The OpenSciEd curriculum developers have revised the planned Scope and Sequence (S&S) based on the unit development progress, most of which are relatively minor. This memo provides an update on these changes.

Several scenarios have led us to refine the S&S as our OpenSciEd development proceeds:

1. **Moving a Performance Expectation (PE) from one unit to another:** As we work to build a coherent sequence of phenomena and investigations for a target bundle of PEs, we sometimes realize that a particular PE would be more coherently addressed in one unit rather than another. These changes improve the coherence for students and helps meet the target number of instructional days for all the middle school PEs.

2. **Adding a PE to a unit:** As we work to identify the phenomenon for each unit, we sometimes find that investigating a particular phenomenon would allow us to build or extend parts of a PE not previously flagged for the unit. We identify these PEs on the S&S as partially developed in this unit with an asterisk. For example, the addition of fossils to unit 6.4 (Plate Tectonics).

3. **Including the Engineering PEs:** The earlier version of the S&S did not include the engineering PEs. They have been added to this version.

4. **Changing arrows:** As we made the changes described above, we uncovered potential connections between units that are important to make explicit. We added additional arrows or moved arrows in our S&S diagram to illustrate these connections. For example, the new arrows from unit 6.6 (Cells & Systems) to units 7.1 (Chemical Reactions & Matter Transformations), 8.1 (Contact Forces) and 8.2 (Sound Waves) involving cells sensing odor, touch, and sound.
In the table below, we outline the specific changes made to the S&S since the version released in March 2019.

As we continue developing and revising units, we plan on enhancing the existing scope and sequence by:

1. **Visualizing the Progressions of the Science & Engineering Practices and the Crosscutting Concepts:** While the current focal SEP and CCC tables help guide our design work, these tables don't tell the story of how the Practices and Crosscutting Concepts build over time. We included some examples of how the SEP and CCC build over several units in the OpenSciEd S&S Webinar. We are exploring representations of these progressions that would be useful for educators. In addition, we continue to fine-tune the focal SEP and CCC tables during unit development.

2. **Clarifying what an arrow means:** We sometimes hear questions such as "Why is Unit X connected to Unit Y but not Unit Z?" and "What exactly does it mean when an arrow connects two units?" We are developing documentation that spells out the various meanings reflected by arrows between units.
Table 1. Scope and Sequence Changes from the 3/11/2019 version to 4/9/2020 version

<table>
<thead>
<tr>
<th>Unit</th>
<th>Changes</th>
<th>Reason for Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1 Light and Matter</td>
<td>a) Added LS1-8*</td>
<td>a) Determined light was a better context to introduce the idea of biological receptors for light than its original placement in Unit 6.6 Cells &amp; Systems</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.2 Thermal Energy</td>
<td>a) Added an asterisk to PS1-4</td>
<td>a) Added this PE to 6.3</td>
</tr>
<tr>
<td></td>
<td>b) Added ETS1-4*</td>
<td>b) Added engineering PEs to S&amp;S</td>
</tr>
<tr>
<td>6.3 Weather, Climate &amp; Water Cycling</td>
<td>a) Added PS1-4*</td>
<td>a) Determined we needed to revisit the change in particle motion to explain phase change</td>
</tr>
<tr>
<td></td>
<td>b) Added ETS1-4</td>
<td>b) Added engineering PEs to S&amp;S</td>
</tr>
<tr>
<td>6.4 Plate Tectonics &amp; Rock Cycling</td>
<td>a) Added LS4-1*</td>
<td>a) Found fossil record useful in plate tectonics investigations</td>
</tr>
<tr>
<td>6.5 Natural Hazards</td>
<td>a) Removed PS4-1</td>
<td>a) Did not need to get into MS-level wave properties of earthquakes for unit coherence</td>
</tr>
<tr>
<td></td>
<td>b) Added ETS1-1* and ETS1-2*</td>
<td>b) Added engineering PEs to S&amp;S</td>
</tr>
<tr>
<td>6.6 Cells &amp; Development</td>
<td>a) Removed LS1-8*</td>
<td>a) PE fit better in 6.1</td>
</tr>
<tr>
<td></td>
<td>b) Added arrows showing the use of ideas about cells to units 7.1, 8.1, and 8.2.</td>
<td>b) Sensing odor, pressure, and sound in 7.1, 8.1, 8.2 now build on the idea of cells and systems from 6.6</td>
</tr>
<tr>
<td></td>
<td>c) Updated name</td>
<td></td>
</tr>
</tbody>
</table>

\[^1\] Updated 4/9/20
Table 1 (continued). Scope and Sequence Changes from the 3/11/2019 version to 4/9/2020 version

<table>
<thead>
<tr>
<th>Unit</th>
<th>Changes</th>
<th>Reason for Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.1 Chemical Reactions &amp; Matter Transformations</td>
<td>a) Added LS1-8* and arrow from 6.6.</td>
<td>a) This unit builds on ideas from several units in 6th grade:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 6.1 presents the idea of sensors sending information to the brain</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 6.6 presents the ideas of cells and systems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Students use those ideas to understand that we can sense odor via cells that</td>
</tr>
<tr>
<td></td>
<td></td>
<td>detect particular molecules in the air and send messages through the nervous</td>
</tr>
<tr>
<td></td>
<td></td>
<td>system to the brain.</td>
</tr>
<tr>
<td>7.2 Energy in Chemical Reactions</td>
<td>a) Title change</td>
<td>a) Avoid confusion with 7.1</td>
</tr>
<tr>
<td></td>
<td>b) Added ETS1-2*, ETS1-3*, ETS1-4*</td>
<td>b) Added engineering PEs to S&amp;S</td>
</tr>
<tr>
<td>7.3 Metabolic Reactions</td>
<td>a) No Changes</td>
<td></td>
</tr>
<tr>
<td>7.4 Matter Cycling</td>
<td>a) No Changes</td>
<td></td>
</tr>
<tr>
<td>7.5 Ecosystems Dynamics &amp; Biodiversity</td>
<td>a) Added ESS3-3*</td>
<td>a) Used the goal of minimizing human impact as a framing for ecosystem investigations</td>
</tr>
<tr>
<td></td>
<td>b) Added ETS1-1*</td>
<td>b) Added engineering PEs to S&amp;S</td>
</tr>
<tr>
<td>7.6 Natural Resources &amp; Human Impact</td>
<td>a) Added asterisk to ESS3-3</td>
<td>a) PE is now partially built in 7.5</td>
</tr>
<tr>
<td></td>
<td>b) Added ETS1-2*</td>
<td>b) Added engineering PEs to S&amp;S</td>
</tr>
</tbody>
</table>
Table 1 (continued). Scope and Sequence Changes from the 3/11/2019 version to 4/9/2020 version

<table>
<thead>
<tr>
<th>Unit</th>
<th>Changes</th>
<th>Reason for Change</th>
</tr>
</thead>
</table>
| 8.1 Contact Forces | a) Added LS1-8* and arrow from 6.6  
b) Added ETS1-2*, ETS1-3* | a) Use the idea of cells from 6.6 and the idea of opposing forces from this unit to figure out that cells can detect touch when a force deforms tissue, which is experienced as touch by signals sent from cells to the brain.  
b) Added engineering PEs to S&S |
| 8.2 Sound Waves | a) Added LS1-8* and arrow from 6.6  
b) Removed asterisk from PS4-1 | a) Use the idea of cells from 6.6 and the idea of air colliding with a sensor to figure out how we detect sound  
b) PS4-1 was removed from 6.5 |
| 8.3 Forces at a distance<sup>2</sup> | a) Removed 8.2 → 8.3 arrow  
b) Added PS4-3 | a) No direct connections between these two units  
b) PS4-3 fits better as a short extension here |
| 8.4 Earth in Space<sup>3</sup> | a) Removed mini-unit symbol from PS4-3 and moved to 8.3 | a) Mini-unit solution was not feasible |
| 8.5 Genetics | No changes | |
| 8.6 Natural Selection & Common Ancestry | a) Added asterisk to LS4-1 | a) PE added to Plate Tectonics |

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<sup>2</sup> Updated 4/9/20  
<sup>3</sup> Updated 4/9/20
Current OpenSciEd Scope and Sequence (Updated 4/9/2020)

**GRADE 6**

- 6.1 Light & Matter
  - PS4-2*, LS1-8*
- 6.2 Thermal Energy
  - PS1-4*, PS3-3, PS3-4, PS3-5, PS4-2*, ETS1-4*
- 6.3 Weather, Climate & Water Cycling
  - ESS2-4, ESS2-5, ESS2-6, PS1-4*
- 6.4 Plate Tectonics & Rock Cycling
  - ESS1-4, ESS1-2, ESS2-2, ESS2-3, LS4-1*
- 6.5 Natural Hazards
  - ESS3-2, ETS1-1*, ETS1-2*
- 6.6 Cells & Development
  - LS1-1, LS1-2, LS1-3*, LS4-3*

**GRADE 7**

- 7.1 Chemical Reactions & Matter Transformations
  - PS1-1, PS1-2, PS1-5, LS1-8*
- 7.2 Energy in Chemical Reactions
  - PS1-6, ETS1-2*, ETS1-3*, ETS1-4*
- 7.3 Metabolic Reactions
  - LS1-3*, LS1-5*, LS1-7
- 7.4 Matter Cycling & Photosynthesis
  - LS1-6, LS2-3, PS1-3
- 7.5 Ecosystem Dynamics & Biodiversity
  - LS2-1, LS2-2, LS2-4, LS2-5, ESS3-3*, ETS1-1*
- 7.6 Natural Resources & Human Impact
  - ESS3-1, ESS3-3*, ESS3-4, ESS3-5, ETS1-2*

**GRADE 8**

- 8.1 Contact Forces
  - PS2-1, PS2-2, PS3-1, ETS1-2*, ETS1-3*, LS1-8*
- 8.2 Sound Waves
  - PS4-1, PS4-2*, LS1-8*
- 8.3 Forces at a Distance
  - PS2-3, PS2-5, PS3-2, PS4-3
- 8.4 Earth in Space
  - ESS1-1, ESS1-2, ESS1-3, PS2-4, PS4-2*
- 8.5 Genetics
  - LS1-5*, LS3-1, LS3-2, LS4-5
- 8.6 Natural Selection & Common Ancestry
  - LS1-4, LS4-1*, LS4-2, LS4-3*, LS4-4, LS4-6

Updated 4/9/2020
Previous OpenSciEd Scope and Sequence (Released 3/11/2019)

**GRADE 6**
- 6.1 Light & Matter
  - PS4-2*
- 6.2 Thermal Energy
  - PS1-4, PS3-3, PS3-4, PS3-5, PS4-2*
- 6.3 Weather, Climate & Water Cycling
  - PS4-2*, ESS2-4, ESS2-5, ESS2-6
- 6.4 Plate Tectonics & Rock Cycling
  - ESS1-4, ESS2-1, ESS2-2, ESS2-3
- 6.5 Natural Hazards
  - ESS3-2, PS4-1*
- 6.6 Cells & Systems
  - LS1-1, LS1-2, LS1-3*, LS1-8*, LS4-3*

**GRADE 7**
- 7.1 Chemical Reactions & Matter Transformations
  - PS1-1, PS1-2, PS1-5
- 7.2 Chemical Reactions & Energy
  - PS1-6
- 7.3 Metabolic Reactions
  - LS1-3*, LS1-5*, LS1-7
- 7.4 Matter Cycling & Photosynthesis
  - LS1-6, LS2-3, PS1-3
- 7.5 Ecosystem Dynamics
  - LS2-1, LS2-2, LS2-4, LS2-5
- 7.6 Natural Resources & Human Impact
  - ESS3-1, ESS3-3, ESS3-4, ESS3-5

**GRADE 8**
- 8.1 Contact Forces
  - PS2-1, PS2-2, PS3-1
- 8.2 Sound Waves
  - PS4-1*, PS4-2*
- 8.3 Forces at a Distance
  - PS2-3, PS2-5, PS3-2
- 8.4 Earth in Space
  - ESS1-1, ESS1-2, ESS1-3, PS2-4, PS4-2*, PS4-31*
- 8.5 Genetics
  - LS1-5*, LS3-1, LS3-2, LS4-5
- 8.6 Natural Selection & Common Ancestry
  - LS1-4, LS4-1, LS4-2, LS4-3*, LS4-4, LS4-6

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**Bundle Emphasis**
- PHYSICAL SCIENCE PEs
- EARTH AND SPACE SCIENCE PEs
- LIFE SCIENCE PEs

*PE built across several units
*PE could be separate mini-unit

**Prior PEs the Bundle Builds on**
- PRIOR PHYSICAL SCIENCE PEs
- PRIOR EARTH AND SPACE SCIENCE PEs
- PRIOR LIFE SCIENCE PEs

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