Innovations in Science Map, Assessment, and Report Technologies (I-SMART)

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I-SMART Purpose

Improve achievement of multidimensional science standards for students with and without disabilities through accessible, learning map model-based assessments and reporting tools.

State Partners

- Maryland – Lead State
- Missouri
- New Jersey
- New York
- Oklahoma

Project Advisors

- Karen Erickson, University of North Carolina
- Neal Kingston, University of Kansas
- Cara Laitusis, ETS
- Jim Pellegrino, University of Illinois at Chicago
- Michael Wehmeyer, University of Kansas
- Phoebe Winter, Independent Consultant

I-SMART Staff

- University of Kansas - ATLAS
- CAST
- BYC Consulting

I-SMART and DLM

DLM	I-SMART

• Operational alternate assessment
  • students with significant cognitive disabilities
	• Research & development
	  • Inform future summative and formative assessments
	  • Three populations

I-SMART Goals

Goal 1 - Develop & evaluate science learning map

- Expands existing DLM science neighborhoods
- Connects to math, ELA & pre-academic foundational skills

Goal 2 – Design, develop & evaluate assessments

- Measures Science disciplinary content and science & engineering practices
- Uses highly engaging, universally designed, technology-delivered formats.

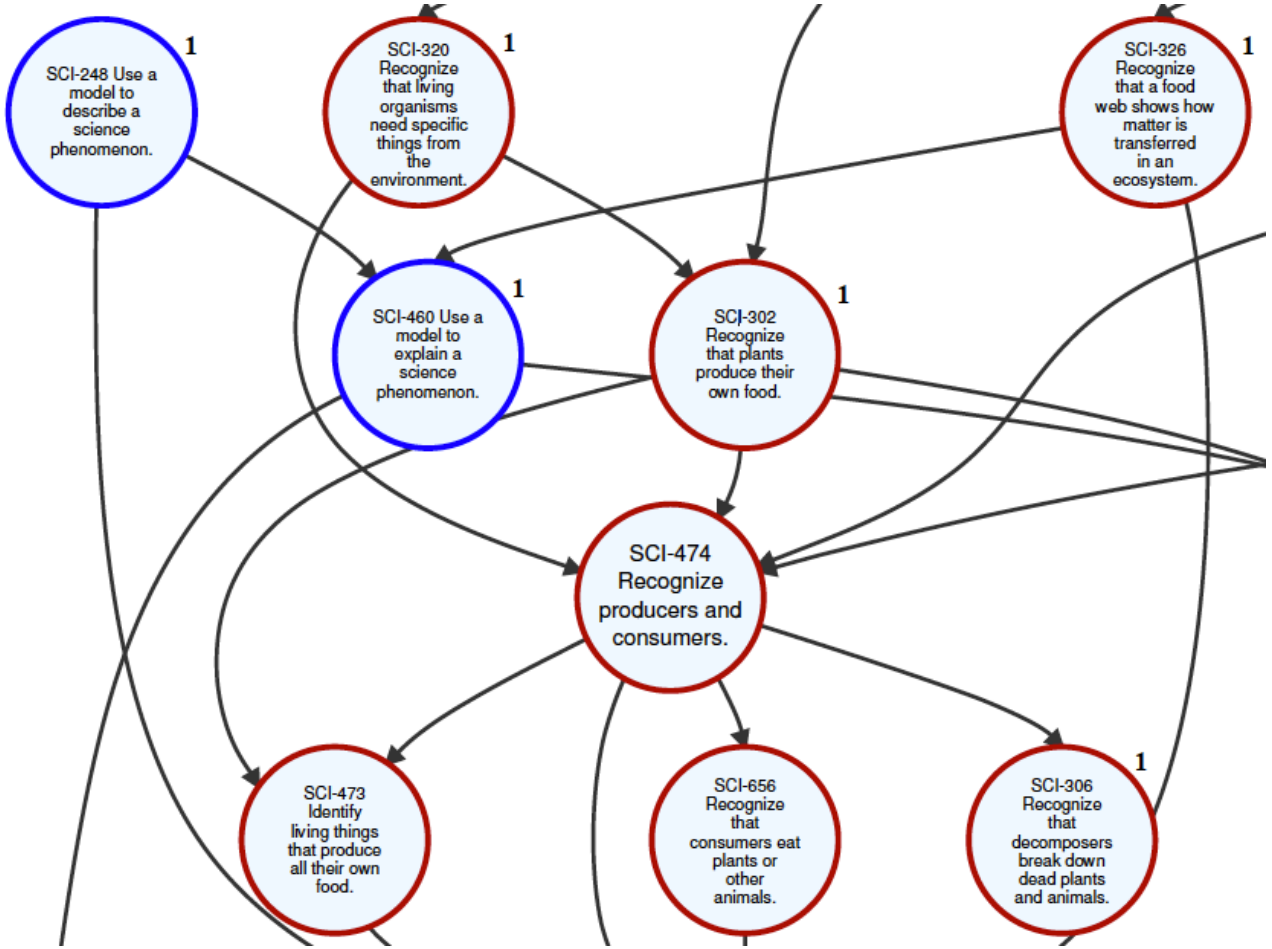
I-SMART Goals

Goal 3 – Design, develop & evaluate a dashboard	• Describes student performance on science assessments • Co-designed with teachers
Goal 4 - Dissemination	• Distribution of materials to stakeholders • Project briefs, technical reports, presentations, journal submissions

Goal 1
Science Learning Map Model Development and Review

Overview of Map Development

- DLM Science Essential Element (EEs)
  - 34 in 3 grade bands
  - Connected to the NGSS
- Deep Dive into each Essential Element
  - Content Analysis for disciplinary core idea (DCI) and science and engineering practice (SEP)
  - Literature review
  - Modeling nodes & connections for a "neighborhood"



Map Model Segment from Neighborhood EE.MS.LS2-2: Use models of food chains/webs to identify producers and consumers in aquatic and terrestrial ecosystems.

Disciplinary Core Idea: LS2.B Cycle of Matter and Energy Transfer in Ecosystems.

Science and Engineering Practice (Blue Circles): Developing and using models

Map Development – Phases 1 & 2 (DLM)

- 7 neighborhoods
- Development plan reviewed by DLM TAC
- Multiple rounds of online, asynchronous review
- Recruited reviewers from DLM Science States
- Iterative refinement of review criteria

Map Development – Phase 3 (I-SMART)

- 11 neighborhoods - 7 from Phases 1 & 2, 4 new
- Onsite panel review - July, 2017
- Recruited reviewers from I-SMART partner states

I-SMART Review Panel Process

- One panel per grade span
- 3-4 neighborhood maps per panel
- 4 educators per panel (2 content- and 2 accessibility-focused)
- Trained in advance and onsite

Panel Review Process - 4 Steps

1. Individual ratings
2. Table discussion and panel recommendations
3. Panel horizontal evaluation using ELA and math maps with an identification of a major pathway
4. Panel vertical relationships between science maps in the same DCI

Post-Panel Review Process

- Step 1: Individual staff review
  - Review based on criteria:
    - Logic
    - Consistency with the neighborhood map
    - Consistency with the research narrative
  - Either accept panel recommendation or forward to step 2
- Step 2: Group staff review
  - Discuss recommendations that did not meet the above criteria
  - May decide to accept, reject, or identify an alternative revision
  - Final decisions were tracked, analyzed, and summarized based on rationales

Evaluation of Map Development

- Internal evaluator
  - Staff observer
- External evaluator
  - Focus group

Goal 2
Testlet Development Progress – Literature Review and Development Plan

Example of a Current DLM Science Testlet

- Includes an engagement activity and items to assess student understanding of forces and motion.

- Example Testlet Link

Testlet Design Literature Review

- Staff queried academic search databases
- Search terms such as: UDL, choice, motivation, engagement, accessibility in assessment, science instruction
- Results synthesized and summarized

Testlet Development Next Steps

- From the literature review and revised design framework, create prototype Essential Element Concept Maps, develop prototype testets, conduct cognitive labs, field-test testlets

Goal 3
Reporting Dashboard Progress - Needs Assessment and Focus Groups

Dashboards

Provide immediate access to student data in an accessible, attractive, and engaging way that facilitates comprehension, insight, and instructional design-making.

Design of Focus Groups

- Four focus groups of 4-5 teachers each
- Virtual meetings
- 90 minute sessions of informal conversation, with guiding questions and examples of existing educational dashboards

Analysis

Analyzed according to 3 categories

1. What teachers expressed that they need in order to teach
2. Strategies and practices that teachers currently employ
3. What features teachers do / don't desire from dashboards

Dashboard Design Ideas - Highlights

- Expose teachers to the learning map models
- Design to clearly indicate what has been assessed, mastered, or not mastered with a quick look
- Carry-over teacher comments / recommendations from year to year
- Provide links to each essential element to instructional resources

Individual Student Report

INTERIM 03-20-2017

Name: Jan Snow
Subject: Science
Grade: 7
Student IEP Plan >
Accomodations >

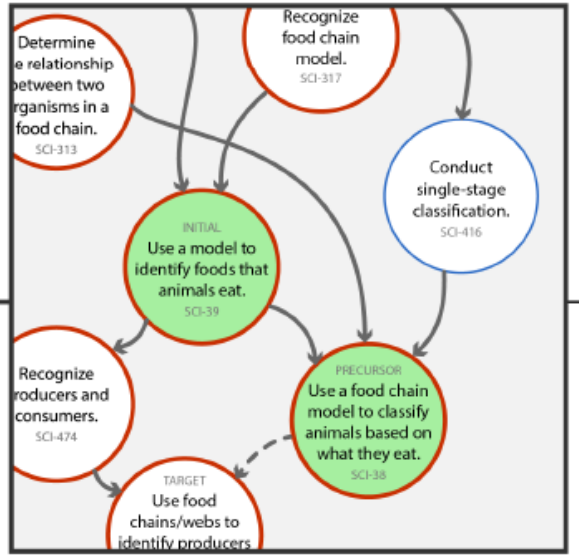
One idea.. Many more to come

Learning Profile

Essential Element [+]	Linkage Level 1	2	3
EE.MS-PS1-2			
EE.MS-PS2-2			
EE.MS-PS3-3			
EE.MS-PS4-2			
EE.MS-LS1-3			
EE.MS.LS2-2 **Use models of food chains/webs to identify producers and consumers in aquatic and terrestrial ecosystems.**			
EE.MS-LS3-2			
EE.MS-ESS1-1			
EE.MS-ESS2-1			
EE.MS-ESS2-2			

Key: No evidence of mastery | Levels mastered | Essential Element not tested

Learning Map [+]



EE-specific skills | Science or engineering practice skills
Direct path → | Indirect path - - ->

Additional Details

Disciplinary Core Idea: LS2.B: Cycle of Matter and Energy Transfer in Ecosystems >

Science and Engineering Practice: Developing and using models >

Instructional Resources

Content
- DLM Science Instructional Activity: Food Chains (PDF) >

Additional resources
- . . .
- . . .

Project Feedback from States and Advisors

Feedback from States and Advisors

- Map model information originally designed for item writers could provide rich information for teachers (e.g. how each map node could be observed.)

SCI-248	Use a model to describe a science phenomenon.	Use a model to describe a science phenomenon.	Given a model, the student can identify the science phenomenon that the model represents. For example, given a food chain model, the student can describe the feeding relationships described by the model. If the model shows grass => cow => people, and the student is asked what the model shows, the student identifies that the model shows that cows and people eat other living things for food, OR that the model shows that grass makes its own food.

Feedback from States and Advisors

- Enhancements to testlets should be carefully considered; competing strengths and needs of student populations
- We should look to lessons learned from other projects re: motivation, choice, UDL (PARA/NARAP, Science Notebooks)
- We could focus on reporting and displaying clusters of nodes to prevent over-emphasis of any one node and support teachers in thinking across concepts and practices

Feedback from States and Advisors

- The dashboard could help teachers' assessment literacy, understanding of terms, what mastery is, etc.
- The team should provide clear documentation for all products, including how testlet innovations / components are tied to design framework

Questions?

Contact Us...

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