

Navigating the Places to Go When Learning Mathematics: Using Common Core State Standards as a Map for Instruction

*The **Dynamic Learning Maps** project is guided by the core belief that all students should have access to challenging grade-level content.*

Kansas State Department of Education Annual Meeting

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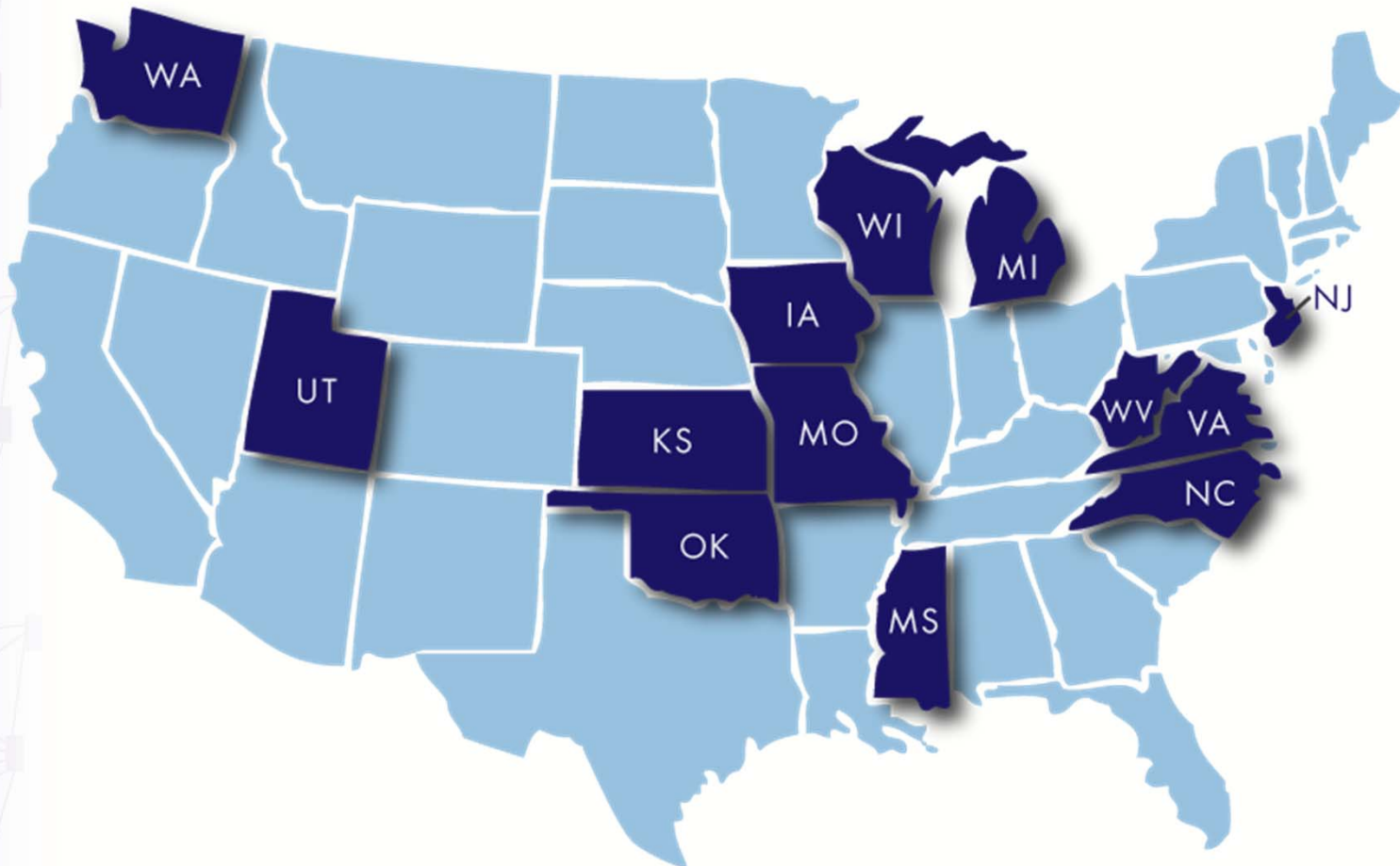
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State Participants



Key features of the DLM

- Learning maps
- Instructionally relevant item types
- Instructionally embedded assessments
- Technology platform
- Dynamic assessment

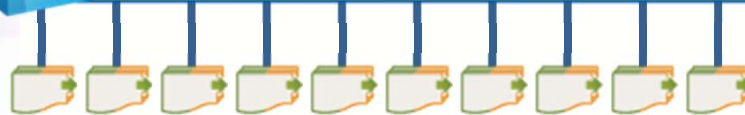
The DLM Alternate Assessment System*

English Language Arts and Mathematics, Grades 3–8 and High School

BEGINNING
OF YEAR

END
OF YEAR

DIGITAL LIBRARY of learning maps; professional development resources; guidelines for IEP development and student selection for the alternate assessment; instructionally relevant tasks with guidelines for use materials, accommodations, and scaffolding; automated scoring (for most) and diagnostic feedback; and online reporting system.



EMBEDDED TASKS ASSESSMENTS

A series of more than 100 items/tasks per year embedded within instruction, each with various forms and scaffolds to allow for customization to student needs. Each task typically requires one to five minutes for completion.



Two options for summative assessment**



Instructionally embedded tasks used with all DLM students. States may choose to use aggregate data for summative purposes (state decision).*



Summative assessment for accountability for those states that choose not to use the embedded tasks for accountability.

* Alternate assessment systems are those developed for students with the most significant cognitive disabilities and are based on alternate achievement standards.

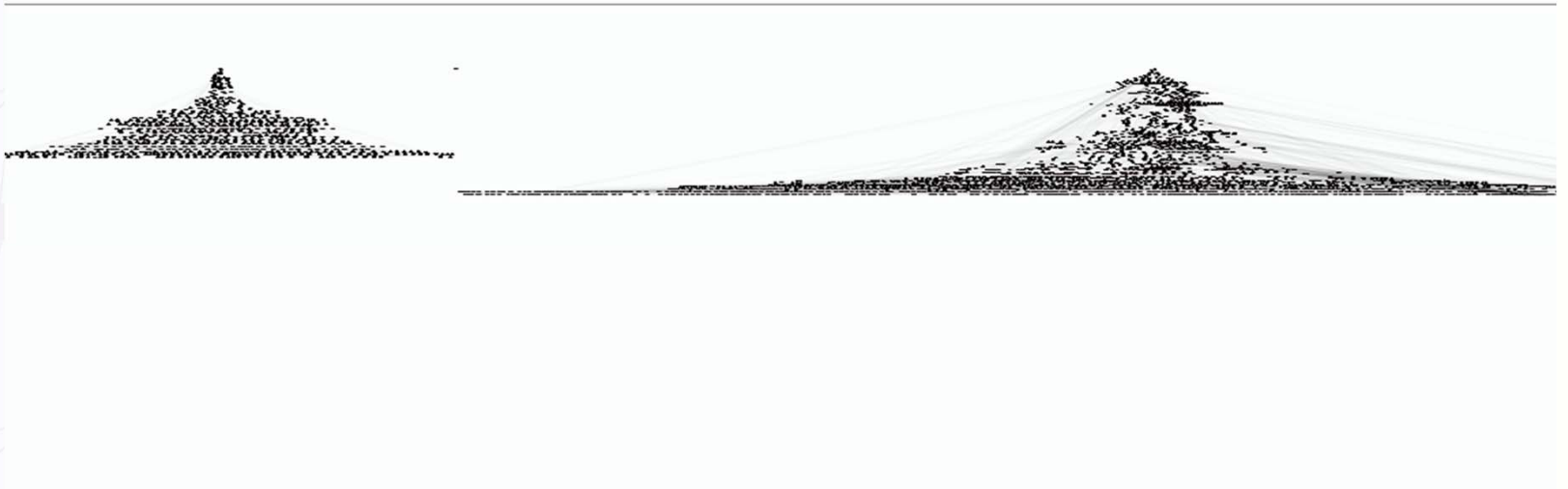
** Research will be conducted to review the technical feasibility of using data from the tasks for summative accountability purposes.



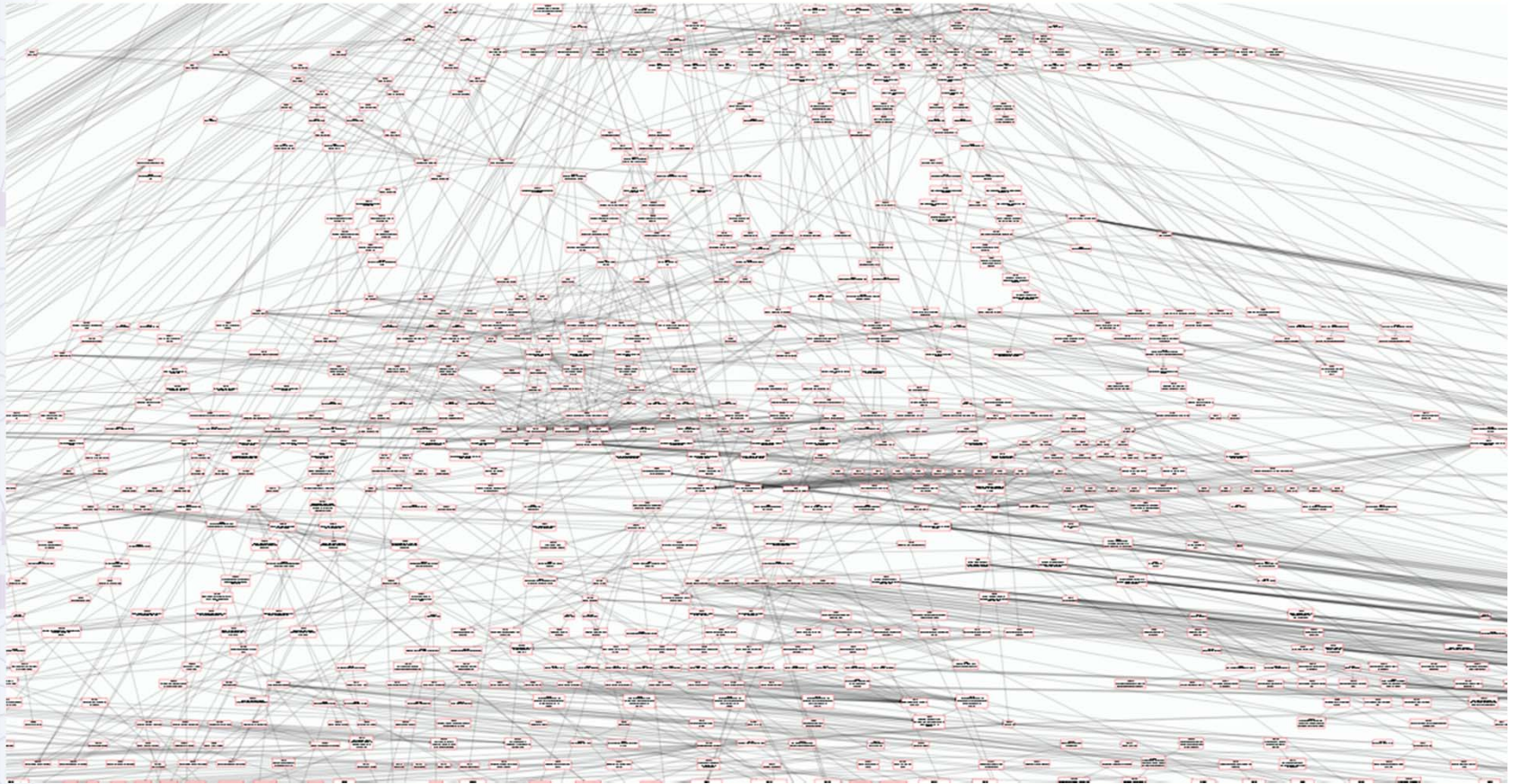


Learning Map Development

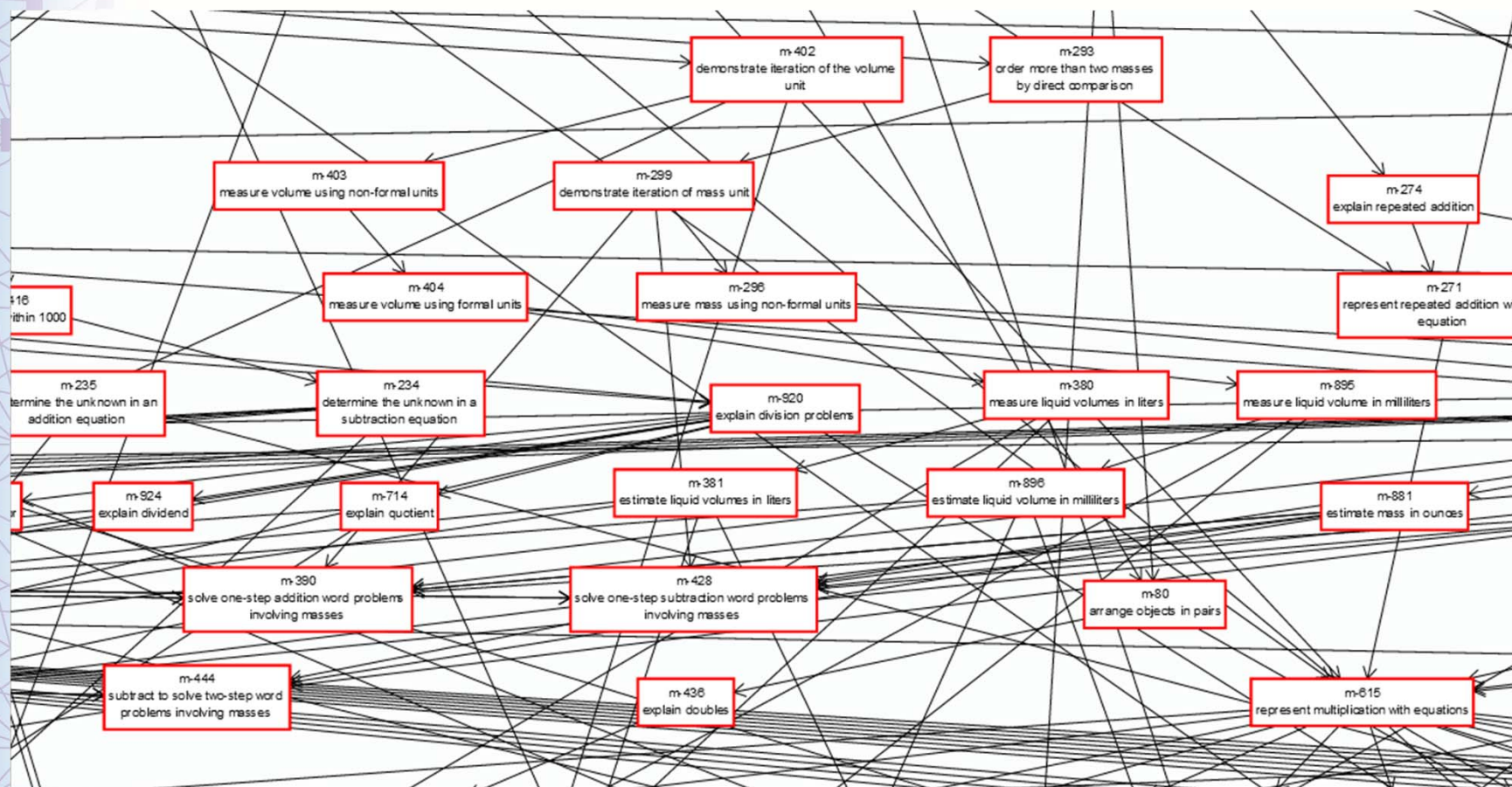
Learning Map



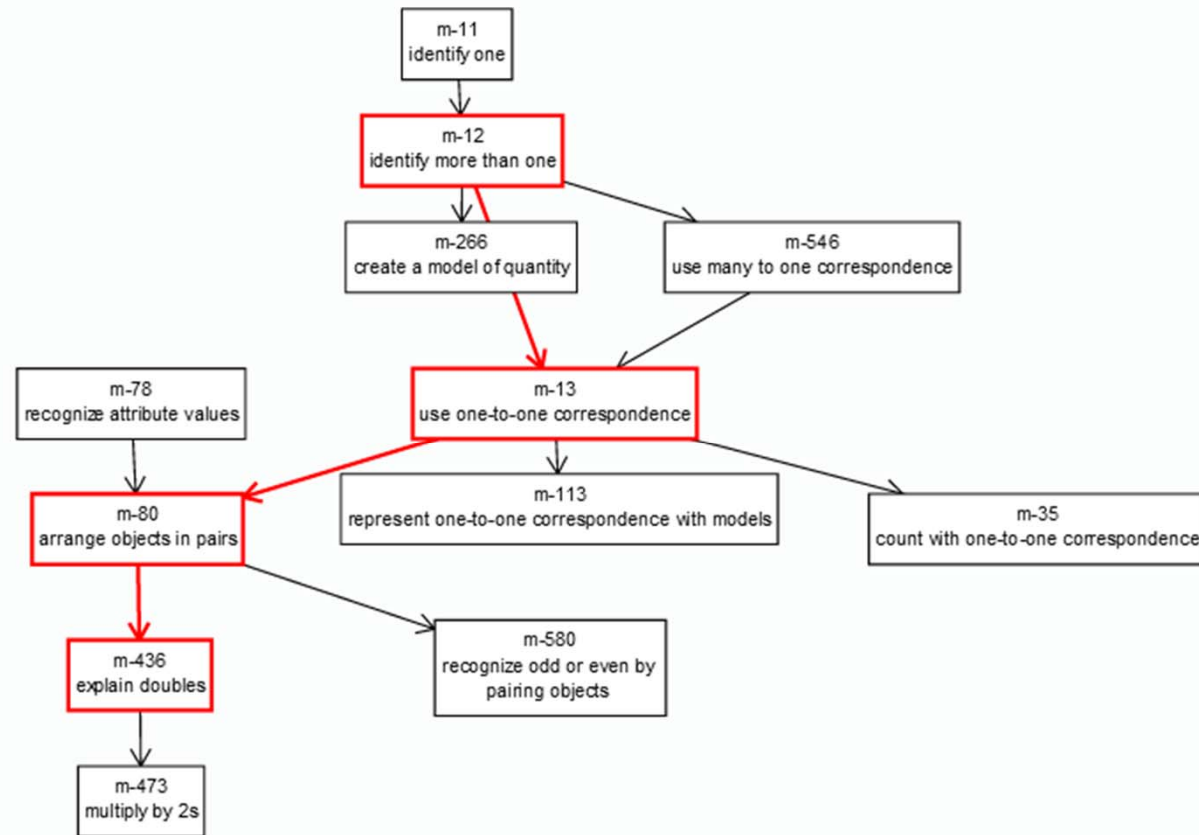
Learning Map



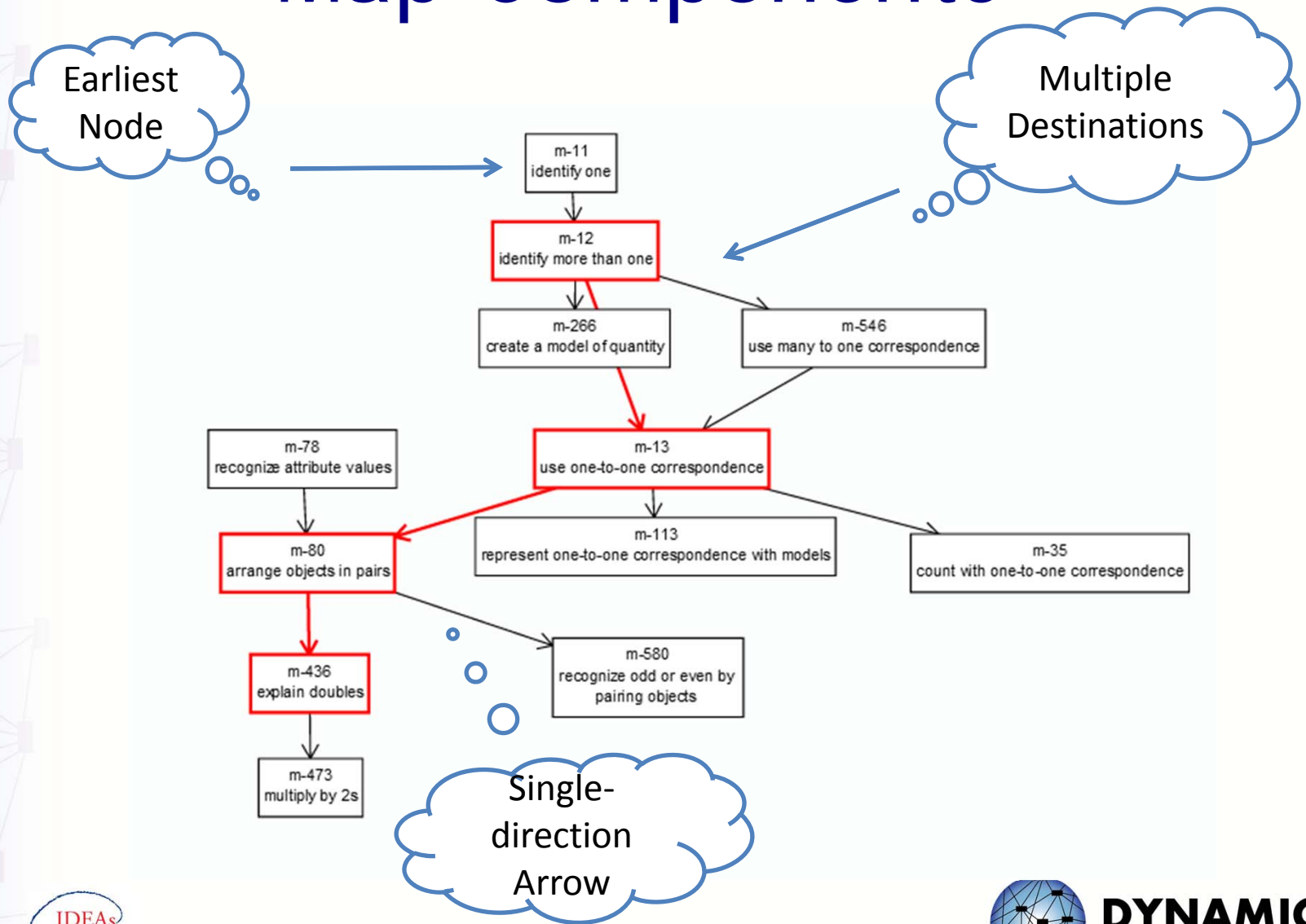
Learning Map



Learning Map (filter)



Map Components



Process Standards (NCTM, 2000)	Mathematical Proficiency Strands (NRC, 2001)	Standards for Mathematical Practice (CCSSO, 2010)
Problem Solving	Conceptual Understanding	Make sense & persevere
Reasoning & Proof	Procedural Fluency	Reason abstractly & quantitatively
Communication	Strategic Competence	Construct viable arguments & critique reasoning
Representation	Adaptive Reasoning	Model with mathematics
Connections	Productive Disposition	Use appropriate tools strategically
		Attend to precision
		Look for & make use of structure
		Look for & express regularity in repeated reasoning

Understanding Mathematics

- Understanding depends on networks of related facts and processes
(Hiebert & Carpenter, 1992; NCTM, 1989, 2000; Skemp, 2006; Webb & Romberg, 1992).
- Representations allow people to perceive of abstract mathematics concepts in different ways, which when cognitively organized and connected, support understanding
(NCTM, 2000).

Fostering Mathematical Understanding

- Educational experiences should foster connections (NCTM, 1989, 2000).
 - New information connected to prior knowledge
 - Interconnections among major domains
 - Connections among mathematical concepts and skills
- Procedural skill does not constitute understanding (Hiebert et al., 1996).

Three Phases for Mastering Basic Number Computations

(Baroody, 2006)

1.OA.5 - Relate counting to addition and subtraction

1.OA.6 - Add and subtract within 20, demonstrating fluency for addition and subtraction within 10...

Counting strategies

Using object counting or verbal counting to determine an answer

Reasoning strategies

Using known information to logically determine the

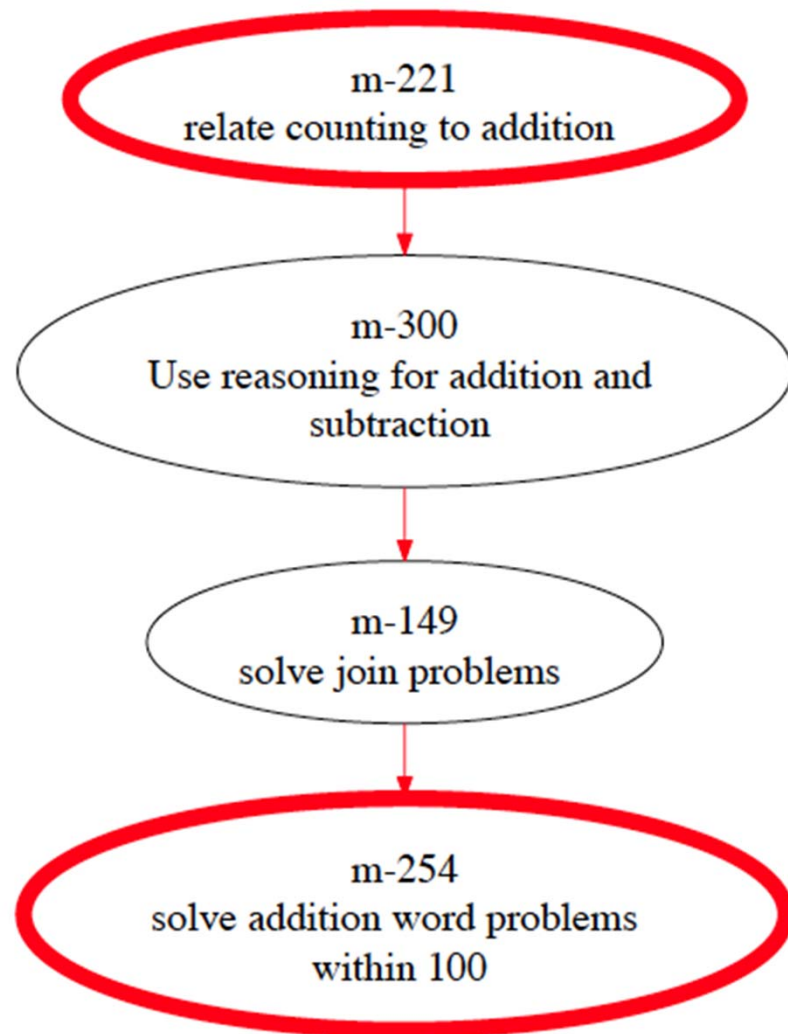
Mastery

Efficient (fast and accurate) production of answers

2.OA.1 - Use addition and subtraction within 100 to solve one- and two-step word problems...

2.NBT.5 - Fluently add and subtract within 100 using strategies...

Dynamic Learning Map Project

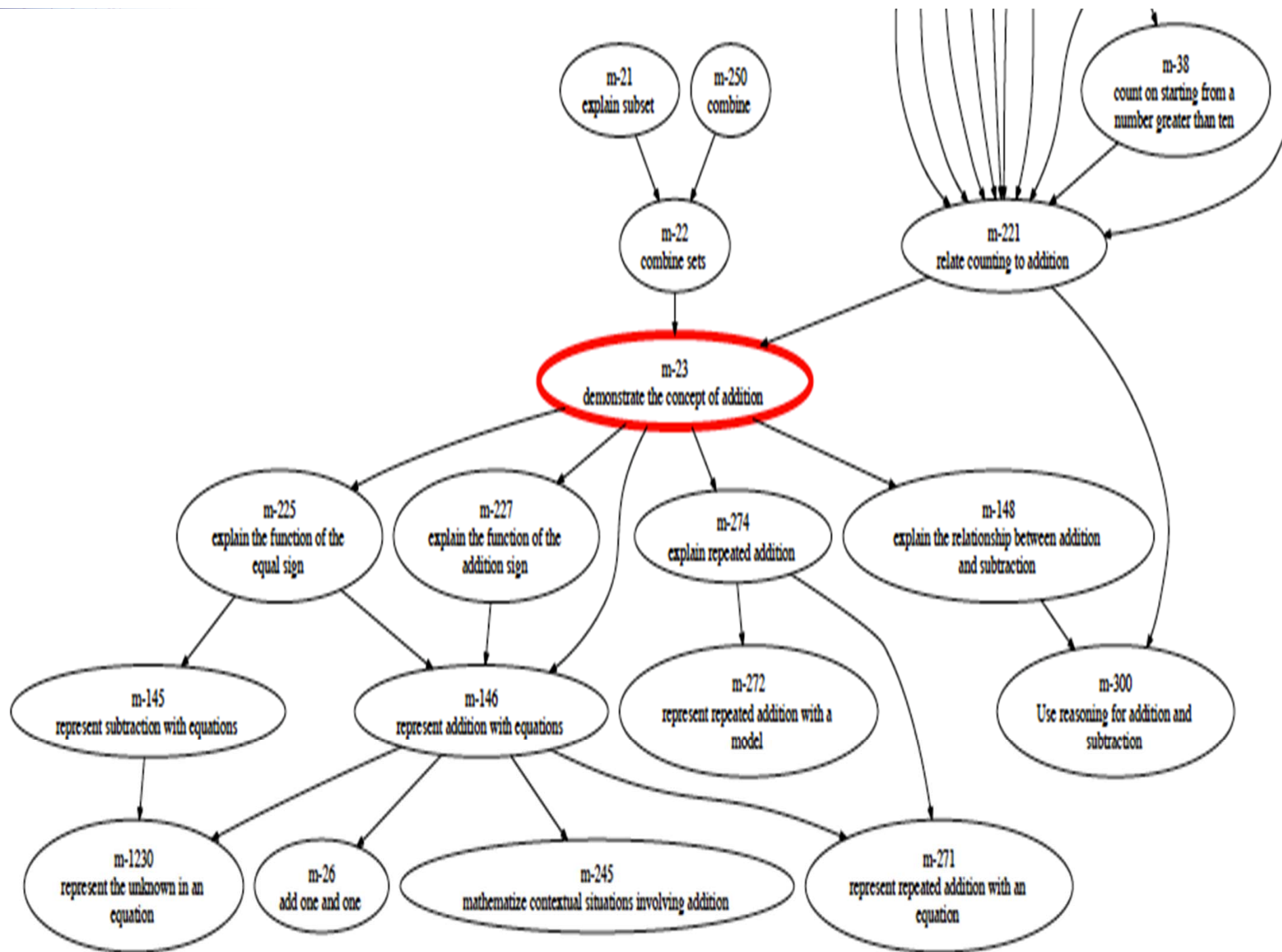


Using object counting or verbal counting to determine an answer

Using known information to logically determine the

Efficient (fast and accurate) production of answers

Baroody, 2006



Node Creation Informed by...

- *Common Core State Standards provide Framework for Literature Review...*
 - **Cognitive development** (Does this standard require that the student has undergone developmental growth?)
 - **Curricular** (Does it represent new learning goals within the scope and sequence of a domain?)
 - **Instruction** (Does the standard's acquisition require instructional scaffolds or particular instructional strategies?)
 - To achieve....
 - Concepts
 - Skills
 - Schema/Representation



What other concepts and skills are related to the nodes in the progression provided to your table?

- Create nodes to represent precursor or intermediate concepts and skills.
- Draw relevant connections between the nodes.

Draw upon your experiences working with teachers and students, knowledge of curricular materials, and your own mathematical understanding.

Discussion

- What differences did you notice between your draft and the draft DLM?
- What did you learn?

Discussion

- How could this information benefit teaching and learning?
 - Mathematics Knowledge for Teaching
 - Instructional practice
 - Data-based decision making
- What professional development activities will foster appropriate instructional use of the DLM?

Keeping up with the project

www.dynamiclearningmaps.org