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National Assessment Governing Board
800 North Capitol Street, NW, Suite 825
Washington, DC 20002

RE: NAEP Science Framework

Submitted *via email* to nagb@ed.gov

Dear Governing Board,

Since 1984, CAST (originally the Center for Applied Special Technology) has worked relentlessly to ensure that our nation is one where learning has no limits for all individuals. CAST pioneered Universal Design for Learning (UDL), a set of principles and guidelines for inclusive design for learning—including curricula, learning goals, materials, instructional methods, and assessments. UDL is now incorporated in key federal education, career training, and workforce laws.ⁱ UDL provides the basis for innovation and success in expanding and strengthening education across all subject areas (e.g., reading, mathematics, science). When applied to assessments, UDL can ensure that accessible normative and summative assessments are available to all students regardless of any potential learning barrier they may experience whether it be due to socio-economic status, language, or disability status.

CAST is pleased to submit comments and recommendations to the National Assessment Governing Board (NAGB) query regarding the National Assessment of Education Progress (NAEP) Science Framework (“the Framework”). Because universal design is included as a minor reference in the current framework, CAST strongly urges the NAGB to update the Framework to make it consistent with current federal law and documented best practices in the application of inclusive design in student engagement, student learning, assessment design, and assessment application.

CAST leads work funded through grants provided by the National Science Foundation (NSF), U.S. Departments of Education (ED) and Labor (DOL), state education agencies, local education agencies, as well as the private sector. CAST seeks to ensure that the full power of UDL is applied to technology, instructional, and assessment design and practice in order to remove barriers to learning and assessment in digital as well as physical settings. Our UDL initiatives encourage and support the design of flexible learning environments that anticipate learner variability and provide alternative routes or paths to success, as well as provide flexible opportunities for learners to demonstrate their construct-relevant knowledge, skills, and abilities during summative, formative, and diagnostic assessment. UDL acknowledges that the variability of how people learn is the *norm* rather than the exception. UDL provides viable alternatives for *all* learners to access in-person, blended, and online education and assessment, providing a responsive framework to support students and educators in any academic subject, including in science.

In support of our recommendation that NAGB update the Framework, CAST has examined and compared NAEP participation data for students with disabilities and English Learners (ELs) in the science assessment for the years 2009, 2015, and 2019 respectively. While NAEP data show that participation rates do increase between 2009 and 2019 for both groups of students (NAEP Science Assessment data)ⁱⁱ, the participation rates remain well below NAEP’s own 95 percent requirement (NAEP Policy, 2014).ⁱⁱⁱ

Additionally, the participation of students with disabilities falls between grades 8 and 12 (NAEP Participation Rate).^{iv} Therefore, CAST strongly encourages NAGB to consider our recommendations, which intend to ensure that the [new] NAEP science assessment incorporates from the outset the most modern and inclusive design so that a variable and diverse student population can successfully access and complete the assessment in grades 4, 8, and 12 at a participation rate of at least 95 percent. To help NAGB accomplish these goals, we offer the following:

General Recommendations

- Incorporate the principles of UDL throughout the Framework to support and assure student access to the NAEP science assessment, regardless of literacy level, language, and/or disability status.
- Adopt a validity framework that promotes consideration of the broad range of construct-irrelevant factors learners bring to testing. This framework should be applied from the beginning of test and item design in an effort to reduce reliance on retrofitted accommodations that provide inadequate support and/or compromise construct integrity. Examples of such frameworks, based on principles of UDL, include Dolan et al. (2013)^v and Almond et al. (2010)^{vi}, the former of which has been applied in development of next-generation science assessments (e.g., Quellmalz et al., 2016).^{vii}
- Eliminate all references to No Child Left Behind and include in a new Framework references and citations consistent with current law, the Elementary and Secondary Education Act currently known as the Every Student Succeeds Act (ESSA).^{viii}
- Eliminate use of the term ‘special needs’, replacing such term with ‘students with disabilities’ to ensure consistency with the ESSA and the Individuals with Disabilities Education Act (IDEA).
- Discuss how to include students with the most significant cognitive disabilities in NAEP assessments who take state-designed alternate assessments on alternate achievement standards. Currently these students are not included *in any* NAEP assessment. Recent research has demonstrated the promise of combining learning map model- and UDL-based approaches in evaluating the science knowledge, skills, and abilities of students with significant cognitive disabilities.

Recommendations for the Framework (based on current pages 2-5):

- Add new rationale to ensure the Framework and new NAEP Science assessment:
 - **Inclusive Design:** Incorporate the principles of UDL as an essential component to developing a robust assessment tool from inception and design to roll-out of the assessment.
 - **Student Diversity:** Respond to the growing and increasingly diverse student population in the nation, the inclusion of all types and ages of students in the general curriculum, and the growing emphasis and commitment to serve and be accountable for all students. Such diversity does include students with disabilities and English Learners (ELs); however, the Framework *must assure* the meaning of diversity is expanded [beyond students with disabilities and ELs] consistent with NAEP resources developed in recent years (NAEP Engineering Framework).
 - **Cultural Relevance:** Acknowledge that advances have been made in understanding cultural relevance and its impact on student engagement, learning and assessment.
 - **Access Features:** Include specificity in the need for the assessment to be designed with access features consistent with [WCAG 2.1](#) and UDL recommendations and provide built-in navigation and access supports (e.g., motoric supports, language/glossary, audio, fonts, text size, etc.) without altering the science construct. Such features are increasingly no longer considered ‘accommodations’ and instead are regularly available to all users. The Framework must require and acknowledge their incorporation and encourage/allow for their use for all students.

- **Accessibility and Accommodations:** Ensure full accessibility in the design of test items, including in the availability of standard accommodations for students with disabilities and ELs as required by federal laws (IDEA and Section 508).^x The Framework must assure accessibility specifically includes the use and interoperability with any external assistive technology [device/system] required by the student. Consistent with ESSA^x such accessibility is specifically intended to increase inclusion of formerly excluded groups in assessments, including the NAEP (e.g., students with disabilities and English learners).
- **Computer Skills:** Clarify that recent events show that young students (e.g., grade 4 NAEP test takers) may have insufficient access to and training in computer use for fair inclusion in digital assessments.
- **Access to Broadband:** Make clear that many communities and schools that exist in digital deserts may have insufficient access to broadband services to support access to the assessment across grades 4, 8, and 12.

Recommendation for the Steering Committee (current page 5):

- Provide guidelines to the Steering Committee which clarifies the framework applies UDL in determining assessment content, access features and—when necessary—accommodations consistent with the objectives being assessed. (Rose et al., 2018)^{xi}

Recommendations for the Model of Assessment Development and Methods:

- Ensure the methodology outlines how the assessment incorporates inclusive design and is built upon the principles of UDL, and also includes access features including in the use and interoperability with assistive technology
- Describe considerations for English learners and students with disabilities. In particular, that assessment design applies a UDL-based validity framework to help ensure full accessibility, including in the use and interoperability with assistive technology, consistent with ESSA.^{xii}

Recommendation: Chapter 4: Students With Disabilities and English Language Learners (Current Pages 114-115)

- Make updates consistent with current research and practice, incorporating the principles of UDL throughout the Framework to support and assure student access to the NAEP science assessment, regardless of literacy level, language and/or disability status. (Rose et al., 2018)^{xiii}

Recommendations: Chapter 4: Key Attributes of Effective Assessment (current page 124)

- Takes into account student diversity as reflected in gender, geographic location, language proficiency, race/ethnicity, socioeconomic status, and disability status consistent with NAEP policies (e.g., NAEP Engineering Framework, 2018).^{xiv}
- Clarifies the design and implementation is guided by the best available research on assessment item design and delivery:
 - so that it is accessible to all students and whose design minimizes the need for any/standard accommodations for students with disabilities and English Learners.
 - so that students with disabilities and other diverse learners are considered during initial assessment design so they can fully participate and are provided adequate means to demonstrate their construct-relevant knowledge, skills, and abilities, including—but not limited to—the use and interoperability with any needed external assistive technology. (Almond et al., 2010; ESSA; Dolan et al., 2013)^{xv}
 - Eliminate the use of the term ‘special needs’.

CAST thanks the NAGB for the opportunity to provide these comments, to advocate for a revision to the NAEP Science Framework, and to provide thoughts on how the Framework can be updated to align with current federal policy and documented best practices in the application of inclusive design in assessment design and application. This will allow the nation to provide all learners the opportunity to demonstrate fairly and accurately their science knowledge, skills, and abilities regardless of any potential learning barrier they may experience, whether it be due to socio-economic status, language, or disability status.

Please contact CAST's Director of Federal Relations Sherri Wilcauskas at swilcauskas@cast.org with any questions or for additional information.

Sincerely,



David Gordon
Interim CEO

ⁱ P.L. 110-315, P.L. 113-28, P.L. 114-95, P.L. 115-224, National Education Technology Plan (2021), U.S. Department of Education.

ⁱⁱ National Center for Education Statistics Appendix Tables (2009) at: <https://nces.ed.gov/nationsreportcard/pdf/main2009/2011451.pdf>; Appendix Tables (2015) at: https://www.nationsreportcard.gov/science_2015/files/2015_Science_Technical_Appendix.pdf; Appendix Tables (2019) at: https://www.nationsreportcard.gov/science/supporting_files/2019_appendix_sci.pdf

ⁱⁱⁱ National Assessment Governing Board *Testing and Reporting on Students with Disabilities and English Language Learners Policy Statement*, (2014) at: https://www.nagb.gov/content/dam/nagb/en/documents/policies/naep_testandreport_studentswithdisabilities.pdf

^{iv} National Center for Education Statistics Appendix Tables (2009) at: <https://nces.ed.gov/nationsreportcard/pdf/main2009/2011451.pdf>; Appendix Tables (2015) at: https://www.nationsreportcard.gov/science_2015/files/2015_Science_Technical_Appendix.pdf; Appendix Tables (2019) at: https://www.nationsreportcard.gov/science/supporting_files/2019_appendix_sci.pdf

^v Dolan, R.P., Burling, K., Harms, M., Strain-Seymour, E., Way, W. (Denny), & Rose, D.H. (2013) *A Universal design for Learning-based Framework for Designing Accessible Technology-Enhanced Assessments* at: http://images.pearsonclinical.com/images/tmrs/dolanudl-teaframework_final3.pdf

^{vi} Almond, P., Winter, P., Cameto, R., Russell, M., Sato, E., Clarke-Midura, J., Torres, C., Haertel, G., Dolan, R., Beddow, P., & Lazarus, S. (2010). Technology-Enabled and Universally Designed Assessment: Considering Access in Measuring the Achievement of Students with Disabilities: A Foundation for Research. *The Journal of Technology, Learning and Assessment*, 10(5) at: <https://ejournals.bc.edu/index.php/jtla/article/view/1605>

^{vii} Quellmalz, E. S., Silbergliitt, M. D., Buckley, B. C., Loveland, M. T., & Brenner, D. G. (2016). Simulations for Supporting and Assessing Science Literacy. In Y. Rosen, Y., Ferrara, S., & Mosharraf, M. (Eds.). (2016). *Handbook of Research on Technology Tools for Real-World Skill Development*. IGI Global at: <http://doi:10.4018/978-1-4666-9441-5>

^{viii} See: P.L. 114-95

^{ix} See: P.L. 108-446, Sections 300.105 and 300.324; and 29 U.S.C. 794d

^x See: P.L. 114-95, Section 1111, (b)(2)(B)(vii)(II)

^{xi} Rose & Gravel, (2013); Daley & Rappolt-Schlichtmann, 2009; Rose & Meyer, (2006); Blascovich, Mendes, Tomaka, Salomon, & Seery, (2003); Csikszentmihalyi, (1991)

^{xii} See: P.L. 114-95, Section 1111, (b)(2)(B)(vii)(II)

^{xiii} Rose & Gravel, (2013); Daley & Rappolt-Schlichtmann, 2009; Rose & Meyer, (2006); Blascovich, Mendes, Tomaka, Salomon, & Seery, (2003); Csikszentmihalyi, (1991)

^{xiv} The 2018 NAEP Technology and Engineering Literacy Framework at:

<https://www.nagb.gov/content/dam/nagb/en/documents/publications/frameworks/technology/2018-technology-framework.pdf>

^{xv} Almond, P., Winter, P., Cameto, R., Russell, M., Sato, E., Clarke-Midura, J., Torres, C., Haertel, G., Dolan, R., Beddow, P., & Lazarus, S. (2010). Technology-Enabled and Universally Designed Assessment: Considering Access in Measuring the Achievement of Students with Disabilities: A Foundation for Research. *The Journal of Technology, Learning and Assessment*, 10(5) at:

<https://ejournals.bc.edu/index.php/jtla/article/view/1605>; P.L. 114-95, Section 1111, (b)(2)(B)(vii)(II); Dolan, R.P., Burling, K., Harms, M., Strain-Seymour, E., Way, W. (Denny), & Rose, D.H. (2013) *A Universal design for Learning-based Framework for Designing Accessible Technology-Enhanced Assessments* at: http://images.pearsonclinical.com/images/tmrs/dolanudl-teaframework_final3.pdf