



Aligning Science Assessment Standards:

Texas and the 2009 National Assessment of Educational Progress (NAEP)



To support efforts to improve science achievement in Texas, the Regional Educational Laboratory Southwest (REL Southwest) examined how well the science section of the Texas Assessment of Knowledge and Skills (TAKS) aligns with the science framework for the 2009 National Assessment of Educational Progress (NAEP) (Timms, M., Schneider, S., Lee, C., & Rolfhus, E. (2007).

The purpose of the research report is to give policymakers and educators a head-start in determining where they might, if they so decide, begin to make changes in state assessment standards and specifications to develop an assessment system more closely aligned to that used for the NAEP.

2009 NAEP Science Framework

Although the 2009 NAEP science assessment does not yet exist, the framework identifying the standards and test specifications that will guide its development have already been established. The framework defines the knowledge and skills that students should have at grades 4, 8 and 12 (National Assessment Governing Board, 2006). It will determine the content and format of NAEP science assessments through 2017, setting the direction of science assessment across the country. The new framework reflects the view that measuring student learning involves more than assessing factual knowledge. Consequently, in addition to traditional paper-and-pencil formats, the new assessments will include performance assessments in both classroom settings and computer simulations.

Elementary School Alignment

To determine the alignment between TAKS and NAEP at the elementary level, the NAEP grade 4 science standards were compared with the Texas Essential Knowledge and Skills statements in the TAKS Information Booklet for Science Grade 5 (Texas Education Agency, 2004). The analysis revealed that most of the grade 4 NAEP science content statements are, to some degree, addressed by the grade 5 Texas content statements. The Texas statements typically, however, were only partially aligned to the NAEP statements, and most of the NAEP content is implicit rather than explicit in the Texas content.

There are some topics in which Texas differs from the NAEP. Specifically, the TAKS has 10 statements pertaining to the nature of science that NAEP does not address. In addition, 3 of the 15 life science statements, and 6 of the 17 earth science and space science are not included in NAEP.

Middle School Alignment

Where as most of the NAEP grade 4 science standards were addressed in the TAKS, almost half of the grade 8 content statements are unaddressed by the grade 8 Texas statements. Of those that are addressed, 40% are partially aligned and have less content and detail than the corresponding NAEP statements. Similar to the grade 4 statements, the NAEP grade 8 statements contain more content or more detail than Texas statements which imply content that is explicitly stated in the NAEP.

High School Alignment

Because Texas does not have a grade 12 science assessment, the NAEP grade 12 science standards were compared with the statements for grades 10 and 11 exit level (Texas Education Agency, 2004). The alignment between the grade 12 NAEP assessment and the TAKS high school assessment is fairly low. The low rating is due in large part because the NAEP includes earth and space science standards, while the TAKS only includes biology, chemistry, and integrated physics. Furthermore, the physical and life science sections are more often than not only partially aligned with the NAEP. The alignment for the physical and life science sections are higher but not complete.

Test Specifications

Prior to 2005, the NAEP science assessment contained mostly short answer and multiple-choice types of questions that limited the depth of the knowledge and skills that could be assessed. In response to this issue, the last two NAEP science frameworks have expanded the types of items used in the test. These changes reflect the nature of science, which has a strong tradition of investigation, experimentation and application of declarative and procedural knowledge. Under the 2009 framework multiple-choice questions will only comprise half of the total items on the NAEP science assessment. The remaining 50 percent of the items will consist of constructed response items as well as hands-on performance tasks and interactive computer tasks. In contrast, the Texas assessments consist entirely of multiple-choice items.



Key Questions for Texas Policymakers

This research has provided important insights that may facilitate substantive conversations in the future. There are a number of key questions for Texas policymakers to consider in light of the relatively low alignment between the TAKS and the 2009 NAEP science framework. Potential questions to consider:

- Given that the 2009 NAEP science framework represents current knowledge about science learning and assessment, are the TAKS science assessments measuring the knowledge and skills that Texas students need to be science literate?
- How important is it to narrow the gaps between TAKS and the NAEP science framework?
- Can a state assessment that consists only of multiple-choice items accurately assess the science knowledge and skills students need to be science literate?
- How much of an investment would it take to bring the TAKS into full alignment with the NAEP?

To access the full report, *Aligning Science Assessment Standards: Texas and the 2009 National Assessment of Educational Progress* visit:
<http://ies.ed.gov/ncee/edlabs/projects/project.asp?id=76>

REL Southwest is currently conducting research to examine the alignment between the TAKS content standards in mathematics align to NAEP mathematic standards. This comparison continues to address the overall issue of alignment between NAEP and state assessments.

References

- Timms, M., Schneider, S., Lee, C., & Rolfhus, E. (2007). *Aligning science assessment standards: Texas and the 2009 National Assessment of Educational Progress (NAEP) (Issues & Answers Report, REL 2007-No. 011)*. Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Laboratory Southwest. Retrieved from <http://ies.ed.gov/ncee/edlabs>.
- Texas Education Agency. (2004). *Texas Assessment of Knowledge and Skills (TAKS) information booklet for science grade 5*. Retrieved February 5, 2007 from <http://www.tea.state.tx.us/student.assessment/taks/booklets/index.html>.
- National Assessment Governing Board. (2006). *Science framework for the 2009 National Assessment of Educational Progress and science assessment and item specifications*. Retrieved February 5, 2007, from <http://www.nagb.org>