

## LCAS APPENDIX B -- SCIENCE

### Assessment Summaries, Strengths, and Limitations

The tables below offer information, observations, and recommendations regarding the purpose and implementation of specific science assessments utilized at the local level (provider, school, district, supervisory union/district). This resource is included to further support supervisory unions/districts (SU/SDs) in the provision of local comprehensive assessment systems (please see the AOE’s Strengthening and Streamlining Local Comprehensive Assessment Systems: Guidelines and Support for Leadership Teams for additional information) and to meet the goals of [Act 173 of 2018](#).

This document is intended to provide a high-level overview of a sampling of assessments, including assessments known to be in use by LEAs in Vermont, to support local systems and schools in making informed decisions and investment requests. This appendix is not an exhaustive list, does not represent the full breadth and depth of information about the included assessments, and is not an endorsement of the assessments reviewed. LEAs are encouraged to evaluate assessments before purchasing or utilizing an assessment. For guidance on how to evaluate assessments, please refer to the Agency’s [LCAS Defining Essential Components](#).

<b>Assessment Name:</b>	<a href="#">Next Generation Science Assessment (NGSA)</a>
<b>Type/ Purpose/ Uses:</b>	<p><i>Type:</i> Formative</p> <p><i>Purpose:</i> To provide educators with classroom-ready formative assessments to inform teachers of student progress toward achieving proficiency of the Next Generation Science Standards (NGSS) performance expectations.</p> <p><i>Uses:</i> In addition to being used as formative assessments indicating progress towards proficiency, these assessments can be used as diagnostic assessments to identify how much knowledge a student has on a subject matter as well as a student’s strengths and needs in specific skill areas.</p>
<b>Summary of Tool/ Assessment:</b>	The NGSA is a comprehensive set of standardized physical and life science assessments created to align with the NGSS. They aim to measure students’ scientific knowledge, critical thinking abilities, and problem-solving skills in line with the NGSS principles. At the time of publication, the assessment is available for two grade bands: 3 – 5 and middle school.*

#### Contact Information:

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<b>Assessment Name:</b>	<a href="#">Next Generation Science Assessment (NGSA)</a>
	The NGSA was designed and created through collaborative efforts by WestEd’s STEM Department, Michigan State University’s CREATE for STEM Institute, The University of Illinois at Chicago’s Learning Sciences Research Institute, and the Concord Consortium. A detailed description of the design process is located on the NGSA website: <a href="#">Design Process – Next Generation Science Assessment</a> .
<b>Evidence and/or Research</b>	<p>There is not a clear evidence-base that was found at the time of this publication. The assessment applies the principles of evidence-centered design (ECD) (Almond, Steinberg, and Mislevy, 2002; Mislevy &amp; Haertel, 2006) to construct instructionally supportive assessment tasks that ingrate NGSS dimensions and performance expectations.</p> <p>As reported by the <a href="#">Concord Consortium</a>, also incorporated into the development of these assessments are “state-of-the-art psychometric methods within an integrated validity framework. The validity studies include the following:</p> <ul style="list-style-type: none"> <li>• cognitive, inferential, and instructional aspects,</li> <li>• expert reviews of alignment with the Framework and the NGSS,</li> <li>• student cognitive analysis,</li> <li>• classroom observation,</li> <li>• teacher interviews, and</li> <li>• psychometric analyses.</li> </ul> <p>It is important to note that Concord Consortium is a partner in the development of these assessments. No data representing the validity studies was found at the time of this publication.</p>
<b>Technical Specifications:</b>	<ul style="list-style-type: none"> <li>• This assessment bank is hosted in a web-based platform that should be accessible on any preferred browser.</li> <li>• Offers text-to-speech feature for each task.</li> <li>• Students can record answers orally or typewritten.</li> </ul>
<b>Strengths:</b>	<ul style="list-style-type: none"> <li>• Free formative assessment resource.</li> <li>• Assessment tasks are NGSS-aligned and blend disciplinary core ideas, crosscutting concepts, and science and engineering practices for classroom formative applications.</li> <li>• Assessment tasks are organized into Learning Performances that address student proficiency in clusters of related performance expectations or they can be viewed individually.</li> <li>• Teachers can <a href="#">create classes/rosters</a> to track student progress.</li> <li>• Shows a summary of student work to help the educator and student monitor the completion of a task.</li> <li>• Includes proficiency-based rubrics for each assessment with sample student feedback.</li> </ul>

<b>Assessment Name:</b>	<a href="#">Next Generation Science Assessment (NGSA)</a>
	<ul style="list-style-type: none"> <li>• The assessments can be used to help educators identify gaps in student understanding so they are prepared for the state summative assessment.</li> </ul>
<b>Limitations:</b>	<ul style="list-style-type: none"> <li>• Only available for grades 3-5 and 6-8; still in development for high school grade band.</li> <li>• Only addresses physical and life sciences; assessment of all proficiency performance expectations are not currently available.</li> </ul>
<b>Recommendation(s):</b>	<p>Because the NGSA is limited to only providing assessment tasks for grades 3-5 and 6-8, and for those grade bands only for physical and life sciences, it is recommended that districts and/or schools seek other formative assessments to address the remaining breadth of the NGSS, including Earth and Space Science and Engineering and Technical Design.</p> <p>SU/SDs and/or schools using this online service should research what personally identifiable information (PII) is collected. If PII is collected, the SU/SD or school should obtain a data privacy agreement from the company. Linked is the <a href="#">Concord Consortium's Privacy Policy</a>. For more information on such agreements, consult with your Technology Coordinator or staff and/or go to the <a href="#">Vermont Student Privacy Alliance</a>.</p>

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<b>Assessment Name:</b>	<a href="#">Concord Consortium Performance Assessments</a>
<b>Type/ Purpose/ Uses:</b>	<p><i>Type:</i> Diagnostic, Formative and/or Summative</p> <p><i>Purpose:</i> Assessments offered can be used for formative, diagnostic, or summative assessment of student understanding. The nature of online simulations support student engagement and bringing content into an applicable, visual, and experiential context. New learning, reinforcement of learning, and assessment of learning happen through student engagement of online models and simulations that are aligned to the NGSS.</p> <p><i>Uses:</i> With this tool, teachers can access formative and summative assessments. Individual assessments are not able to be differentiated to meet individual student’s needs. Through the developed platform, teachers can use a classroom dashboard to see where individual students are in their work completion and understanding.</p>
<b>Summary of Tool/ Assessment:</b>	<p>Concord Consortium has a variety of assessments tied to specific standards for K-12 and higher education classrooms. Many of their resources are part of collections that are created by their various research projects. The Consortium offers tools for inquiry, STEM models and simulations, and data science education in the physical and life sciences. Embedded into the tasks are engineering and science connections and analytics and feedback mechanisms to better understand student learning in real time. Using technology, these assessments deliver tasks that incorporate the three dimensions detailed in the NGSS, allowing a lens into student proficiency of the performance expectations and standards. There are simulations developed for K-12 classrooms and higher education.</p>
<b>Evidence and/or Research</b>	<p>There is not a clear evidence-base that was found at the time of this publication. However, there is a strong research-base supporting these assessment tasks. These assessments are designed to incorporate the three dimensions of the NGSS. Principles of evidence-centered design and psychometric methods are incorporated into a validity framework. The validity studies address cognitive, inferential, and instructional aspects of validity and include expert reviews of alignment with the Framework and NGSS, student cognitive analyses, classroom observation, teacher interviews, and psychometric analysis (<a href="#">Next Generation Science Assessment – Concord Consortium</a>).</p>

<b>Assessment Name:</b>	<a href="#">Concord Consortium Performance Assessments</a>
<b>Technical Specifications:</b>	<ul style="list-style-type: none"> <li>• Web-based assessment only</li> <li>• May require Java to run: Java is a widely used object-oriented programming language and software platform that runs on many devices, including notebook computers, mobile devices, gaming consoles, medical devices, and many others. A Chromebook can run Java programming with the use of the Chrome Remote Desktop app and a remote Windows PC. Consult your district’s education technology director for assistance.</li> <li>• Offers text-to-speech option for tasks.</li> <li>• In collaboration with the Educational Testing Service, Concord Consortium is offering Automated Scoring for Argumentation, which assesses students’ written responses in real time and provides immediate feedback. This is currently available for two High-Adventure curriculum modules: “What is the future of Earth’s climate?” and “Will there be enough fresh water?”</li> </ul>
<b>Strengths:</b>	<ul style="list-style-type: none"> <li>• Free tool; see personally identifiable information (PII) note below in the Recommendations section.</li> <li>• The curriculum is embedded in modules and simulations.</li> <li>• Modules and simulations can be searched by grade, subject, or focus area.</li> <li>• Teachers can create classes, assign resources, and track which assignments students have completed. <a href="#">User guide</a> for teachers is provided.</li> <li>• Topics are organized into Physical Sciences, Life Sciences, Earth Sciences, and Engineering Practices, similar to the NGSS.</li> <li>• Tasks are based on real-world phenomena.</li> <li>• Offers <i>Interactions</i>, a curriculum that introduces students to thinking of science as a process of exploration, rather than a set of discoveries made by others. It is designed for 9th-grade physical science classes. These units include pre-and post-tests.</li> </ul>
<b>Limitations:</b>	<ul style="list-style-type: none"> <li>• Not all units are explicitly aligned to Next Generation Science Standards or alignment is not mentioned.</li> <li>• Cannot search by performance expectation.</li> <li>• Some are Java-based and difficult to access in schools (see details in Technical Specifications above).</li> <li>• Individual assessments cannot be differentiated or scaffolded (canned/plug and play).</li> </ul>

<b>Assessment Name:</b>	<a href="#">Concord Consortium Performance Assessments</a>
<b>Recommendation(s):</b>	<p>Concord Consortium offers strong, research-based model and simulation assessments that will help students to reinforce concepts presented in real-world applications. There is no fee to educators associated with this resource, so cost is not a barrier. Although some of the modules can be used as a summative assessment, overall, the assessments in this collection will be more effective when utilized as a formative assessment.</p> <p>SU/SDs and/or schools using this online service should research what personally identifiable information (PII) is collected. If PII is collected, the SU/SD or school should obtain a data privacy agreement from the company. Linked is the <a href="#">Concord Consortium's Privacy Policy</a>. For more information on such agreements, consult with your Technology Coordinator or staff and/or go to the <a href="#">Vermont Student Privacy Alliance</a>.</p>

<b>Assessment Name:</b>	Stanford NGSS Assessment Project: <a href="#">SNAP Assessments</a>
<b>Type/ Purpose/ Uses:</b>	<p><i>Type:</i> Formative and Summative</p> <p><i>Purpose:</i> Assessments offered can be used for formative, diagnostic, or summative assessment of student understanding. These assessments were designed to facilitate teaching and deeper learning of science at all levels in K-12 grades and reinforce learning outcomes' expectations.</p> <p><i>Uses:</i> SNAP assessments are readily usable for formative and summative assessments of students and can provide data at the student, class, school, district, and state level. Given this broad application, it is possible that the SNAP assessments can also be used as benchmark assessments.</p>
<b>Summary of Tool/ Assessment:</b>	<p>The Stanford NGSS Assessment Project (SNAP) is a collaboration between experts in science performance assessment at the Stanford Center for Assessment, Learning and Equity (SCALE) and lead authors of the Framework for K-12 Science Education. SNAP explores how performance assessments can be used to support teaching and learning of the NGSS as intended in the K-12 Science Framework.</p> <p>SNAP offers three types of student-centered assessments -- short-response items, short performance assessments, and instructional-embedded assessments -- that were designed to highlight the intersection of instruction and assessment. All assessments were developed to meet or reinforce the NGSS performance expectations (PEs) in physical science, Earth and space science, life science, and engineering, and address all three dimensions (disciplinary core ideas, science and engineering practices, and crosscutting concepts) of the performance expectations of the NGSS.</p>
<b>Evidence and/or Research</b>	<p>No independent research was found on the effectiveness, validity, or reliability of this assessment bank at the time of this publication. As reported by SNAP, the development of the assessments incorporated student feedback; student feedback informed developers where gaps in student understanding existed. As well, it was reported that extensive research was conducted on hundreds of assessment resources that were designed to engage students in scientific reasoning, not just evaluating rote knowledge.</p>
<b>Technical Specifications:</b>	<ul style="list-style-type: none"> <li>• Accessible on any web browser.</li> <li>• Assessments are delivered as PDFs (printable).</li> </ul>

<b>Assessment Name:</b>	Stanford NGSS Assessment Project: <a href="#">SNAP Assessments</a>
<b>Strengths:</b>	<ul style="list-style-type: none"> <li>• Open Education Resource (free)</li> <li>• Aligned to the three dimensions of the NGSS. Short response items, short performance assessments that can be both formative and summative in nature, and instructionally embedded assessments are available.</li> <li>• Assessments complement constrained items with performance-based formats, highlighting how students authentically engage in contextualized, real-world problems.</li> <li>• Designed through an equity lens and with scaffolds built in to meet students at different levels of proficiency.</li> <li>• Offers <a href="#">free, on-line hybrid courses</a> for educators (designed to be taken in teams from a school, district, or state) to learn how to best use SNAP assessments in their classrooms.</li> <li>• Connected to SNAP, SCALE (Stanford Center for Assessment, Learning, and Equity) offers NGSS-aligned K-8 curriculum that is supported by the SNAP assessments.</li> <li>• Proficiency-based rubrics (including student work examples) were developed to link assessments with student-centered instruction.</li> <li>• Provides teachers and students with information needed to shift both science teaching and learning toward goals.</li> <li>• Provides <a href="#">tools</a> to assist curriculum directors and educators in creating high-quality assessments for NGSS.</li> </ul>
<b>Limitations:</b>	<ul style="list-style-type: none"> <li>• Not searchable by performance expectations, not all performance expectations are available.</li> <li>• Personally identifiable information (PII) data collected and compliance with FERPA are unclear.</li> </ul>
<b>Recommendation(s):</b>	<p>SNAP provides exemplar assessments and assessment design tools to facilitate meaningful implementation of the NGSS. It is a strongly researched-based template, that when used correctly as a formative or summative assessment, can greatly enhance student engagement in learning as the assessment is an integral part of that learning. SNAP reportedly created assessments that promote equity and access for all students, although no specific information was found about the project’s support for universal design at the time of publication.</p> <p>SU/SDs and/or schools using this online service should research what personally identifiable information (PII) is collected. If PII is collected, the SU/SD or school should obtain a data privacy agreement from the company. Linked is the <a href="#">Concord Consortium’s Privacy Policy</a>. For more information on such agreements, consult with your Technology Coordinator or staff and/or go to the <a href="#">Vermont Student Privacy Alliance</a>.</p>