



REL Appalachia Ask A REL Response

Data Use, Literacy, Math
February 2019

Question:

What evidence exists that assessment accommodations for students with disabilities in the subjects of reading and math (a) are appropriate and effective for meeting individual students' needs to participate in the assessments, (b) do not alter the constructs being assessed, and (c) allow for meaningful interpretations of results and comparison of scores for students who need and receive accommodations and students who do not need and do not receive accommodations?

Response:

Thank you for your request to our REL Reference Desk regarding evidence-based information about assessment accommodations for students with disabilities. Ask A REL is a collaborative reference desk service provided by the 10 Regional Educational Laboratories (RELs) that, by design, functions much in the same way as a technical reference library. Ask A REL provides references, referrals, and brief responses in the form of citations in response to questions about available education research.

Following an established REL Appalachia research protocol, we searched for peer-reviewed articles and other research reports on assessment accommodations for students with disabilities. We focused on identifying resources that specifically addressed the following types of accommodations: text to speech, extended time, assistive technology, adult transcription, rest breaks, braille, large print, and visual representation. The sources included ERIC and other federally funded databases and organizations, research institutions, academic research databases, and general Internet search engines. For more details, please see the methods section at the end of this document.

The research team did not evaluate the quality of the resources provided in this response; we offer them only for your reference. Also, the search included the most commonly used research databases and search engines to produce the references presented here, but the references are not necessarily comprehensive, and other relevant references and resources may exist. References are listed in alphabetical order, not necessarily in order of relevance.

References

Bolt, S. E., & Thurlow, M. L. (2004). Five of the most frequently allowed testing accommodations in state policy: Synthesis of research. *Remedial and Special Education, 25*, 141–152. Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.1013.981&rep=rep1&type=pdf>

From the abstract: “In the past, students with disabilities were frequently excluded from statewide testing. With changes in federal laws, states are seeking ways to increase the participation of students with disabilities in testing. Many have developed lists of allowable accommodations to facilitate participation. Although there has been an increase in research on how accommodations can aid in the measurement of skills among students with disabilities, many questions remain unanswered. The degree to which accommodations may compromise the integrity of tests is not clear. As a result, accommodation decision making is difficult. A review of research on five frequently allowed test accommodations (dictated response, large print, Braille, extended time, and sign language interpreter for instructions) was conducted; 36 studies were identified. Results indicate mixed support and nonsupport for providing these accommodations to students with disabilities. Guidelines for effective accommodation decision making and administration are discussed, and recommendations for future research are given.”

Buzick, H., & Stone, E. (2014). A meta-analysis of research on the read aloud accommodation. *Educational Measurement: Issues and Practice, 33*(3), 17–30. Abstract retrieved from <https://eric.ed.gov/?id=EJ1040469>

From the abstract: “Read aloud is a testing accommodation that has been studied by many researchers, and its use on K–12 assessments continues to be debated because of its potential to change the measured construct or unfairly increase test scores. This study is a summary of quantitative research on the read aloud accommodation. Previous studies contributed information to compute average effect sizes for students with disabilities, students without disabilities, and the difference between groups for reading and mathematics using a random effects meta-analytic approach. Results suggest that (1) effect sizes are larger for reading than for math for both student groups, (2) the read aloud accommodation increases reading test scores for both groups, but more so for students with disabilities, and (3) mathematics scores gains due to the read aloud accommodation are small for both students with and without disabilities, on average. There was some evidence to suggest larger effects in elementary school relative to middle and high school and possible mode effects, but more studies are needed within levels of the moderator variables to conduct statistical tests.”

Cawthon, S. W., Ho, E., Patel, P. G., Potvin, D. C., & Trundt, K. M. (2009). Multiple constructs and effects of accommodations on accommodated test scores for students with disabilities. *Practical Assessment, Research & Evaluation, 14*(18). Abstract retrieved from <https://eric.ed.gov/?id=EJ933677>; full text available at https://www.researchgate.net/profile/Stephanie_Cawthon/publication/242090758_Multipl

[e Constructs and Effects of Accommodations on Accommodated Test Scores for Students with Disabilities/links/00b7d5286f4ec148db000000.pdf](#)

From the abstract: “Students with disabilities frequently use accommodations to participate in large-scale, standardized assessments. Accommodations can include changes to the administration of the test, such as extended time, changes to the test items, such as read aloud, or changes to the student’s response, such as the use of a scribe. Some accommodations or modifications risk changing the difficulty of the test items or decreasing the validity of how test scores are interpreted. Questions regarding the validity of accommodated tests are heightened when scores are used in high-stakes decisions such as grade promotion, graduation, teacher merit pay, or other accountability initiatives. The purpose of this article is to review existing literature on multiple constructs that affect validity of interpretations of accommodated assessment scores. Research on assessment accommodations continues to grow but offers few conclusive findings on whether they facilitate fair and accurate measurement of student knowledge and skill. The validity of an accommodated score appears to vary depending on several factors such as student characteristics, test characteristics, and the accommodations themselves. A multiple construct approach may facilitate more accurate evaluations of the effects of accommodated test scores.”

Cook, L., Eignor, D., Steinberg, J., Sawaki, Y., & Cline, F. (2014). Using factor analysis to investigate the impact of accommodations on the scores of students with disabilities on a reading comprehension assessment. *Journal of Applied Testing Technology*, 10(2), 1–33. Abstract retrieved from <https://eric.ed.gov/?id=EJ865587>; full text available at <http://www.jattjournal.com/index.php/atp/article/download/48354/39224>

From the abstract: “The purpose of this study was to investigate the impact of a read-aloud test change administered with the Gates-MacGinitie Reading Test (GMRT) on the underlying constructs measured by the Comprehension subtest. The study evaluated the factor structures for the Level 4 Comprehension subtest given to a sample of New Jersey fourth-grade students with and without reading-based learning disabilities. Both exploratory and confirmatory factor analyses were used to determine whether or not the GMRT Comprehension subtest measures the same underlying constructs when administered with and without a read-aloud test change. The results of the analyses indicated factorial invariance held when the Comprehension subtest was administered to groups of students without disabilities who took the test under standard conditions and with a read-aloud test change and for groups of students with reading-based learning disabilities who also took the test under standard conditions and with a read-aloud test change.”

Cormier, D. C., Altman, J., Shyyan, V., & Thurlow, M. L. (2010). *A summary of the research on the effects of test accommodations: 2007–2008*. (Technical Report 56). Minneapolis, MN: University of Minnesota, National Center on Educational Outcomes. Retrieved from <https://eric.ed.gov/?id=ED511744>

From the abstract: “The use of accommodations for both instruction and assessment continues to be of great importance for students with disabilities. The purpose of this report

is to provide an update on the state of the research on testing accommodations, as well as to identify promising areas of research likely to contribute to understanding of current and emerging issues. The research is summarized to facilitate a discussion of trends in current research and to provide a better understanding of the implications related to accommodations use in the development of future policy directions, implementation of current and new accommodations, and the reliable and valid interpretation when used in testing situations. Many of the 40 research studies reviewed sought to study the effects of accommodations on scores or to compare accommodated scores to non-accommodated versions of a similar testing instrument. The most researched content areas were mathematics and reading. Most studies used a large sample of more than 300 participants, who often were K–12 students; students often were from multiple grade levels. Research samples most often included students with learning disabilities compared to other disability classifications. Presentation accommodations were studied by more than half of all the research studies published in 2007–2008. Findings from these studies were mixed for most specific accommodations, such as read-aloud and extended time, as well as for studies in which accommodations were aggregated. There was some consensus on the equivalence of computer-based tests and paper-and-pencil test formats.”

Elliott, S. N., Kratochwill, T. R., McKeivitt, B. C., & Malecki, C. K. (2009). The effects and perceived consequences of testing accommodations on math and science performance assessments. *School Psychology Quarterly*, 24(4), 224–239. Abstract retrieved from <https://eric.ed.gov/?id=EJ866094>; full text available at https://www.researchgate.net/publication/232505572_The_Effects_and_Perceived_Consequences_of_Testing_Accommodations_on_Math_and_Science_Performance_Assessments

From the abstract: “The present study examined the effect accommodations have on test results of students with and without disabilities and documented experts’ judgments about the appropriateness of testing accommodations. Test score data were collected from 218 fourth-grade students with and without disabilities on mathematics and science performance tasks and from eight testing experts who evaluated the fairness and validity of a sample of testing accommodations used with these students. Results indicated that, for most students with disabilities and some students without disabilities, packages of testing accommodations had a moderate to large effect on performance task scores. Expert reviewers rated most accommodations for a student with disabilities as being both valid and fair, and they gave accommodations listed on a student’s individualized education program (IEP) significantly higher validity and fairness ratings than accommodations that were not listed on the student’s IEP. Interpretations of these data are provided and implications for practice and future research are discussed.”

Ferrell, K. A., Correa-Torres, S. M., Howell, J. J., Pearson, R., Carver, W. M., Groll, A. S., ... Botsford, K. D. (2017). Audible image description as an accommodation in statewide assessments for students with visual and print disabilities. *Journal of Visual Impairment & Blindness*, 111(4), 325–339. Retrieved from <https://eric.ed.gov/?id=EJ1149592>

From the abstract: “Although image description has been identified as an accommodation for presentations conducted in the classroom, only a few U.S. states have approved it for use in high-stakes assessments. This study examined the use of audible image description as an assessment accommodation for students with visual and print disabilities by investigating student comprehension under multiple conditions. Methods: Students in three western states in grades three through eight who had visual ($n = 117$) or print ($n = 178$) disabilities participated in an abbreviated test constructed of retired assessment questions in English language arts, mathematics, and science, that were aligned with each state’s instructional standards, under conditions with and without standardized description of graphic images. The study used a within-subjects block design to collect and compare comprehension data under conditions where audible image description was both used and not used in an abbreviated test. Results: Results indicated that students who read braille were more likely to respond correctly under the audible image description condition, and students with visual and print disabilities who used print were equally likely to respond correctly regardless of condition. Discussion: Braille readers were more likely to obtain a correct answer when audible image description accompanied the question. Audible image description did not affect the likelihood of a correct response from students with print disabilities or students with visual disabilities who read print. Implications for practitioners: Audible image description is an accommodation that may help braille readers perform better on tests. Although the Partnership for Assessment of Readiness for College and Careers (PARCC) and Smarter Balanced consortia are taking steps to include image (or picture) descriptions in their assessment accommodations, teachers may want to develop a standard method for describing images and familiarize their braille readers to the strategy by including it in instruction and in classroom tests. Readers are referred to the National Center on Accessible Media’s online guidelines for image description.”

Fletcher, J. M., Francis, D. J., O’Malley, K., Copeland, K., Mehta, P., Caldwell, C. J., & Vaughn, S. (2009). Effects of a bundled accommodations package on high-stakes testing for middle school students with reading disabilities. *Exceptional Children*, 75(4), 447–463. Abstract retrieved from <https://eric.ed.gov/?id=EJ844206>; full text available at <https://www.thefreelibrary.com/Effects+of+a+bundled+accommodations+package+on+high-stakes+testing...-a0202627457>

From the abstract: “This study investigated the efficacy of a package of accommodations for poor readers in Grade 7. Students with and without word reading disabilities were randomly assigned to take an experimental version of a high-stakes reading comprehension test in 1 of 3 formats: (a) standard administration, (b) read aloud accommodations with 1-day administration, or (c) read aloud accommodations with 2-day administration. The significant condition effect and nonsignificant group by condition interaction suggested that accommodations helped both poor and average readers. However, the accommodation effect in average readers stemmed from low performance in the nonaccommodated experimental condition that was not apparent when the same students previously took the state-administered test. The 2-day administration was more effective than the 1-day administration.”

Lai, S. A., & Berkeley, S. (2012). High-stakes test accommodations: Research and practice. *Learning Disability Quarterly*, 35(3), 158–169. Abstract retrieved from <https://eric.ed.gov/?id=EJ972258>; full text available at <https://www.jstor.org/stable/pdf/41702367.pdf>

From the abstract: “Because high stakes are now attached to standardized assessments of student progress, policy makers, administrators, practitioners, and parents must understand how to most effectively and accurately measure the performance of all students, including students with learning disabilities (LD). To accomplish this, test accommodations are provided on an individual basis that are intended to mediate the impact of a student’s disability. The purpose of this article was to examine policy and guidelines related to accommodations among states and to review research related to the effectiveness of accommodations for students with LD. Findings showed that there continues to be large variability among states regarding allowed testing accommodations and that although there has been an increase in research conducted related to the effectiveness of accommodations for students with LD in the past decade, empirical evidence remains sparse and findings are often inconclusive. Implications are discussed.”

Lovett, B. J. (2010). Extended time testing accommodations for students with disabilities: Answers to five fundamental questions. *Review of Educational Research*, 80(4), 611–638. Abstract retrieved from <https://eric.ed.gov/?id=EJ907705>; full text available at <https://www.jstor.org/stable/pdf/40927295.pdf>

From the abstract: “Extended time is one of the most common testing accommodations provided to students with disabilities. It is also controversial; critics of extended time accommodations argue that extended time is used too readily, without concern for how it changes the skills measured by tests, leading to scores that cannot be compared fairly with those of other students. Advocates argue, instead, that many students with disabilities are only able to demonstrate their skills with extended time. This article reviews a wide variety of empirical evidence to draw conclusions about the appropriateness of extended time accommodations. The evidence reviewed raises concerns with the way that extended time accommodations are currently provided, although the same literature also points to potential solutions and best practices.”

Rogers, C. M., Lazarus, S. S., & Thurlow, M. L. (2016). *A summary of the research on the effects of test accommodations: 2013–2014* (NCEO Report 402). Minneapolis, MN: University of Minnesota, National Center on Educational Outcomes. Retrieved from <http://nceo.umn.edu/docs/OnlinePubs/Report402/NCEOReport402.pdf>

From the introduction: “The use of accommodations in instruction and assessments continues to be of great importance for students with disabilities. This importance is reflected in an emphasis on research to investigate the effects of accommodations. Key issues under investigation include how accommodations affect test scores, how educators and students perceive accommodations, and how accommodations are selected and implemented. The purpose of this report is to provide an update on the state of the research on testing accommodations as well as to identify promising future areas of

research. Previous reports by the National Center on Educational Outcomes (NCEO) have covered research published since 1999. We summarize the research to review current research trends and enhance understanding of the implications of accommodations use in the development of future policy directions, implementation of current and new accommodations, and valid and reliable interpretations when accommodations are used in testing situations.”

Sireci, S. G., Scarpati, S. E., & Li, S. (2005). Test accommodations for students with disabilities: An analysis of the interaction hypothesis. *Review of Educational Research, 75*(4), 457–490. Abstract retrieved from <https://eric.ed.gov/?id=EJ737306>; full text available at <https://www.jstor.org/stable/pdf/3516104.pdf>

From the abstract: “Test accommodations are often given to students with disabilities as one means of removing construct-irrelevant barriers to proper measurement of their knowledge, skills, and abilities. However, the practice is controversial. This article reviews numerous studies that focused on the effects of accommodations on test performance. Consistent conclusions were not found across studies because of the wide variety of accommodations, the various ways in which they were implemented, and the heterogeneity of students to whom they were given. But two consistent findings emerged: Extended time tended to improve the performance of all students, although students with disabilities tended to exhibit relatively greater score gains; and oral accommodations on math tests were associated with increased test performance for some students with disabilities.”

Zhang, D., Ding, Y., Stegall, J., & Mo, L. (2012). The effect of visual-chunking-representation accommodation on geometry testing for students with math disabilities. *Learning Disabilities Research & Practice, 27*(4), 167–177. Abstract retrieved from <https://eric.ed.gov/?id=EJ986227>; full text available at https://www.researchgate.net/profile/Joanna_Stegall/publication/264216767_The_Effect_of_Visual-Chunking-Representation_Accommodation_on_Geometry_Testing_for_Students_with_Math_Disabilities/links/5b47abf90f7e9b4637d1c330/The-Effect-of-Visual-Chunking-Representation-Accommodation-on-Geometry-Testing-for-Students-with-Math-Disabilities.pdf

From the abstract: “Students who struggle with learning mathematics often have difficulties with geometry problem solving, which requires strong visual imagery skills. These difficulties have been correlated with deficiencies in visual working memory. Cognitive psychology has shown that chunking of visual items accommodates students’ working memory deficits. This study investigated the effects of visual-chunking representation as a testing accommodation for improving students’ geometry problem-solving performance. Participants were four third-graders with difficulties in mathematics. An adapted reversal design was employed to examine the students’ performance changes during standard testing conditions and accommodated testing conditions. During the accommodated condition, students were presented with visual-chunking images. Results suggested that the visual-chunking representation accommodation improved students’ performance on

geometry problem-solving tasks, and an interview confirmed students' preference for the visual-chunking representation approach."

Zhang, D., Wang, Q., Ding, Y., & Liu, J. J. (2014). Testing accommodation or modification?: The effects of integrated object representation on enhancing geometry performance in children with and without geometry. *Journal of Learning Disabilities, 47*(6), 569–583. Abstract retrieved from <https://eric.ed.gov/?id=EJ1043275>; full text available at https://www.researchgate.net/publication/258116303_Testing_Accommodation_or_Modification_The_Effects_of_Integrated_Object_Representation_on_Enhancing_Geometry_Performance_in_Children_With_and_Without_Geometry_Difficulties

From the abstract: "According to the National Council of Teachers of Mathematics, geometry and spatial sense are fundamental components of mathematics learning. However, learning disabilities (LD) research has shown that many K–12 students encounter particular geometry difficulties (GD). This study examined the effect of an integrated object representation (IOR) accommodation on the test performance of students with GD compared to students without GD. Participants were 118 elementary students who took a researcher-developed geometry problem solving test under both a standard testing condition and an IOR accommodation condition. A total of 36 students who were classified with GD scored below 40% correct in the geometry problem solving test in the standard testing condition, and 82 students who were classified without GD scored equal to or above 40% correct in the same test and condition. All students were tested in both standard testing condition and IOR accommodation condition. The results from both ANOVA and regression discontinuity (RD) analyses suggested that students with GD benefited more than students without GD from the IOR accommodation. Implications of the study are discussed in terms of providing accommodations for students with mathematics learning difficulties and recommending RD design in LD research."

Additional Ask A REL Responses to Consult

Ask A REL West at WestEd. (2015). *Could you provide research on English Language Proficiency testing of students with disabilities, including 1) how tests are administered 2) how tests are validated for students with disabilities 3) how tests are scored 4) how those scores are used and 5) how tests are used to reclassify students with disabilities?* Retrieved from https://relwest.wested.org/system/documents/pdfs/437/original/REL_West_Memo_ELP_assessment_and_SWD_102015.pdf?1444938567

Additional Organizations to Consult

Understood: <https://www.understood.org/>

From the website: "Our goal is to help the millions of parents whose children, ages 3–20, are struggling with learning and attention issues. We want to empower them to understand their children's issues and relate to their experiences. With this knowledge, parents can make effective choices that propel their children from simply coping to truly thriving."

This journey can pose challenges, though. That's where Understood comes in. Understood aims to give parents a direct path to the support they need most to make them feel more confident and capable, less frustrated and alone."

- Accommodations: What they are and how they work:
<https://www.understood.org/en/learning-attention-issues/treatments-approaches/educational-strategies/accommodations-what-they-are-and-how-they-work>

Learning Disabilities Association of America: <https://ldaamerica.org/>

From the website: "LDA visualizes a world in which learning disabilities are universally understood, so all individuals are accepted, supported and empowered to live a self-determined life."

- Accommodations, techniques and aids for learning:
<https://ldaamerica.org/accommodations-techniques-and-aids-for-learning/>

Methods

Keywords and Search Strings

The following keywords and search strings were used to search the reference databases and other sources:

- ("assessment accommodation*" OR "test* accommodation*") AND (math* OR read*) AND ("students with disabilities" OR SWD OR "special education") AND (appropriate OR construct OR compare OR valid* OR fair)
- ("assessment accommodation*" OR "test* accommodation*") AND (math* OR read*) AND ("students with disabilities" OR SWD OR "special education") AND (appropriate OR construct OR compare OR valid* OR fair) AND ("text to speech" OR "read aloud" OR "extended time" OR "assistive technology" OR "adult transcription" OR "rest break*" OR braille OR "large print" OR "visual representation")

Databases and Resources

We searched ERIC, a free online library of more than 1.6 million citations of education research sponsored by the Institute of Education Sciences (IES), for relevant resources. Additionally, we searched the academic database ProQuest, Google Scholar, and the commercial search engine Google.

Reference Search and Selection Criteria

In reviewing resources, Reference Desk researchers consider—among other things—these four factors:

- Date of the publication: Searches cover information available within the last ten years, except in the case of nationally known seminal resources.
- Reference sources: IES, nationally funded, and certain other vetted sources known for strict attention to research protocols receive highest priority. Applicable resources must be publicly available online and in English.
- Methodology: The following methodological priorities/considerations guide the review and selection of the references: (a) study types—randomized controlled trials, quasi experiments, surveys, descriptive data analyses, literature reviews, policy briefs, etc., generally in this order; (b) target population, samples (representativeness of the target population, sample size, volunteered or randomly selected), study duration, etc.; (c) limitations, generalizability of the findings and conclusions, etc.
- Existing knowledge base: Vetted resources (e.g., peer-reviewed research journals) are the primary focus, but the research base is occasionally slim or nonexistent. In those cases, the best resources available may include, for example, reports, white papers, guides, reviews in non-peer-reviewed journals, newspaper articles, interviews with content specialists, and organization websites.

Resources included in this document were last accessed on January 25, 2019. URLs, descriptions, and content included here were current at that time.

This memorandum is one in a series of quick-turnaround responses to specific questions posed by education stakeholders in the Appalachia region (Kentucky, Tennessee, Virginia, and West Virginia), which is served by the Regional Educational Laboratory Appalachia (REL AP) at SRI International. This Ask A REL response was developed by REL AP under Contract ED-IES-17-C-0004 from the U.S. Department of Education, Institute of Education Sciences, administered by SRI International. The content does not necessarily reflect the views or policies of IES or the U.S. Department of Education, nor does mention of trade names, commercial products, or organizations imply endorsement by the U.S. government.