

## Science Distance Learning

March 19, 2020

The Minnesota Department of Education (MDE) defines distance learning as “students have access to appropriate educational materials and receive daily interactions with their licensed teachers.” Supporting science learning in the period where students are working from home provides some challenges and opportunities. MDE has provided a document to help districts set up distance learning. This document builds on those delivery systems and applies them to distance learning in the science.

### What is at issue?

As schools close their doors as part of public health measures to limit the spread of COVID-19, educators are faced with how to support the diverse needs of all learners when students are not in school. States and districts should consider:

- unequal access to technology;
- diverse affective/emotional responses to home lives and the pandemic;
- responsibilities learners hold as part of their homes and communities;
- access to safe and supportive learning spaces; and
- access to peers and/or adults to support learning and sense-making.

### Things to Consider

- Adapting classroom instruction to at-home situations will be an evolving process. The immediate tendency is to replicate classroom instruction online or give students busy work and isolated activities. Over time you should use this opportunity to incorporate effective learning strategies, especially those envisioned for our new standards; three-dimensional learning and phenomena-based instruction.
- Equity of learning opportunities for all students must be a priority. This includes providing the support that individual students need to accomplish the standards. In the classroom we do this through differentiated instruction. Now we also need to consider the delivery and communication means for students without availability of the internet and adult support. This may necessitate paper or mail delivery, individual phone calls, and study buddies. We also want to provide the opportunity for students with greater resources to learn as much as possible with enrichment and extensions.
- As you think about learning activities and learning progression, consider whether you need to follow your classroom scope and sequence. This could be an opportunity for longer projects that include the integration across standards areas and among content areas such as writing activities that are evaluated for both literacy/ELA and science standards.
- Take advantage of the home situation for observational and data collection activities of occurrences at home and data that comes from the news and other resources. Have students develop questions, investigations, and evidence-based explanations.
- Bring in the culture and setting of the students. [STEM Teaching Tool #31](#) provides some suggestions for activities, including a strategy called Self Documentation.

- Provide guidance for parents and family members who may assist the student in the learning. Consider the multiple home and homeless situations and the demands on families for caregiving, working from home, and shared resources. Some suggestions for families are given at the Council of State Science Supervisors link below.

This chart from the Council of State Science Teachers could be helpful in designing learning activities.

Learning experience should look more like...	Learning experiences should look less like...
<p><b>Flexible goals and structures for learning</b></p> <ul style="list-style-type: none"> <li>• <b>extended time</b> for learning and reflection</li> <li>• use of <b>commonly available materials</b></li> <li>• <b>purposeful selection of learning targets</b></li> <li>• allowing students to <b>explore their interests</b></li> <li>• <b>meaningful, manageable tasks and projects</b></li> <li>• <b>opportunities to learn without the use of devices or the internet</b></li> </ul>	<p><b>An attempt to recreate school at home</b></p> <ul style="list-style-type: none"> <li>• assuming a <b>strict “school day” schedule</b></li> <li>• <b>requiring special materials</b> (e.g., lab or materials not commonly found at home)</li> <li>• pacing with the <b>planned scope and sequence</b></li> <li>• assigning <b>readings</b> to stay “caught up”</li> <li>• packet of <b>worksheets and busy-work</b></li> <li>• all learning experiences happen <b>virtually</b></li> </ul>
<p><b>Purposeful teacher-student interactions</b></p> <ul style="list-style-type: none"> <li>• <b>optional</b> opportunities to connect with teachers and peers <b>virtually and at a variety of times</b></li> <li>• teachers providing <b>coaching, feedback, and encouragement</b></li> <li>• encouraging <b>students to engage in learning and reflection with their families and communities</b></li> <li>• encouraging <b>self-reflection</b> on what students learn and how they learn it</li> </ul>	<p><b>Teacher-centered instruction</b></p> <ul style="list-style-type: none"> <li>• virtual lectures/classes that all students <b>synchronously</b> attend</li> <li>• teachers <b>delivering information and assignments</b></li> <li>• teacher instruction and feedback as the <b>primary mode</b> of facilitating learning</li> </ul>

Learning experience should look more like...	Learning experiences should look less like...
<p><b>Authentic science learning in the home setting</b></p> <ul style="list-style-type: none"> <li>• <b>connecting science <a href="#">phenomena and problems</a> to household activities</b>, like cooking, fixing things, or gardening</li> <li>• asking students to <b>identify relevant problems</b> in their lives and <b>engage in design cycles</b> to address them</li> <li>• allowing students to <b>deeply explore phenomena or problems of interest</b> through investigation to build understanding and practice over time</li> </ul>	<p><b>Assignments to “get through” content</b></p> <ul style="list-style-type: none"> <li>• <b>emphasizing memorizing science content</b> or “checking off” tasks on lists</li> <li>• <b>asking students to solve contrived or hypothetical problems</b>, or complete design projects that <b>value form over function</b></li> <li>• trying to cover content through a volume of activities or skipping from topic to topic</li> </ul>

## Particular situations

- Observations, data collection
  - Observation logs: weather, phenology, traffic, changes in the yard, snow content, etc.
  - Have students look for patterns and make tentative generalizations.
    - Have students produce tentative explanations and provide evidence.
- Investigations (to replace laboratory activities)
  - Have students develop questions and design investigations
  - Include engineering design, with or without materials. This could include analysis of designed household objects such pens, tools, and parts of the building structure. Consider purpose, structure/function, cost/benefit, etc.
  - For students with internet access, there are great simulations, such as PhET, virtual dissections, and collections of data.
- Assessments and grading
  - Formative assessment is still important, including readiness for learning, engagement and status of their learning.
  - Consider progress toward meeting standards and benchmarks rather than completion of tasks.
  - In this environment you may need to put less emphasis on items that can be copied and shared and emphasize authentic evidence. You could rely on learning logs, student calls to your voicemail, posting pictures, and phone conversations.
  - Consider the priorities of home life and the competing demands for students and families. Grading practices can deepen inequities.
- Early Grades
  - Be sensitive about discussion of COVID-19. Many children will have fears and family involvement will be important. This could be a good time to focus on health practices.
  - There may be some unique opportunities for individual attention via phone check-ins.

- Find opportunities for integration with other content areas: reading and analyzing a variety of texts as evidence, writing or illustrating observational experiences, mathematical analysis of observational data, presenting understanding through multiple modalities.

## Professional Development and planning for 2019 Science Standards

With the urgency to plan and deliver distance learning, educators may initially be focused on delivering distance learning rather than gearing up for the new standards. As indicated above, once educators get the distance instruction process underway there may be time for professional development toward new instructional practices. A good resource to use is the online modules of Science and Engineering Practices in Action.

[Enrollment link.](#)

## Resources

The Council of State Science Supervisors [Guidance for Supporting Students' Science Learning during COVID-19 School Closures](#). This link also provides guidance for parents and students.

There are lists of resources, websites, lesson plans and much more that are being compiled daily by many organizations. These websites have various degrees of vetting for quality instructional practice. Look for items that include deep learning experiences. Some collection locations are:

[National Science Teachers Assn. Resources for Online Learning](#). (NSTA) is also [providing free 30 day memberships](#) to access all their resources

[Minnesota Science Teachers Association](#)

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