Design Features Supporting Teachers' Use of a Dashboard for Diagnostic Assessment Results

Emma L. Starr, Robert P. Dolan, Cara Wojcik, Kim Ducharme, and Jose Blackorby

CAST, Inc.

April 6, 2019

Agenda

- Background of Project
- Brief Introduction to Universal Design for Learning
- Dashboard Development Methodology
  - Participants
  - Process
- Design Findings
- Next Steps

Project Background

I-SMART Purpose

Help students with and without disabilities achieve proficiency on multidimensional science standards through an assessment system that is:

- learning map model-based
- instructionally embedded
- formative and summative

Builds on the work from DLM

- Deeply integrates the **UDL guidelines** into the test design and development process
- Supports not just students with significant cognitive disabilities, but also **students with and without disabilities** who are struggling to meet grade-level expectations in science
- Provides a new, actionable **dashboard** to support teacher interpretation of test results to inform instructional decision making, designed through a UDL lens

A Few Guiding Principles for Development

Instructionally relevant

Connected to the timing of instruction

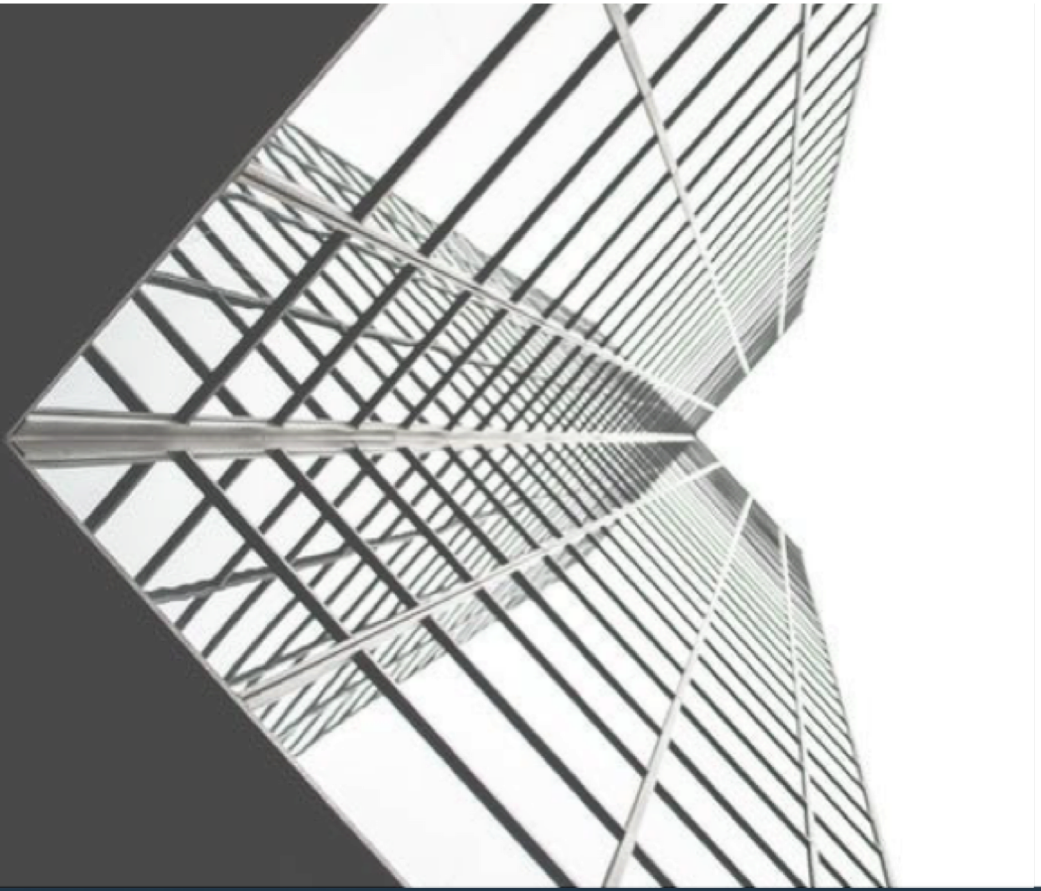
Utilized maps - show teachers important nodes

Diagnostic information to guide decisions

Brief Introduction to Universal Design for Learning

Universal Design for Learning (UDL)

A **framework** that suggests embedding options and supports into curricula and learning experiences to expand learning opportunities for ***all*** learners



What is Universal Design?

Universal Design

"The design of products and environments to be usable by all people, to the greatest extent possible, **without the need for adaptation or specialized design**."

Source: Mace, R. (1997). What is universal design. *The Center for Universal Design at North Carolina State University.*

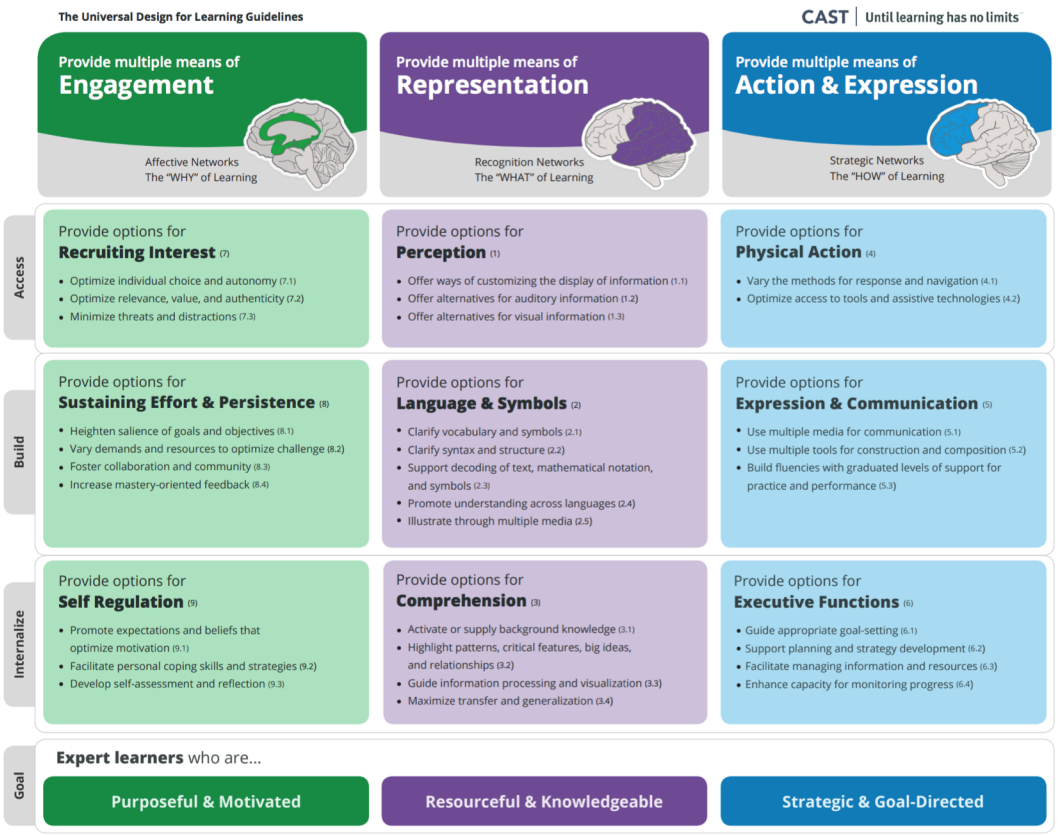
Necessary for **some**, good for **all**

What is Universal Design for Learning?

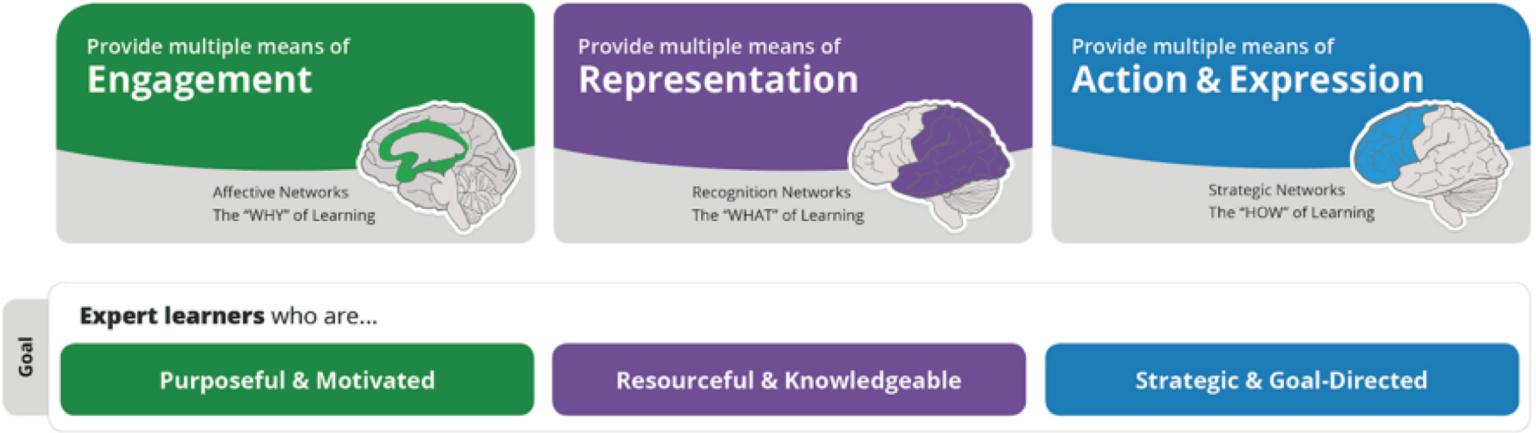
Access

Build

Internalize



The Goal of UDL: Expert Learners (and Teachers)



Dashboard Development

The problem

Teachers are swimming (drowning) in data generated by standardized tests; but it is often not presented in a usable, actionable way.

How can we make data displays and the way they are used more empowering and effective for teachers?

How can UDL principles inform data visualization design for teachers?

The starting point

REPORT DATE: 06-06-2018
SUBJECT: English language arts
GRADE: 10

Individual Student Year-End Report
Learning Profile 2017-18

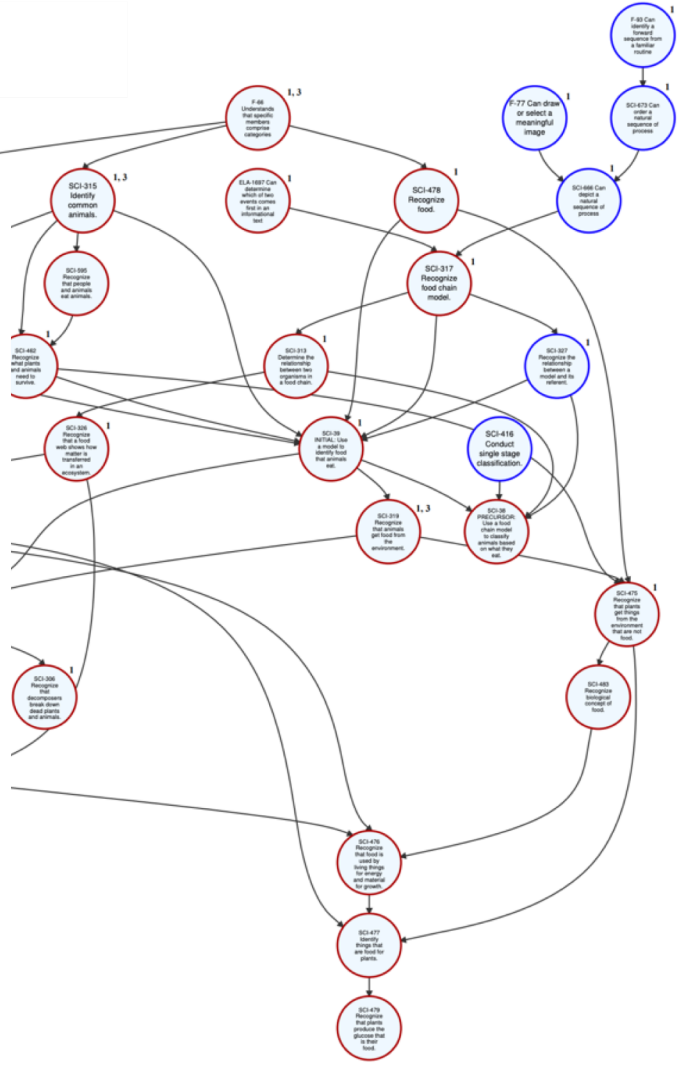
DYNAMIC® LEARNING MAPS

NAME: Student DLM
DISTRICT: DLM District ID
SCHOOL: DLM School

DISTRICT ID: DLM District
STATE: DLM State

		Level Mastery				
Area	**Essential Element**	1	2	3	4 (Target)	5
ELA.C1.3	ELA.RI.9-10.3	Identify actions in familiar routines	Determine which event comes first	Identify relationships between concrete details	Determine the logical relationship between details	Identify how details change across the text
ELA.C1.3	ELA.RL.9-10.3	Understand subgroups within categories	Identify character feelings in a familiar story	Describe internal and external character traits	Determine how a character changes or develops	Identify changes in characters, settings, and events
ELA.C1.3	ELA.RL.9-10.5	Identify event sequence	Identify the beginning and end of a story	Identify story elements that change	Identify deviations from chronological order in a text	Understand how structure influences meaning
ELA.C2.1	ELA.L.9-10.2.c	Identify the first letter in own name	Use letters to create words	Represent initial sound in a word with a letter	Spell single-syllable words conventionally and phonetically	Spell irregular words correctly
ELA.C2.1	ELA.W.9-10.2.c	Produce a two word message	Connect two or more words together when writing	Write a complete thought	Write grammatically correct simple sentences	Write grammatically correct compound sentences
ELA.C2.1	ELA.W.9-10.2.d	Understand subgroups are within broad categories	Recognize domain-specific words	Use domain-specific vocabulary in writing	Use domain-specific vocabulary to strengthen claims	Use academic words in informative writing
ELA.C2.1	ELA.W.9-10.2.f	Identify the end of a familiar routine	Produce a universal ending	Write a concluding sentence	Write a conclusion for a text	Produce a relevant conclusion when writing

Levels mastered this year | No evidence of mastery on this Essential Element | Essential Element not tested



The goal

Design an interface that supports teachers to use the Dynamic Learning Maps and test results as a planning tool for instructional decision-making

Cadre Design Process

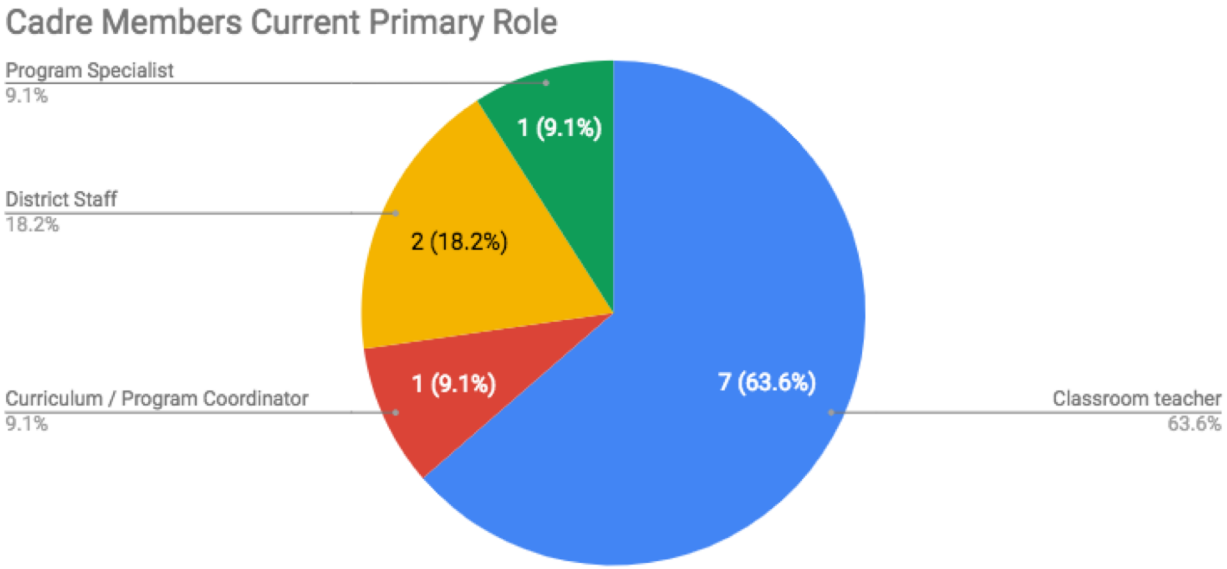
Main Cadre:

- 11 Educators from DLM partner states
- 4 Meetings
- Meetings of 1-5 cadre members, 2-4 I-SMART team members
- 90 Minutes
- Video Conferencing

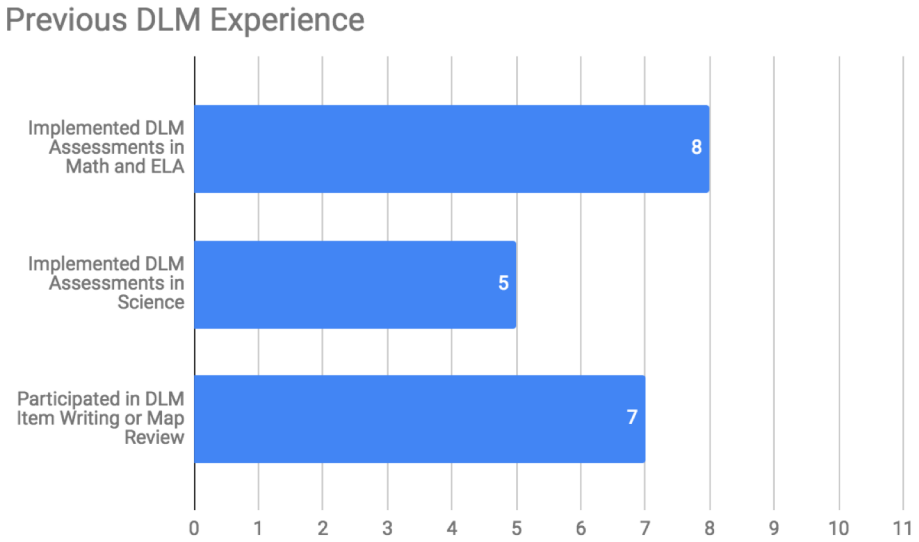
Gen Ed Focus Group:

- 1 Meeting during Cadre Process
- Same Format as Above
- 2 Gen Ed Science Teachers (6th and 8th) from a MA school

Cadre Participants



Cadre Participants



Iterative Discovery / Design Process:

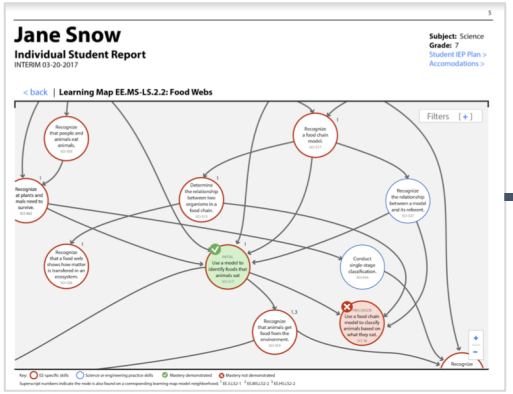
Cadre Meetings 1-3

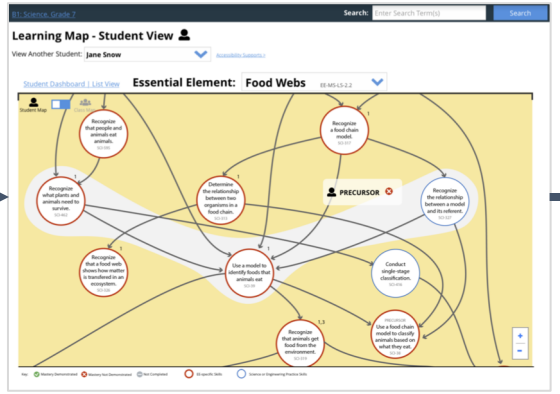
- Recap of the previous design's principal elements and features
- Walk-through of newly introduced screens and functions spotlighting design solutions resulting from teacher-generated feedback
- Facilitated discussion of prototype focusing on areas of clarity/confusion, features to change/add, most/least useful functions, and "Five Ws"

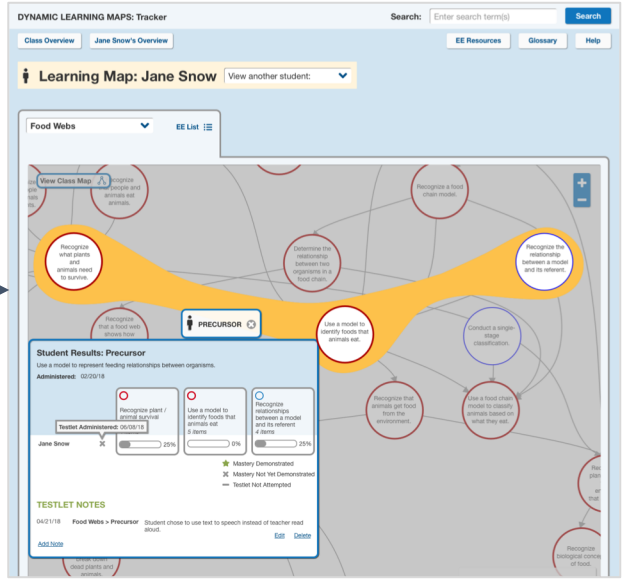
Cadre Meeting 4

- "Scavenger Hunt" usability testing session - teachers completed usability tasks to uncover any areas needing further refinement
- Cadre process reflection

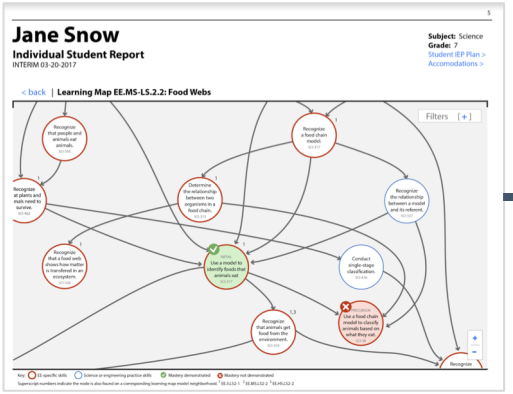
Iterative co-design cycles

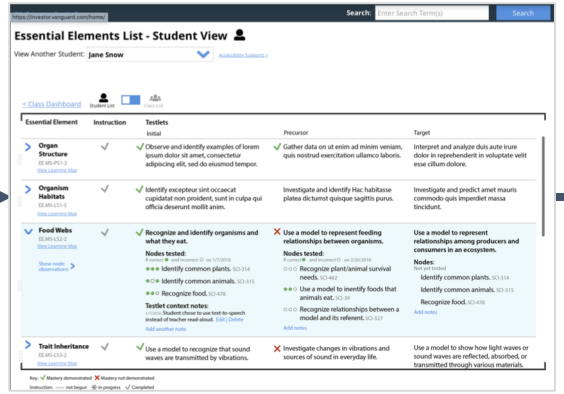


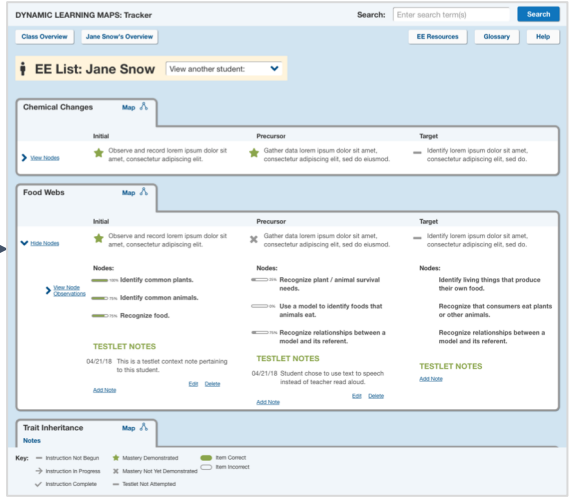




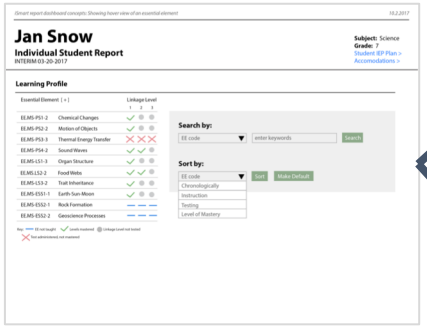
Iterative co-design cycles

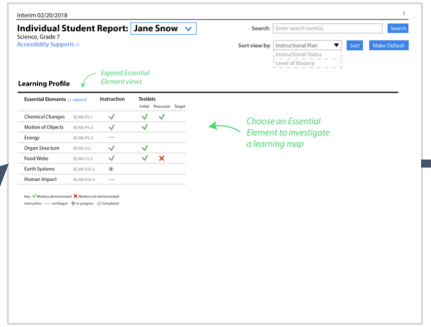


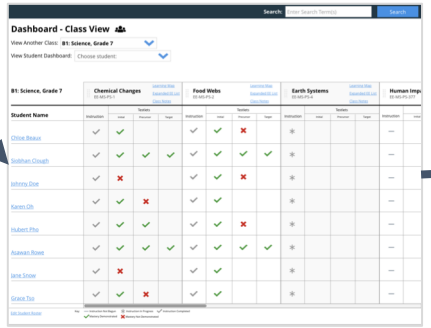


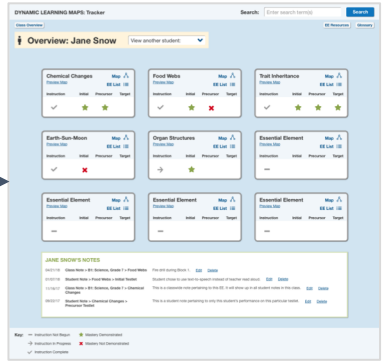


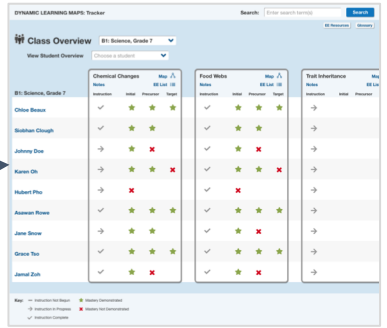
Iterative co-design cycles







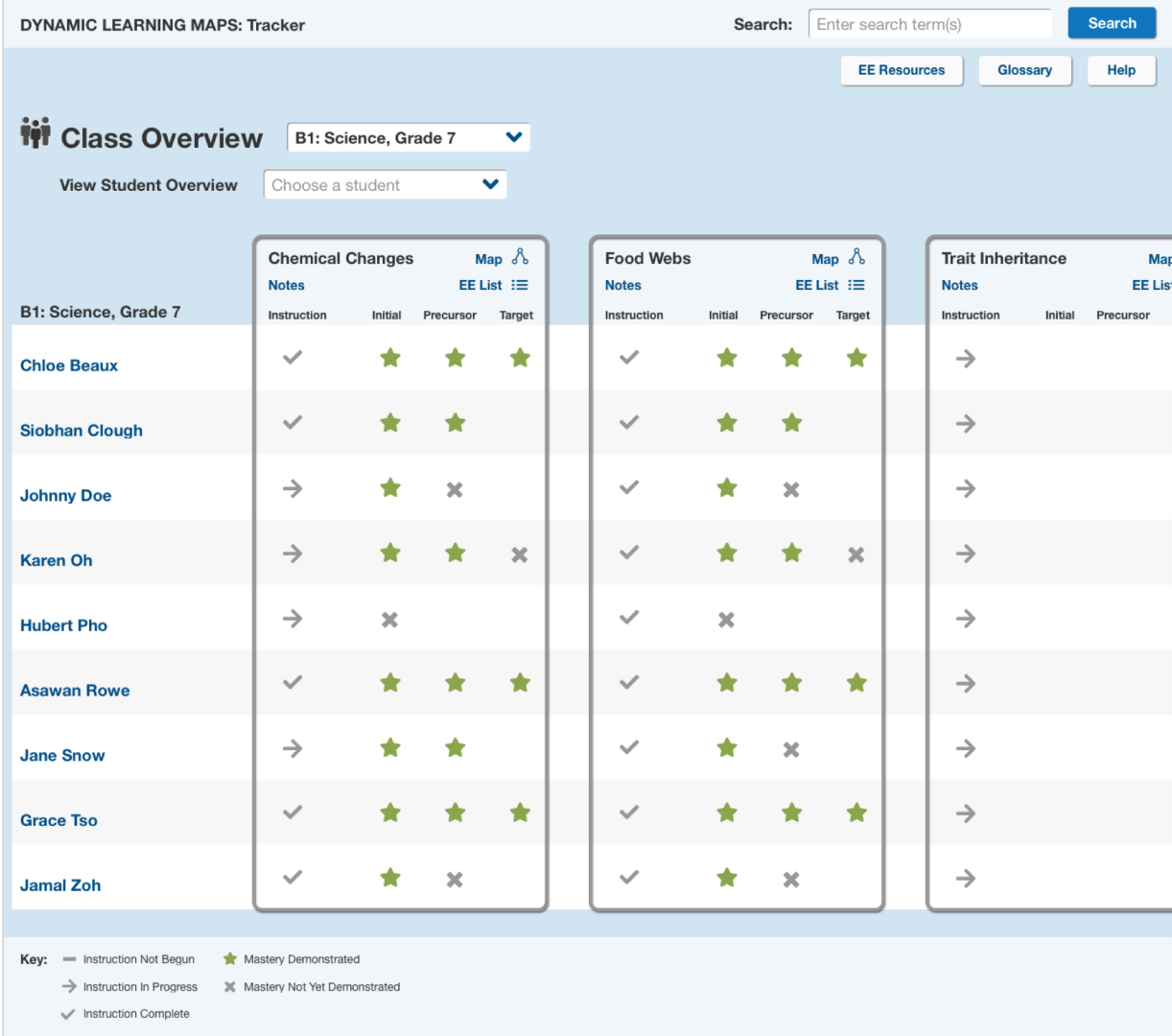




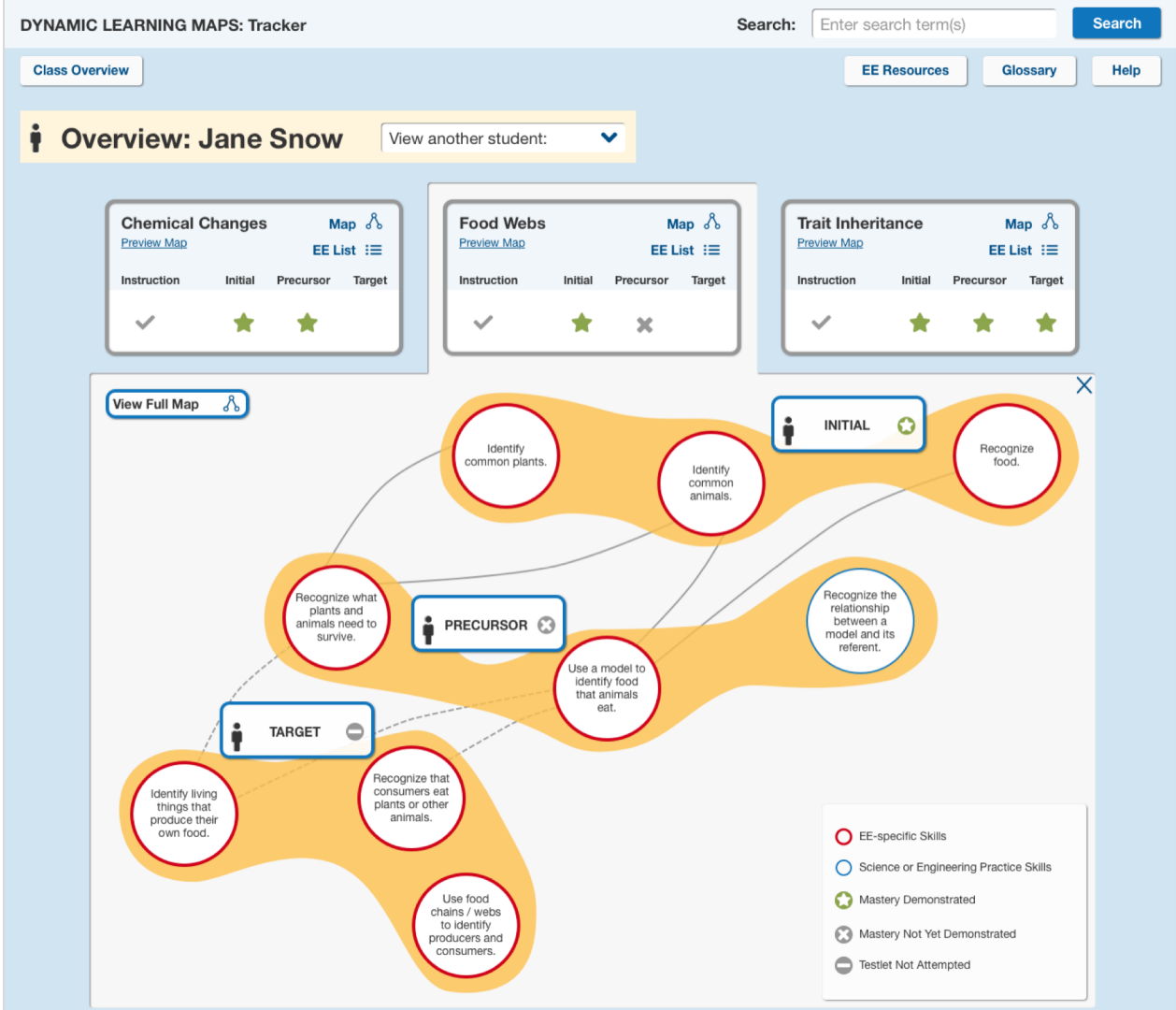
I-SMART

Innovations in Science Map, Assessment & Report Technologies

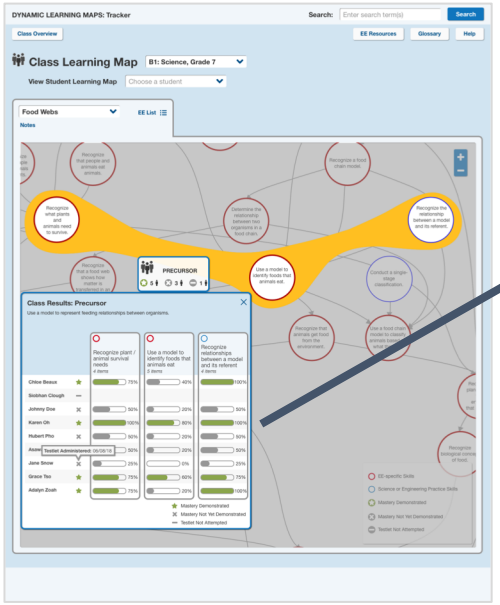
Test results: class overview



Test results: student overview



Test results: detail view by class



Summary of Design Findings

- Teachers found the learning maps valuable for understanding student progress and supporting instructional decisions
- However, scaffolding teacher's use of the map is necessary; there is a learning curve that can be supported through multiple representations of the same data
- Necessary to include aggregate view of class data to meet teachers' instructional needs

Final Cadre Findings

- In final usability/interpretability testing, cadre members were able to complete tasks effectively
- Feedback from cadre about final design was positive
- In final reflection, cadre members reported that they felt positive about the process, including that their ideas were used and that they developed professionally through participating

Next Steps

Upcoming Research Study

- Pilot study of science assessment system in 2020
    - Including evaluation of teacher dashboard through …
        - Interpretability and usability studies
        - Teacher interviews and focus groups