Using Learning Map Models to Design Accessible Assessments

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Challenge

- To provide science assessments for students with significant cognitive disabilities
  - Linked to grade-level standards and
  - Accessible to students who may have
    - Severe or multiple disabilities
    - Sensory Barriers
    - Communication Barriers
Framework

- **Learning Map Models**
  - Cognitive models that are fine-grained representations of the knowledge, skills, and understandings required to reach a learning target, which have interconnected, multiple pathways. (Bechard et al., 2012; Kingston et al., 2017)

- **Universal Design for Learning**
  - Guidelines for creating assessments that are accessible to all learners (CAST, 2018; Rose & Meyer, 2000)

- **Evidence-Centered Design**
  - Conceptual model for assessment design that integrates UDL guidelines (DeBarger et al., 2011; Mislevy et al., 1999)
Approaches to Accessible Assessments

Traditional
- Same assessment targets for all students
- Retrofitting makes materials accessible

DLM & I-SMART
- Variable targets matched to student profile
- Materials are accessible by design

(Dynamic Learning Maps, 2016)
We used the UDL guidelines when developing the design principles and stakeholder review criteria for I-SMART maps.

(Andersen et al., 2019; Swinburne Romine et al., 2018).
Development Process

Define region → Synthesize literature → Develop nodes → Connect nodes → Internal Review → External Review

Revision after each review

(Swinburne Romine et al., 2018)
Identifying Assessment Targets

- We used the LM structure to select multiple groups of nodes as assessment targets that span the LM from beginning to end
- Guidelines for linkage levels
  - Includes DCI and SEP
  - Different complexity
  - Provides wide range of access
  - One direct connection
  - Adjacent levels overlap
Varying assessment targets

(ATLAS, 2018)
**EE.5.LS2-1** Create a model that shows the movement of matter through living things.

<table>
<thead>
<tr>
<th>Initial LL</th>
<th>Precursor LL</th>
<th>Target LL</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-77 Can draw or select a meaningful image</td>
<td>SCI-326 Recognize that a food web shows how matter is transferred in an ecosystem</td>
<td>SCI-309 Use a model to trace the matter in animals’ food back to plants</td>
</tr>
<tr>
<td>SCI-666 Can depict a natural sequence or process</td>
<td>SCI-313 Determine the relationship between two organisms in a food chain</td>
<td>SCI-7 Create a model that shows the movement of matter through living things</td>
</tr>
<tr>
<td>SCI-317 Recognize food chain model</td>
<td>SCI-8 Identify a model that shows the movement of matter from plants to animals</td>
<td>SCI-307 Recognize that matter moves from the soil to plants to animals and back to the soil</td>
</tr>
<tr>
<td>SCI-326 Recognize that a food web shows how matter is transferred in an ecosystem</td>
<td>SCI-309 Use a model to trace the matter in animals’ food back to plants</td>
<td>SCI-311 Recognize that plants get matter from air</td>
</tr>
</tbody>
</table>
Systematic Approach to Universal Design

Holistic approach to accessible assessment design
UDL in an Evidence-Centered Design Framework

- Essential Element Concept Map is a document that specifies the connection between the content, a testlet's design elements, and student observations.

- Provides guidance to item-writers in developing testlets and incorporating UDL options.

(DLM, 2016)
I-SMART Testlets

- Phenomena-based
- Student Choice
- Wonder Questions
- Science Narratives
- Embedded Items
Examples of UDL Features

• Engaging science phenomena
• Wonder Questions
• Student choice of context for assessment
• Self-evaluation questions
• Innovative Item Types
Choice of Context

• Provides an option for recruiting interest
• Found at the beginning of the testlet
• Unscored

Lisa and Zack will study animals from a farm for their science class project. Choose which student you would like to read more about.
Wonder Question

- Provides option for self-regulation
- Found near the beginning of the testlet
- Unscored
- Students return to wonder question at end of testlet
Thank You

- [https://ismart.works/](https://ismart.works/)
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