (see Bullis, Bull, Johnson, & Peters, 1994, for procedures).

RESULTS

This study was designed to address two research questions:

1. Do teachers' local accommodation decision-making procedures match the requirements established by federal legislation?
2. Do accommodations listed on the IEP correspond with teacher recommendations and student performance data?

Concordance Between Federal Mandates and Local Practice

To evaluate the first question, we examined teachers' responses to the open-ended question that asked teachers to "describe how decisions for making accommodations to instructional materials and assessment tools are made in your school." The 14 general education teachers in our study reported a wide variety of ways in which accommodation decisions were made in their schools. Only four specifically mentioned IEPs in their responses, although an additional five reported that a team made accommodation decisions with the resource or special education teacher participating. Two teachers reported that students were grouped by ability, which allowed them to prepare instructional and testing materials targeted to the students' needs.

Although IEPs should list the necessary and appropriate accommodations for individual students, the teachers in our study responded that *classroom teachers* typically made "instructional accommodations/modifications in the classroom according to student need" (Teacher 3). "Decisions for making accommodations to instructional materials and assessment tools are made mostly by the classroom teacher for most students. . . . Our special ed teacher works very closely with classroom teachers for identified learning disabled students" (Teacher 13). Two of the 14 teachers reported that students identified as having special needs usually take their tests in a separate location, such as in the resource room, but did not report any specific justification. One teacher reported that accommodation decisions were made through "conversations between the SPED teacher and classroom teacher [to] determine what is best for each individual" (Teacher 4).

Correspondence Between IEP and Teacher Recommendations for Accommodations

Reliability and Degree of Relationship. We first established test-retest reliability of the *Survey of Teacher Recommendations for Accommodation* with a larger sample of

students ($n = 187$) to determine if teachers' recommendations were stable. Students in this group included the students in the target population as well as general education students. Two to 4 weeks following their initial recommendations, teachers completed additional surveys for a randomly selected sample of 20% of their students. The teachers' initial recommendations were moderately correlated with their subsequent recommendations, $r(66) = .65, p < .001$. This correlation reflects weak test-retest reliability, indicating possible instability in teacher judgments.

We subsequently computed correlations between teacher recommendations for accommodations and those recommendations listed on the IEP to identify the relationship between these two sources. Five commonly used accommodations were selected for analysis: read-aloud, linguistically simplified text, extended time, multiple testing sessions, and isolated test setting. For the read-aloud accommodation, teachers' judgments were moderately correlated with the IEP team referrals ($r = .45$). Negligible relationships were observed for the remaining accommodations, with correlation coefficients ranging from $-.06$ to $.12$.

Degree of Agreement. To examine the agreement across the accommodation decisions, we prepared a contingency table (see Table 1). Furthermore, we investigated the sensitivity and specificity of each recommendation, as well as the kappa statistics. To determine the consistency between IEP referrals and teacher recommendations for the read-aloud accommodation, we cross-tabulated the frequencies of convergent and divergent placements. Of the 15 students who received an IEP referral for the read-aloud accommodation, all 15 (100%) received a recommendation by the teacher. For 9 students, the IEP and teacher recommendations were consistent with no accommodations referenced. However, teachers recommended read-aloud accommodations for 14 students who did not have this accommodation listed on their IEP. Sensitivity for the read-aloud accommodation was calculated at 1.0, signifying that if the IEP stated that the student would benefit from the read-aloud accommodation, there was a 100% probability that the teacher would recommend it. In contrast, the specificity value was .52, indicating that if the IEP did not recommend the read-aloud accommodation, the teacher had only a 52% probability of agreement. The kappa statistic for the read-aloud accommodation was .36, indicating a weak agreement. A p_{positive} value of .68 indicated a good agreement when the IEP listed the accommodation, but a p_{negative} value of .56 reflected only fair agreement when the read-aloud accommodation was not listed on the IEP.

For the linguistically simplified text accommodation, correspondences between the IEP and teacher recommendations were observed for 8 students, as reflected in a sensitivity value of 1.0. Divergent recommendations were observed for 30 students, with a specificity value of .03. Thus, when the linguistically simplified text accommodation was viewed as unnecessary by the IEP, there was a 97% chance that the

TABLE 1. Comparison of IEP Team and Teacher Recommendations for Test Accommodations Analyzed in the Study

Teacher recommendation	Positive ^a	Negative ^b	Marginal
Read-Aloud			
Positive ^a	15	14	29
Negative ^b	0	9	9
Marginal	15	23	38
Linguistically Simplified Text			
Positive ^a	1	30	31
Negative ^b	0	7	7
Marginal	1	37	38
Extended Time			
Positive ^a	3	23	26
Negative ^b	1	11	12
Marginal	4	34	38
Multiple Sessions			
Positive ^a	1	24	25
Negative ^b	0	13	13
Marginal	1	37	38
Test Alone/Small Group			
Positive ^a	2	16	18
Negative ^b	3	17	20
Marginal	5	33	38

Note. IEP = Individualized Education Program.

^aRecommended for an accommodation. ^bNot recommended for an accommodation.

teacher would still recommend it. The kappa statistic for the linguistically simplified text accommodation was .04, with a p_{positive} value of .06 and p_{negative} value of .32. These results reflect a weak agreement between the IEP and teacher recommendations.

Similar results were observed for the extended time accommodation and for the multiple sessions and isolated testing accommodations. In each of these situations, the results confirmed that when reference was made to the accommodations on the IEP, teachers recommended them. However, even when no reference was made to the accommodations on the IEP, teachers often still recommended them. See Table 2 for specificity, sensitivity, and kappa values for all accommodations.

Consistency with Student Performance Data. We evaluated student performance on the silent reading fluency (SRF) and maze tasks to determine the correspondence between proficiency in reading and recommendations for

reading-based accommodations (i.e., read-aloud and linguistically simplified text). To determine students' competencies in reading, results from the SRF and maze tasks were combined to identify students who might benefit from a reading-based accommodation.

To evaluate performance on the SRF task, national normative rates were considered for the end of third grade. These norms indicate that students reading text orally between 85 and 96 words per minutes are in the 30th to 40th percentiles in reading (Hasbrouck & Tindal, 2005), suggesting that they may be at risk for reading failure. It follows that students reading at this rate silently may experience the same difficulties. To capture students at risk for reading failure, 90 words read per minute was selected as the performance criterion for the SRF task. Thus, students who read 90 or fewer words per minute on the SRF task were classified as being at risk for reading failure.

We also considered comprehension skills when evaluating student competency in reading. Raw scores on the maze

task were used to determine student proficiency. Howell and Nolet (2000) suggested that students scoring less than 60% correct do not adequately comprehend the text and may be in need of instructional interventions. For the maze task used in this study, students scoring 8 or fewer correct (67%) were identified as being at risk for reading failure. Taking the SRF and maze tasks together to evaluate competency in reading, students who scored below 90 words per minute on the SRF or scored 8 or below on the maze task were identified as students who might benefit from a reading-based accommodation.

Thirty-six of the 38 participants completed all reading measures. To determine the consistency between student performance and IEP referrals and teacher recommendations for reading-based accommodations, the frequencies of convergent and divergent placements were cross-tabulated and evaluated (see Table 3 for contingency tables, from which sensitivity, specificity, and kappa values were calculated). For the correspondence between student performance data and

IEP recommendations, the sensitivity value was .67. In other words, there was a 33% likelihood that an IEP would *not* list a reading-based accommodation even if performance on reading measures indicated that the student might be at risk for reading failure based on his or her performance on the SRF and maze measures. Specificity for the IEP was calculated at 1.0, signifying that there was a 100% probability that if performance data did not indicate that the student was at risk, the IEP did not list a reading-based accommodation. The kappa statistic was .63, indicating a good agreement. The p_{positive} and p_{negative} values were .80 and .81, respectively, suggesting strong consistency of agreement.

We also evaluated the correspondence between student performance data and teacher recommendations. A sensitivity value of 1.0 was observed, indicating 100% agreement when student performance on the basic skill tests indicated that the student was at risk for reading failure. Specificity was calculated at .70; in other words, when no reading-based accom-

TABLE 2. Agreement Indices Between IEP Team and Teacher Recommendations for Test Accommodations Analyzed in the Study

Accommodation	<i>r</i>	Sensitivity	Specificity	κ	P_{positive}	P_{negative}
Read-aloud	.45*	1.00	.52	.36	.68	.56
Linguistically simplified text	.08	1.00	.03	.04	.06	.32
Extended time	.05	0.75	.12	.09	.20	.48
Multiple sessions	.12	1.00	.04	.16	.08	.52
Alone/small group	-.06	0.40	.11	.22	.17	.64

Note. IEP = Individualized Education Program.

* $p < .05$.

TABLE 3. Comparison of Student Performance Data With IEP and Teacher Recommendations for Reading-Based Accommodations

Accommodation	Student performance data		
	Positive ^a	Negative ^b	Marginal
IEP team recommendations			
Positive ^a	14	0	14
Negative ^b	7	15	22
Marginal	21	15	36
Teacher recommendations			
Positive ^a	21	9	30
Negative ^b	0	6	6
Marginal	21	15	36

Note. IEP = Individualized Education Program.

^aRecommended for an accommodation. ^bNot recommended for an accommodation.

modation was indicated by student performance data, there was a 30% chance that the teachers would still recommend it. The kappa statistic was .60, with a p_{positive} value of .82 and a p_{negative} value of .57. Although the kappa statistic calculated for the IEP correspondence was similar to this value, the p_{negative} value was significantly lower, indicating that the agreement observed has a higher probability of being due to chance. These results reflect fair to good agreement with strong positive consistency yet fair negative consistency between student performance data and teacher recommendations for accommodations. In summary, when compared to student performance data, teachers are more likely to over-recommend accommodations, whereas IEPs are more likely to underrepresent the need for accommodations. In general, however, IEPs and teachers showed similar overall agreement with student performance data.

DISCUSSION

In this study, we examined general education teachers' perceptions of local accommodation decision-making practices in light of federal regulations. Furthermore, we analyzed the correspondence between IEP and teacher recommendations for accommodations as well as student performance data. Several significant findings emerged from our investigation. Although federal mandates clearly establish the IEP team as the group responsible for making accommodation decisions (IDEIA, 2004), we found that local practices varied considerably. In our study, individual teachers made accommodation decisions without systematic support or guidance from the IEP team. We also found little correspondence between the accommodations listed on the IEP and teacher recommendations. If an accommodation was required by the IEP, teachers also recommended it. However, even when it was *not* listed on the IEP, teachers still recommended it. When compared to student performance data, similar agreement indices between IEPs and teachers were observed; however, IEPs were more likely to make errors of omission, whereas teachers were more apt to make errors of commission in recommending accommodations. These types of errors point to systemic inconsistencies that can significantly jeopardize accurate measurement of students' knowledge and skills.

The scope of this study was not broad enough to suggest widely generalizable results. The sample size poses a significant limitation to the conclusions that can be drawn from these findings. Correlational research studies are particularly sensitive to low sample sizes; therefore, further research involving more participants is needed to corroborate the findings. Moreover, although the participants represented geographically diverse classrooms that served a variety of students and communities, this study was conducted in one state. It is possible that other states may approach assignment of accommodations and implementation procedures using systematic training and prescriptive guidelines. Research has suggested, however, that inconsistencies in providing accommodations

are a nationwide problem that is only growing in significance and may not be easily remedied by teacher training (Shriner & DeStefano, 2003). These findings point to the need to systematically address the validity and reliability of current accommodation decision-making procedures.

Concordance Between Federal Mandate and Local Practice

In our examination of the relation between federal policies and local practices for assigning accommodations, we found that general education teachers reported a variety of decision-making frameworks for supporting the needs of students with disabilities on general education assessments. A majority of the teachers reported that accommodation decisions were made in the classroom according to students' needs. Although the participating teachers were members of the IEP teams and attended the IEP team meetings to discuss accommodation decisions, IEPs were not frequently mentioned as guidelines for assigning accommodations. These findings suggest that the teachers in our sample were unclear about the legal aspects of enacting accommodations in the general education classroom, the function of the IEP team, and the legal significance of IEP team decisions.

These results have significant implications at both the individual student and system levels. Legally, IEPs serve as a binding contract between the school district and the student (and parents); as such, teachers are required to implement the recommendations listed in the IEP document. Specific information about accommodations and modifications for classroom-based and large-scale assessment should be provided by the IEP (IDEIA, 2004). By making decisions without recognition of this document, teachers may be unintentionally subverting the legal process, which may significantly affect student success by withholding accommodations or, more likely, by providing unnecessary accommodations.

Furthermore, independent decision making on the part of teachers diminishes the contribution of parents, special educators, and school psychologists involved in evaluating the students' characteristics. Federal legislation requires IEP decisions to be informed by multiple perspectives, yet these perspectives are lost when IEP team decision making is not implemented. Researchers have suggested that factors such as the nature of the assessments and students' disabilities, teachers' interpretation of policies, and their perception of the ease of use and helpfulness of accommodations influence the degree of implementation of IEP recommendations (Jayanthi, Epstein, Polloway, & Bursuck, 1996; Schulte, Elliott, & Kratochwill, 2000).

If the IEP is to serve as a guiding document, then it is important to understand teachers' perceptions of its usefulness and the challenges they face in enacting it. The teachers in our study reported that they made their decisions in response to their observations of students' needs in the classroom. However, these decisions may not be rooted in longitudinal data or in research on best practices with ac-

commodations. When teachers make accommodation decisions on their own, they essentially ignore the historical information used by the IEP teams and the influence from multiple stakeholders who use a rich array of information sources to ensure that the most appropriate decisions are made. Further study is needed to explore the context and implications that result when teachers base their decisions on their own observations rather than on the listed services and supports mandated by the IEP.

Of course, this interpretation assumes that IEPs are created with adequate input from general and special education teachers, parents, and specialists and that the IEPs include relevant information to provide specific guidelines for supporting students' within the general education classroom. Unfortunately, this is not always the case, in that IEPs frequently lack sufficient information to operationalize the accommodations within the classroom (Shriner & DeStefano, 2003). As mentioned earlier, although IEPs are mandated by federal legislation to list necessary accommodations, no specific guidelines at either the state or federal levels are provided for making these decisions (Thompson & Thurlow, 2003). It is left up to individual IEP teams to determine what data to gather and how to use this information to assign accommodations. Placing this responsibility in the hands of teachers and other IEP team members who have limited knowledge of what accommodations are allowable (Hollenbeck, Tindal, & Almond, 1998), the effects of accommodations (Fuchs & Fuchs, 2001; Fuchs, Fuchs, Eaton, Hamlett, Binkley, & Crouch, 2000; Helwig & Tindal, 2003), or measurement principles (Campbell & Evans, 2000; O'Sullivan & Johnson, 1993) may lead to inappropriate assignment. Therefore, without consistent and reliable procedures in place to assist the IEP team in making these recommendations, the reliability and usefulness of accommodation decisions may be compromised (Shriner & DeStefano, 2003).

To ameliorate the flaws in the current system, a unified definition of allowable accommodations, as well as specific guidelines for making accommodation decisions, would help bring clarity to the field and reduce the inconsistencies across states and individuals. More focused teacher preparation on the appropriate application of accommodations and the principles of measurement and assessment may help increase teachers' familiarity with accommodations and understanding of the importance of their appropriate assignment and use. These improvements to the system may lead to more valid and reliable judgments about the academic proficiencies of students with disabilities.

Correspondence Between IEP and Teacher Recommendations

In examining the relation between the accommodations called for by IEPs and the accommodations that teachers recommended, we observed weak correlations for four out of the five accommodations we studied. Moderate correlations were

observed for the read-aloud accommodation, possibly suggesting a heightened awareness of the effects of this accommodation. Along with extended time, the read-aloud accommodation is one of the most researched accommodations (Sireci, Li, & Scarpati, 2003) and, therefore, may be frequently discussed in the field. Stronger correlations between IEP and teacher recommendations were expected, as all of the participating teachers were members of the corresponding IEP teams. When examining the agreement indices, however, we found little to no agreement between IEPs and teachers for all of the accommodations studied. Given a positive recommendation by the IEP team, teacher judgments were likely to correspond. However, when the IEP team did *not* recommend the accommodation, teachers frequently still recommended it, indicating that teachers may be overidentifying students who may benefit from accommodations.

To further examine this situation, we used students' performance on a series of basic skill tasks to determine their level of proficiency in reading. Using national norms and instructional benchmarks, we identified students who demonstrated deficits in reading and thus might benefit from receiving accommodations. The placements made by this system were compared with the accommodations listed on the IEP and teacher recommendations. The kappa statistic indicated a good agreement between IEPs and student performance data with excellent directional agreement, yet only a fair to good agreement between teachers' recommendations and student performance data when controlling for chance. These results suggest that IEPs are more likely to underestimate the need for accommodations, whereas teachers are more apt to overestimate this need.

When examining the agreement across all three assignment procedures, student performance data, IEP, and teacher recommendations for reading-based accommodations corresponded for 55.6% of the students. Student performance data and teacher recommendations were consistent with each other yet differed from IEP recommendations for 19.4% of the students. Teachers were the exclusive source of accommodation recommendations for 25% of the students. These results suggest that teachers' recommendations are in concordance with other data sources for 75% of the students. These data call into question the source of the inconsistencies in assignment procedures and beg the question: Who is correct, the IEP or the teacher?

One possibility is that the IEP is correct and that teachers are misassigning accommodations. Weak test-retest reliability of the teachers' recommendations for accommodations suggest that teachers' evaluations of justifiable accommodations fluctuate across short periods of time and may not be reliable. Additional evidence indicates that teachers overidentify students for accommodations when compared to other data sources. By providing accommodations that are unnecessary, teachers may be jeopardizing student achievement by giving distracting or confusing accommodations that are not required for success (Fuchs, Fuchs, Eaton, Hamlett, Binkley,

& Crouch, 2000). For accommodations to be beneficial, format changes must be specific to the individual's needs (Helwig & Tindal, 2003). For example, a student with decoding difficulties may benefit from having information presented in linguistically simplified text; however, this same student may be distracted or confused by auditory presentation of information. Also, student success on large-scale assessments may be compromised due to a mismatch between classroom-based and large-scale assessment accommodation practices. If students are not accustomed to receiving a particular accommodation in the classroom, receiving that accommodation on a large-scale assessment may interfere with their performance (Helwig & Tindal, 2003). Finally, the system incurs extra costs from the inefficient overuse of accommodations, because additional resources are needed to provide the requested changes to the testing situation. Thus, overrecommen- dation of accommodations can negatively affect school systems as well as students.

An alternative explanation to the discrepancies between IEP teams' and teachers' judgments is that teachers' recommendations may be more closely aligned to the specific (and current) student characteristics at the time when the recommendations for accommodations are made. IEPs do not always provide specific goals and objectives that are aligned with the students' documented disability (Shriner & DeStefano, 2003). During classroom interactions, teachers may gain greater insight into the needs of the child that they did not have when the IEP was written (Yell & Stecker, 2003). Also, at any given time, the IEP may be as much as one year old, thereby limiting the relevance of its recommendations in light of current tasks. Also, as classroom tasks and assessments become increasingly complex, teachers may be the most qualified to evaluate the anticipated difficulties that the student might face. By proactively modifying their curriculum, teachers may be advocating for their students at a time when no structured IEP review is in place. The reauthorization of IDEIA in 2004 establishes a contingency for this situation by allowing amendments to IEPs without convening the IEP team (IDEIA, 2004). In sum, teachers may not be overrecommen- ding accommodations but instead acting in the child's best interest.

Further research is needed to investigate the question of which source (IEPs or teachers) is more correct in making accommodation decisions. Studies are needed that examine the differential benefit of accommodations by source. Comparing student performance on items using the accommodations as recommended by the IEP with student performance using the accommodations recommended by the teacher might provide greater insights on the accuracy of accommodation judgments. Furthermore, students' perceptions of their need for accommodations may offer another source of valuable information that may contribute to the decision-making process. Although we might question the recommendations made by students (especially young students with limited exposure to accommodations and testing), with appropriate training and

preparation they may provide valuable insights in the accom- modation decision-making process.

Regardless of the root cause for the disagreement between IEPs and teachers, the current system is placing teachers in the awkward position of enacting a set of predetermined, legally binding guidelines with the intention of providing the support needed for their students to succeed. This position is awkward in that the guidelines as specified on the IEP are often lacking in specific procedures, thus forcing teachers to interpret the IEP mandate to the best of their abilities. The high stakes associated with state assessments in this era of NCLB accountability make the situation even more unten- able. As a result, both students' needs and the accountabil- ity systems set up to ensure that those needs are met are compromised. Students may receive inappropriate accommo- dations or may be denied necessary supports, thereby jeopar- dizing their academic achievement. It follows that states may not be getting an accurate accounting of student performance, and limited resources may be wasted by the use of unneces- sary accommodations. As it stands, IEPs may not be serving the purpose for which they were designed if classroom teach- ers are not implementing their recommendations consistently. The current system needs improvement. ■

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NOTE

The following cross tabulations and equations were used for calculating sen- sitivity and specificity statistics:

Teacher/student recommendation	IEP team recommendation		marginal row totals
	positive ^a	negative ^b	
Positive ^a	A	B	f_2
Negative ^b	C	D	g_2
Marginal column totals	f_1	g_1	n

^aRecommended for an accommodation. ^bNot recommended for an accom- modation.

$$\text{Sensitivity} = \frac{A}{A + C}$$

$$\text{Specificity} = \frac{A}{A + B}$$

The following formulae for kappa were used in our analyses:

$$K = \frac{\frac{A + D}{n} - \frac{f_1 g_1 + f_2 g_2}{n^2}}{1 - \frac{f_1 g_1 + f_2 g_2}{n}}$$

$$P_{\text{positive}} = \frac{2A}{N + (A - D)} \quad P_{\text{negative}} = \frac{2D}{N - (A - D)}$$

REFERENCES

- American Educational Research Association, American Psychological Association, & National Council on Measurement in Education. (1999). *Standards for educational and psychological testing*. Washington, DC: Author.
- Bullis, M., Bull, B., Johnson, B., & Peters, D. (1994). Young adults who are hearing and deaf in a transition study: Did they and their parents supply similar data? *Exceptional Children, 60*, 323–333.
- Campbell, C., & Evans, J. A. (2000). Investigations of preservice teachers' classroom assessment practices during student teaching. *The Journal of Educational Research, 93*, 350–355.
- Children's Educational Services. (1987). *Standard reading passages: Measures for screening and progress monitoring*. Minneapolis, MN: Author.
- Cicchetti, D. V., & Feinstein, A. R. (1990). High agreement but low Kappa: II. Resolving the paradoxes. *Journal of Clinical Epidemiology, 43*, 551–558.
- Elliott, J., Ysseldyke, J., Thurlow, M., & Erickson, R. (1998). What about assessment and accountability: Practical implications for educators. *Teaching Exceptional Children, 31*(2), 20–27.
- Elliott, S. N., Kratochwill, T. R., & McKeivitt, B. C. (2000). Experimental analysis of the effects of testing accommodations on the scores of students with and without disabilities. *Journal of School Psychology, 39*, 3–24.
- Elliott, S. N., McKeivitt, B. C., & Kettler, R. J. (2002). Testing accommodations research and decision making: The case of "good" scores being highly valued but difficult to achieve for all students. *Measurement and Evaluation in Counseling and Development, 35*, 153–166.
- Fleiss, J. L. (1981). *Statistical methods for rates and proportions* (2nd ed.). New York: Wiley.
- Fuchs, L. S., & Fuchs, D. (1992). Identifying a measure for monitoring student reading progress. *School Psychology Review, 21*, 45–58.
- Fuchs, L. S., & Fuchs, D. (1999). Fair and unfair testing accommodations. *School Administrator, 56*(10), 24–29.
- Fuchs, L. S., & Fuchs, D. (2001). Helping teachers formulate sound test accommodation decisions for students with learning disabilities. *Learning Disabilities Research & Practice, 16*, 174–181.
- Fuchs, L. S., Fuchs, D., Eaton, S. B., Hamlett, C., Binkley, E., & Crouch, R. (2000). Using objective data sources to enhance teacher judgments about test accommodations. *Exceptional Children, 67*, 67–81.
- Fuchs, L. S., Fuchs, D., Eaton, S. B., Hamlett, C. L., & Karns, M. (2000). Supplementing teacher judgments of mathematics test accommodations with objective data sources. *School Psychology Review, 29*, 65–85.
- Haladyna, T., & Downing, S. M. (2004). Construct irrelevant variance in high stakes testing. *Educational Measurement: Issues and Practice, 23*(1), 6–16.
- Hasbrouck, J., & Tindal, G. (2005). *Oral reading fluency: 90 years of measurement* (Technical Report No. 33). Eugene: University of Oregon, College of Education, Behavioral Research and Teaching.
- Helwig, R., Rozek-Tedesco, M. A., & Tindal, G. (2002). An oral versus a standard administration of a large-scale mathematics test. *The Journal of Special Education, 36*, 39–47.
- Helwig, R., & Tindal, G. (2003). An experimental analysis of accommodation decisions on large-scale mathematics tests. *Exceptional Children, 69*, 211–225.
- Hollenbeck, K., Tindal, G., & Almond, P. (1998). Teachers' knowledge of accommodations as a validity issue in high-stakes testing. *The Journal of Special Education, 32*, 175–183.
- Howell, K. W., & Nolet, V. (2000). *Curriculum-based evaluation: Teaching and decision making*. Belmont, CA: Wadsworth/Thomson.
- Individuals with Disabilities Education Improvement Act of 2004, 20 U.S.C. § 1400 et seq. (2004) (reauthorization of Individuals with Disabilities Education Act of 1990)
- Jayanthi, M., Epstein, M. H., Polloway, E. A., & Bursuck, W. D. (1996). A national survey of general education teachers' perceptions of testing adaptations. *The Journal of Special Education, 30*, 99–115.
- Ketterlin-Geller, L. R. (2003). *Establishing a validity argument for universally designed assessments*. Unpublished doctoral dissertation, University of Oregon, Eugene.
- Ketterlin-Geller, L. R., Yovanoff, P., & Tindal, G. (2007). Developing a new paradigm for accommodations research. *Exceptional Children, 73*(3), 331–347.
- National Center on Educational Outcomes. (2003). *Special topic area: Accommodations for students with disabilities*. Minneapolis: University of Minnesota, National Center on Educational Outcomes.
- No Child Left Behind Act of 2001, 20 U.S.C. § 6301 et seq.
- O'Sullivan, R. G., & Johnson, R. L. (1993, April). *Using performance assessments to measure teachers' competence in classroom assessments*. Paper presented at the Annual Meeting of the American Educational Research Association, Atlanta, GA.
- Parker, R., Hasbrouck, J. E., & Tindal, G. (1992). The maze as a classroom-based reading measure: Construction methods, reliability, and validity. *The Journal of Special Education, 26*, 195–218.
- Schafer, W. D. (1991). Essential assessment skills in professional education of teachers. *Educational Measurement: Issues and Practice, 10*(1), 3–6, 12.
- Schulte, A. A. G., Elliott, S. N., & Kratochwill, T. R. (2000). Educators' perceptions and documentation of testing accommodations for students with disabilities. *Special Services in the Schools, 16*(1/2), 35–56.
- Shin, J., Deno, S. L., & Espin, C. (2000). Technical adequacy of the maze task for curriculum-based measurement of reading growth. *The Journal of Special Education, 34*, 164–172.
- Shriner, J. G., & DeStefano, L. (2003). Participation and accommodation in state assessment: The role of individualized education programs. *Exceptional Children, 69*, 147–161.
- Sireci, S. G., Li, S., & Scarpati, S. (2003). *The effects of test accommodation on test performance: A review of the literature* (Center for Educational Assessment Research Report no. 485). Amherst: University of Massachusetts, School of Education.
- Siskind, T. G. (1993). Teachers' knowledge about test modifications for students with disabilities. *Diagnostique, 18*, 145–157.
- Stiggins, R. J. (1999). Evaluating classroom assessment training in teacher education programs. *Educational Measurement: Issues and Practice, 18*(1), 23–27.
- Thompson, S. J., Morse, A. B., & Sharpe, M. (2004). *Accommodations manual: How to choose and use accommodations for students with disabilities*. Washington, DC: Council of Chief State School Officers.
- Thompson, S., & Thurlow, M. (2003). *State special education outcomes: Marching on*. Minneapolis: University of Minnesota, National Center on Educational Outcomes.
- Tindal, G., & Fuchs, L. (1999). *A summary of research on test changes: An empirical basis for defining accommodations*. Lexington, KY: Mid-South Regional Resource Center.
- Tindal, T., & Ketterlin-Geller, L. R. (2004). *Research on mathematics test accommodations relevant to NAEP testing*. Washington, DC: National Assessment Governing Board. Retrieved January 31, 2004 from <http://www.nagb.org/pubs/conferences/tindal.pdf>
- Wise, S. L., Lukin, L. E., & Roos, L. L. (1991). Teacher beliefs about training in testing and measurement. *Journal of Teacher Education, 42*(1), 37–42.
- Yell, M. L., & Stecker, P. M. (2003). Developing legally correct and educationally meaningful IEPs using curriculum-based measurement. *Assessment for Effective Intervention, 28*(3/4), 73–88.

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