DEPARTMENT OF EDUCATION

MCA Linguistic Supports Change: Removal of Accommodated Text-to-Speech and Script

Beginning in 2020–21, accommodated text-to-speech and the script will no longer be available as linguistic supports for English learners on the Mathematics and Science MCA; English learners who need read-aloud support should use standard text-to-speech.

While providing linguistic supports for English learners is essential, the method of presentation must be the most meaningful method to assist them in integrating, retaining, and recalling new information without cognitive and language overload. This document provides the rationale supporting this decision, and references to applicable research are included at the end.

Purpose of Linguistic Supports for English Learners

Like all students, English learners' needs vary greatly, so not all accommodations and supports available on standardized assessments are necessarily linguistic supports for English learners. The main goal of any type of support for testing is to promote equity and validity in the assessment. Linguistic supports for English learners should increase accessibility to test content with a sensitivity to their linguistic and educational background while not providing an unfair advantage.

Eliminating or reducing the construct-irrelevant variance from testing may help to ensure that English learners have the same opportunity as their English-speaking peers to demonstrate their knowledge and skills in the content area assessed. The term "construct-irrelevant variance," as it applies to standards-based assessments, means that there are variables in accessibility that are irrelevant to the standards being measured.

What is Cognitive Overload?

In general, cognitive load refers to the amount of effort the brain requires when trying to learn, retain, and recall new information. For meaningful learning to occur, a learner must be able to grasp the information provided, process it within short-term memory, and commit it to long-term memory. When this is successful, a student can build on previously learned information, and organize, integrate, and connect new learning to existing knowledge.

Cognitive overload occurs when a student is presented with too much information or too many tasks simultaneously, resulting in the learner being unable to process the information. When cognitive overload occurs during test administration, the learners are not fully engaged in tasks and a meaningful assessment of student learning is inhibited, if not halted altogether.

COGNITIVE OVERLOAD

Cognitive overload occurs when a student is presented with too much information or too many tasks simultaneously.

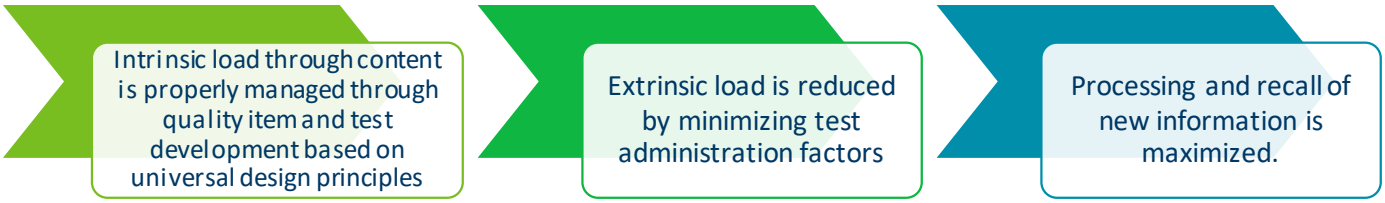
How Does Cognitive Load Relate to Test Administration for English Learners?

Cognitive load has both intrinsic and extrinsic components:

- Intrinsic cognitive demands are inherent in the task itself, such as the content assessed.
- Extrinsic cognitive demands are based on the design of the task, such as factors related to the test administration.

While the intrinsic load is necessary, the extrinsic load is a source of potential construct-irrelevant variance to be minimized so that meaningful processing and recall can take place and equity in the test administration occurs.

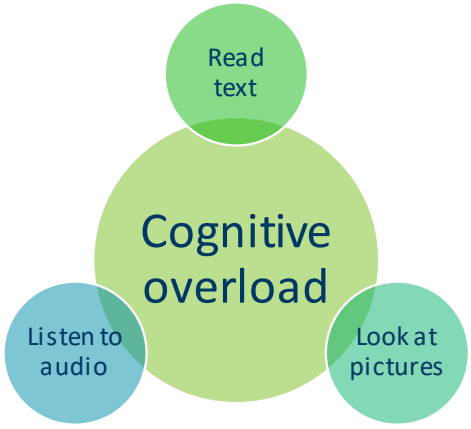
The most effective assessment is when:



While cognitive load is relevant to all students, it is even more important to English learners when considering which supports may be beneficial for test administration.

Limited Capacity Assumption

Studies on cognitive overload, for both English learners and non-English learners, have determined that students have separate channels for processing verbal-aural and pictorial materials. These dual channels can process only a limited amount of material at one time. The limited-capacity assumption evaluates the level of meaningful learning achieved through cognitive processing when asking students to build connections between pictorial and verbal-aural representations.



These studies also explore the instructional consequences of student memory and dual channel processing. For example, if students are asked to read text (eyes), look at a picture (eyes), and then listen to audio (ears), there is the potential for cognitive overload as students must process many different types of information (graphics, text, audio) at once.

Accommodated text-to-speech and the script add an additional language load to the test stimuli and the presentation of questions since it text describing graphs, charts, and images is included verbally and aurally. This additional information may lead to cognitive overload for an English learner, which in practice, denies an English learner the opportunity to demonstrate their knowledge and skill on the content assessed.

Original Intention of Text-to-Speech

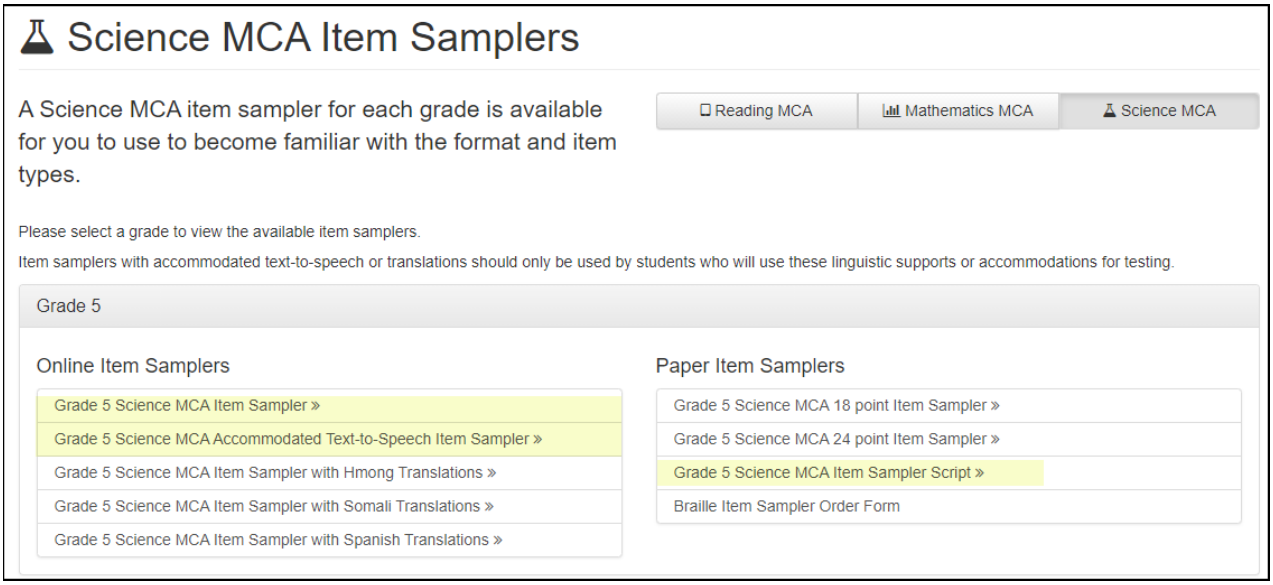
Nationally, while most states provide English learners testing supports of word-to-word dual language dictionaries and reading aloud test directions in English, the majority of other supports, historically, were developed for students with disabilities and were simply extended to the English learner population later when required under the No Child Left Behind Act. Studies have confirmed that 41% of available supports for English learners are designed within a taxonomy developed for students with disabilities.

The use of text-to-speech is meant to provide equal access to the written test items. It is not meant to assist a student who may be a slow or poor reader or for altering the pace of the assessment. In addition, standard text-to-speech is most beneficial for English learners with a higher proficiency in listening than reading, not all English learners. Therefore, with a smaller subset of English learners benefitting from standard text-to-speech, the additional language provided for accommodated text-to-speech further narrows the group who would benefit.

Additional research is needed on supports that specifically benefit English learners, rather than just extending accommodations with the assumption that English learners will benefit.

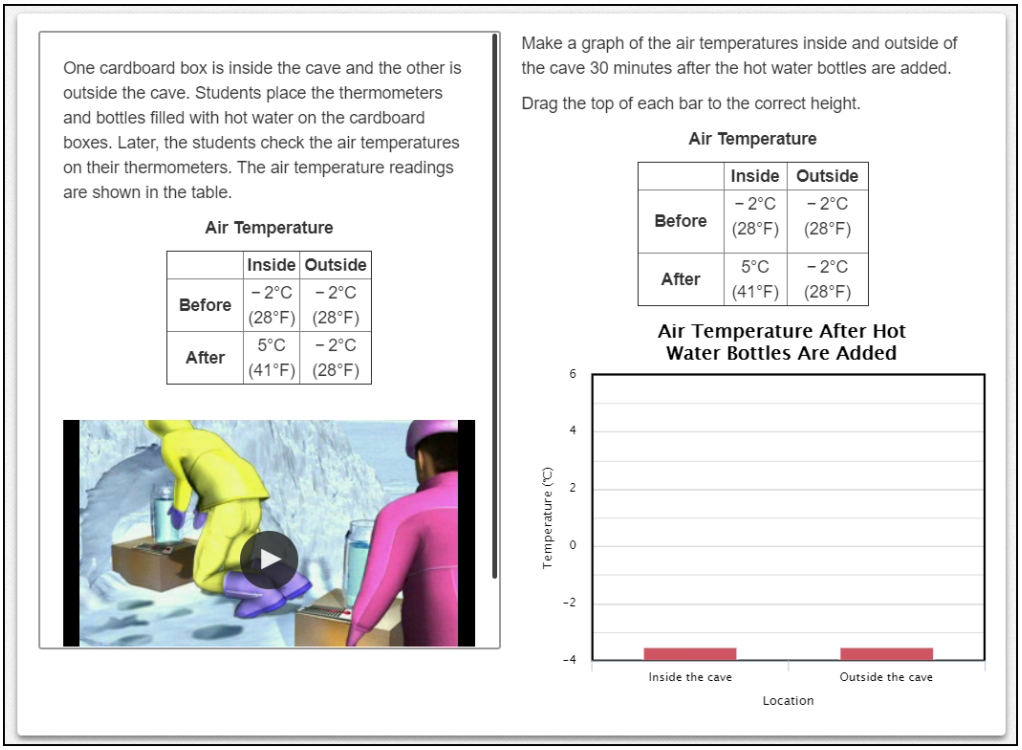
Comparison of Standard Text-to-Speech versus Accommodated Text-to-Speech and Script

The item samplers, available on PearsonAccess Next, are available to review examples of standard and accommodated text-speech, as well as the script by selecting a subject and then a grade (PearsonAccess Next > Preparing for Testing > Item Samplers).



Text-to-speech functionality allows the student to read and choose which parts they want to listen to. Accommodated text-to-speech provides the same information as standard text-to-speech with additional audio describing all labels, graphs and charts. A student can still choose any of the text on the page to listen to. For scripts, in contrast, all additional scripting describing the labels, graphs and charts is read by the Test Monitor without the student's choice of what is read and what is not.

The following provides an example of a grade 5 Science MCA item and the corresponding accommodated text-to-speech audio or scripting.

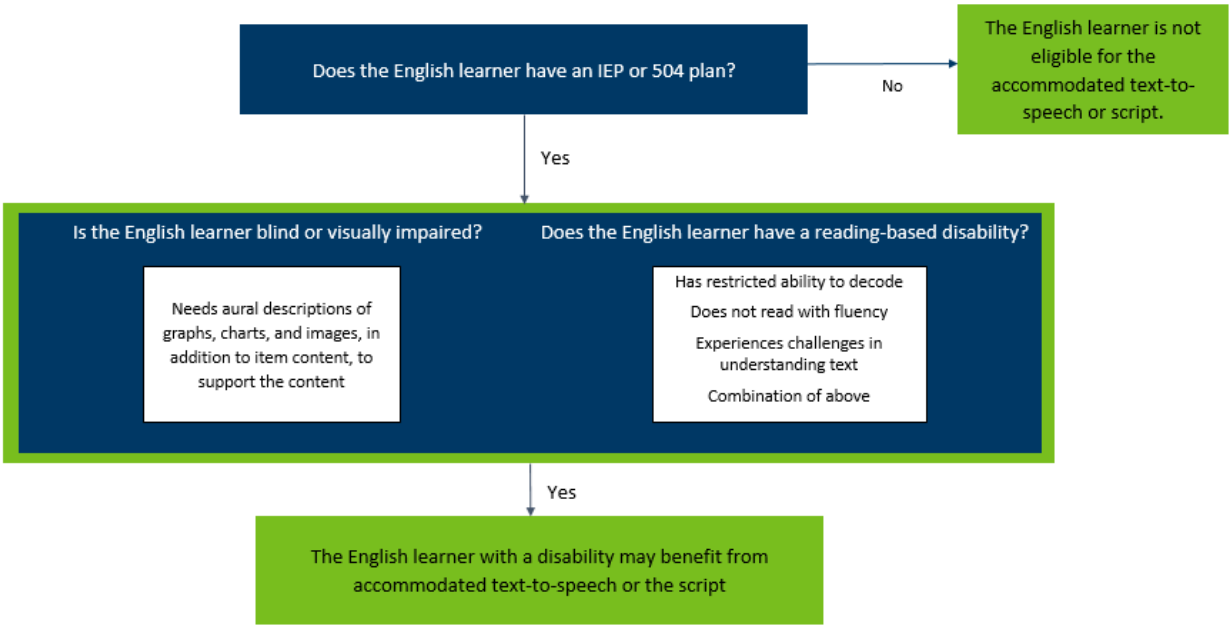


Standard Text-to-Speech	Accommodated Text-to-Speech and Script
One cardboard box is inside the cave and the other is outside the cave. Students place the thermometers and bottles filled with hot water on the cardboard boxes. Later, the students check the air temperatures on their thermometers. The air temperature readings are shown in the table.	One cardboard box is inside the cave and the other is outside the cave. Students place the thermometers and bottles filled with hot water on the cardboard boxes. Later, the students check the air temperatures on their thermometers. The air temperature readings are shown in the table. The table is titled: Air Temperature. The table has two columns and two rows. The columns are labeled, from left to right: Inside, Outside. The rows are labeled, from top to bottom: Before, After.
Make a graph of the air temperatures inside and outside of the cave thirty (30) minutes after the hot water bottles are added. Drag the top of each bar to the correct height.	Make a graph of the air temperatures inside and outside of the cave thirty (30) minutes after the hot water bottles are added. Drag the top of each bar to the correct height. The table is titled: Air Temperature. The table has two columns and two rows. The columns are labeled, from left to right: Inside, Outside. The rows are labeled, from top to bottom: Before, After. The bar graph is titled: Air Temperature After Hot Water Bottles Are Added. The horizontal axis is labeled: Location. The horizontal axis reads, from left to right: Inside the cave, Outside the cave. The vertical axis is labeled: Temperature (degrees Celsius (°C)).

Depending on the level of English proficiency of the English learner, the additional language load of the accommodated text-to-speech or script may be considered construct-irrelevant variance that places a heavier language load on an English learner compared to their English-speaking peers. In the current example, the English learner is asked to read the initial stimuli, watch a video, and read and interpret two graphs. When the additional information and/or script is added, a higher extraneous load from two or potentially three outputs, since the item involves graphics, is then demanded of the English learner's cognitive abilities.

Who Should Use Accommodated Text-to-Speech and Scripts?

Beginning in 2020–21, accommodated text-to-speech and the script are only available for students with an IEP or 504 plan. The following questions can help to determine if an English learner with disabilities should use standard or accommodated text-to-speech and/or whether the script is needed. Based on the historical development of accommodated text-to-speech and the script, only a limited population of students with disabilities benefit from this support during testing, and if they require the additional information for labels, charts, and graphs, it should be provided regularly during instruction.



Conclusion

The use of standard text-to-speech will support English learners by presenting essential information related to the content of the assessment without additional language and cognitive load. In this way, English learners are ensured to have the same opportunity as non-English learners to demonstrate their knowledge and skills in the content area assessed.

References

Abedi, J., Zhang, Y., Rowe, S. E., & Lee, H. (2020). Examining Effectiveness and Validity of Accommodations for English Language Learners in Mathematics: An Evidence-Based Computer Accommodation Decision System. *Educational Measurement: Issues and Practice*. https://doi.org/10.1111/emip.12328

Baddeley, A. (2010). Working memory. *Scholarpedia*, *5*(2), 3015. https://doi.org/10.4249/scholarpedia.3015

Feldon, D. F. (2007). Cognitive Load and Classroom Teaching: The Double-Edged Sword of Automaticity. *Educational Psychologist*, *42*(3), 123–137. https://doi.org/10.1080/00461520701416173

Kalyuga, S., Chandler, P., & Sweller, J. (2004). When Redundant On-Screen Text in Multimedia Technical Instruction Can Interfere With Learning. *Human Factors: The Journal of the Human Factors and Ergonomics Society*, *46*(3), 567–581. https://doi.org/10.1518/hfes.46.3.567.50405

Martiniello, Maria (2009). Linguistic Complexity, Schematic Representations, and Differential Item Functioning for English Language Learners in Math Tests, Educational Assessment, 14:3-4, 160-179, DOI: 10.1080/10627190903422906

Mayer, R. E., Heiser, J., & Lonn, S. (2001). Cognitive constraints on multimedia learning: When presenting more material results in less understanding. *Journal of Educational Psychology, 93*(1), 187–198. https://doi.org/10.1037/0022-0663.93.1.187

Mayer, R., & Moreno, R. (2003). Nine Ways to Reduce Cognitive Load in Multimedia Learning. *Educational Psychologist, 38*, 43 - 52.

Rios, J. A., Ihlenfeldt, S. D., & Chavez, C. (Accepted/In press). Are Accommodations for English Learners on State Accountability Assessments Evidence-Based? A Multistudy Systematic Review and Meta-Analysis. *Educational Measurement: Issues and Practice*. https://doi.org/10.1111/emip.12337

Rivera, Charlene & Collum, Eric. (2004). An Analysis of State Assessment Policies Addressing the Accommodation of English Language Learners.

Young, J. W., & King, T. C. (2008). TESTING ACCOMMODATIONS FOR ENGLISH LANGUAGE LEARNERS: A REVIEW OF STATE AND DISTRICT POLICIES. *ETS Research Report Series*, *2008*(2), i–13. https://doi.org/10.1002/j.2333-8504.2008.tb02134.x