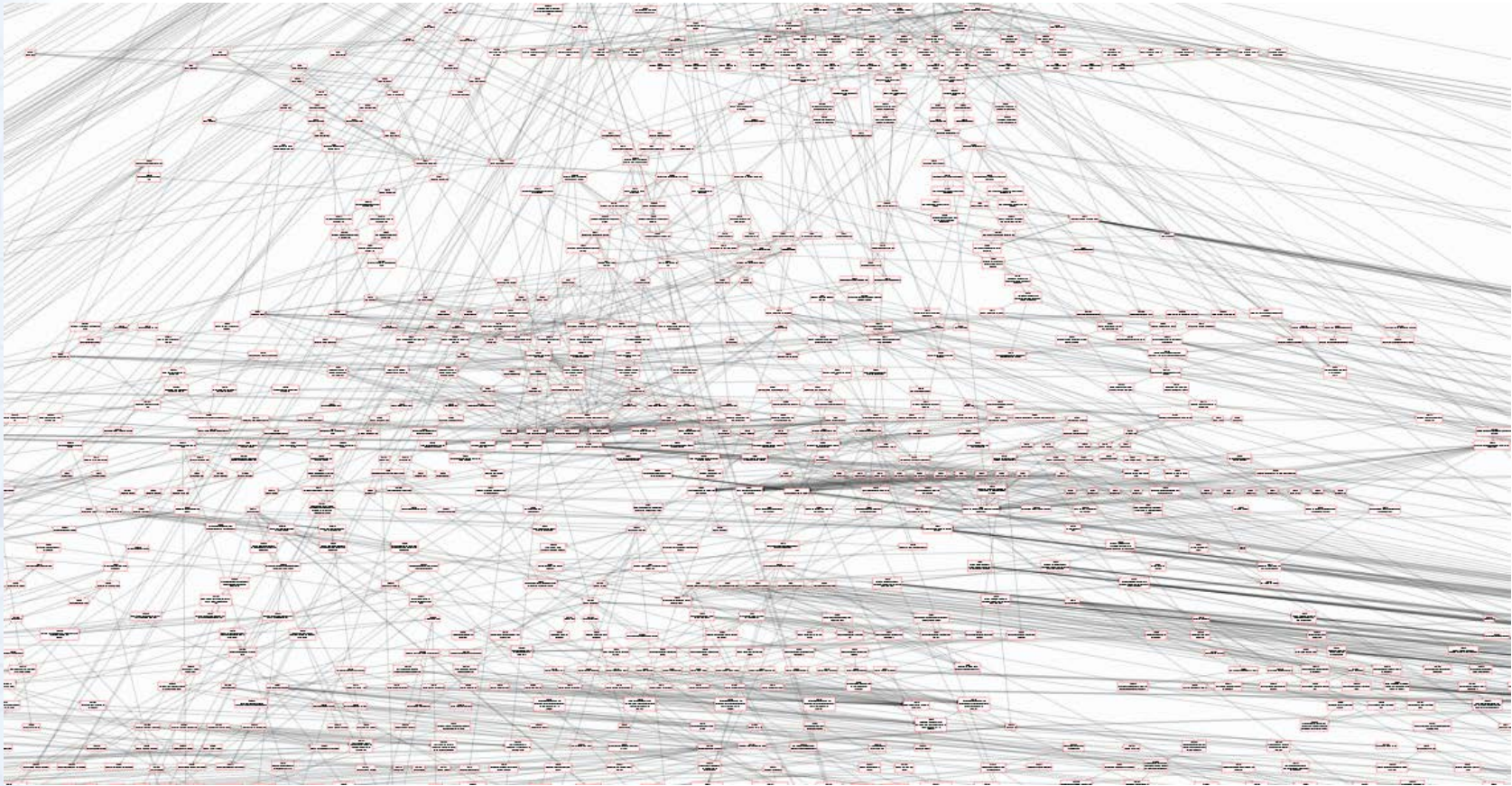# Nature of Standards And Measuring Growth On a Test Based on Diagnostic Classification Modeling

Neal Kingston
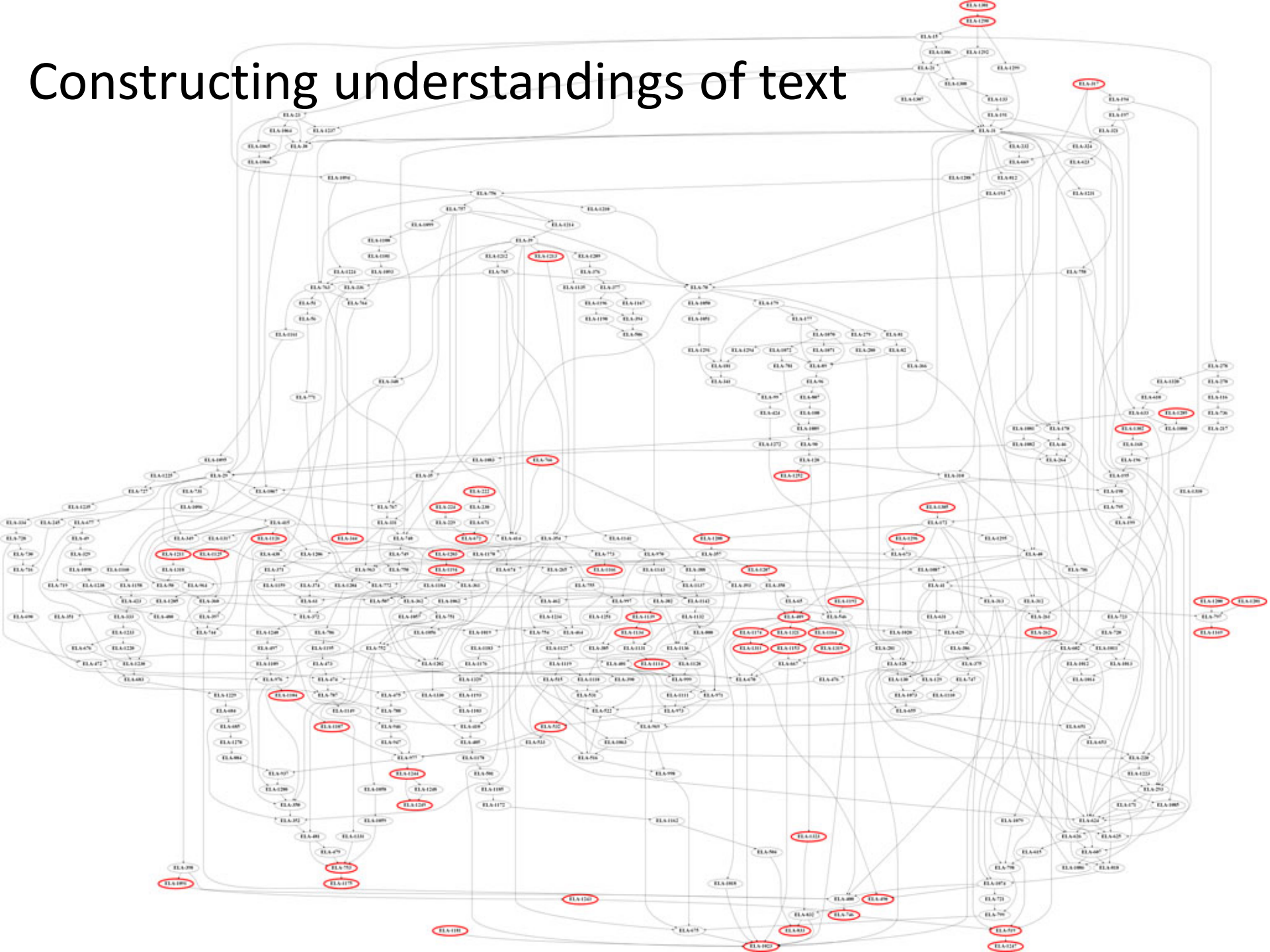
SOME BACKGROUND

A Portion of the Math Map

Constructing understandings of text

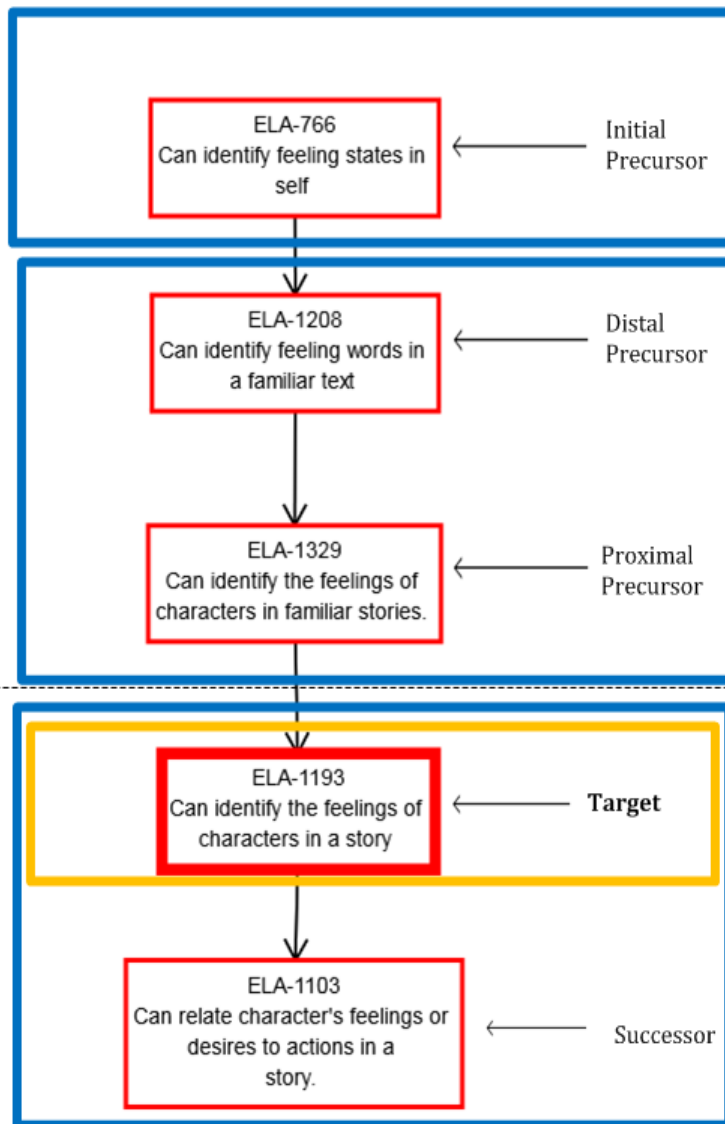| English Language Arts	
Major Claims	Conceptual Areas
Students can comprehend text in increasingly complex ways	Determining critical elements of text
	Constructing understandings of text
	Integrating ideas and information from text
Students can produce writing for a range of purposes and audiences	Using writing to communicate
	Integrating ideas and Information in writing
Students can communicate for a range of purposes and audiences	Using language to communicate with others
	Clarifying and contributing to discussion
Students can investigate topics and present information	Using sources and information
	Collaborating and presenting ideas

Feelings of Characters

ELA.EE.RL.3.3 Identify the feelings of the characters in a story

EE.RL.3.3-Identify the feelings of characters in a story.

Items Embedded and/or at Conclusion

Items Embedded in Text

Items Embedded in Text

ELA-766 Can identify feeling states in self	Initial Precursor
ELA-1208 Can identify feeling words in a familiar text	Distal Precursor
ELA-1329 Can identify the feelings of characters in familiar stories.	Proximal Precursor
ELA-1193 Can identify the feelings of characters in a story	**Target**
ELA-1103 Can relate character's feelings or desires to actions in a story.	Successor

Familiar Text

Unfamiliar Text

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Testlets in Linkage Levels

Connect the map...

...to the items developed.

Initial Precursor	→ Behavior → Testlet IP
Distal Precursor	→ Behavior → Testlet DP
Proximal Precursor	→ Behavior → Testlet PP
Target	→ Behavior → Testlet T
Successors	→ Behavior → Testlet S

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DYNAMIC LEARNING MAPS
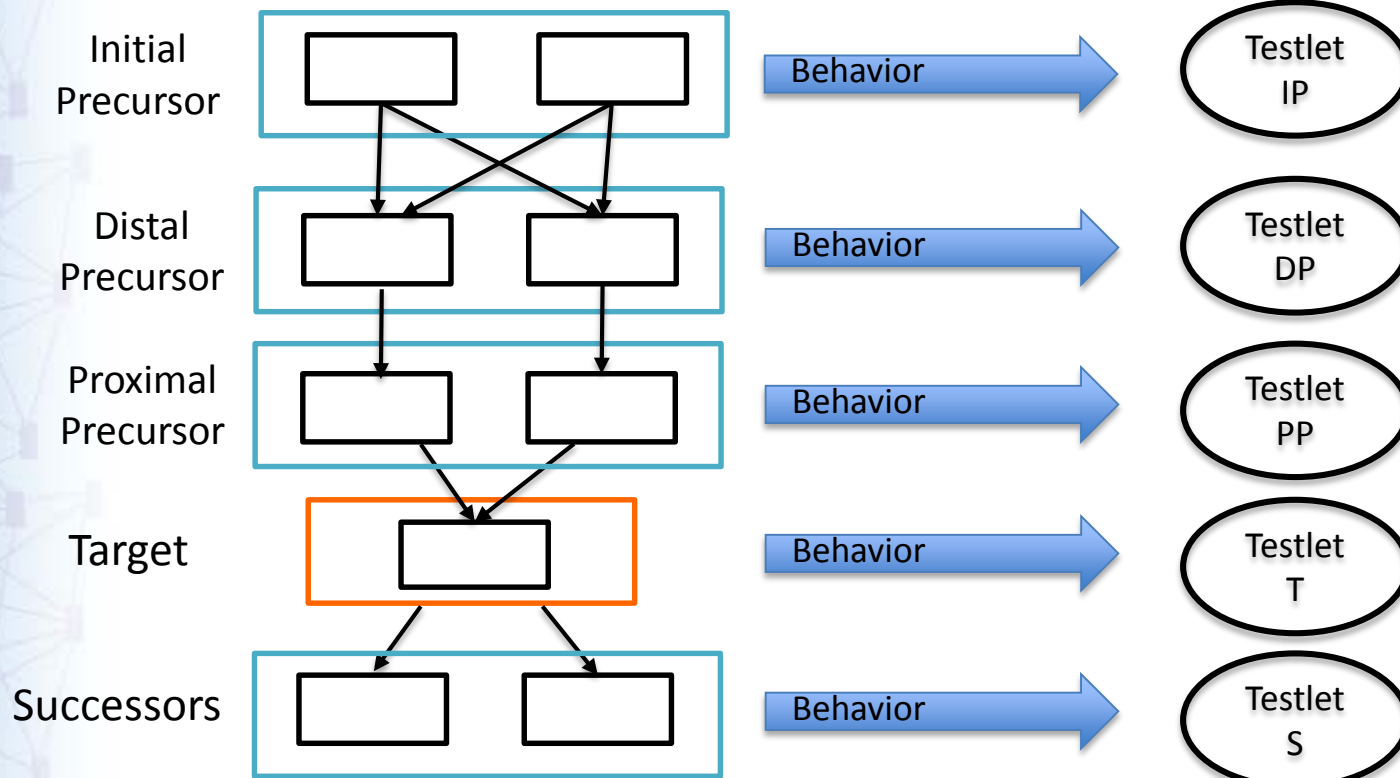
Fractions

M.EE.3.NF1-3
Differentiate a
fractional part from a
whole

F-62
attend

F-13
recognize some — Initial

F-69
recognize wholeness

F-84
recognize separateness

Distal

F-38
explain set

F-59
explain subset

F-72
partition sets

M-248
partition shapes

M-2392
partition length — Proximal

M-561
explain part-whole relationship

M-2633
explain unit fraction — Target

M-2411
recognize fraction

M-2538
recognize whole on a length model

M-2537
recognize whole on an area model

M-2539
recognize whole on a set model

Successor

M-2349
recognize one half on a length model

M-2350
recognize one half on an area model

M-2348
recognize one half in a set model

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Education Programs

STANDARD SETTING

DLM Guiding Principles

- Results are based on mastery classification at the linkage level rather than scale scores
  - Are the risks of false positives and false negatives unequal?
- Standard setting needs to aggregate dichotomous classifications of mastery
  - Total number of linkage levels mastered
- A student-based approach is likely more appropriate than an item-based approach
  - No use of fixed forms

Three judgments must be made

- Probability necessary to determine node mastery
- Percent of nodes that must be mastered within a linkage level
- Number of linkage levels that must be mastered for a given performance level

Proposed Approach

- Body of work
  - Parallel procedures outlined in Kingston & Tiemann, 2012
- Generalized holistic
- Profile method

Materials

- **Profiles across spectrum for number of linkage levels mastered**
  - Exemplars selected from among most common in data (by May 13, 2015)
  - Multiple profiles provided at each number mastered
- **Node reference booklets**
- **Example testlets at two linkage levels**
- **Copies of Performance Level Descriptors**

Area	Grade Level Expectation		Level				
			1	2	3	4	5
Determining Critical Elements of Text	RL.3.1 — Answer who and what questions to demonstrate understanding of details in a text.		Attend to object characteristics	Identify familiar people, objects, places, and events	Answer who and what questions and identify details in a familiar story	Answer who and what questions about story details	Answer who, what, when, and where questions about story details
	RL.3.2 — Associate details with events in stories from diverse cultures.		Seek absent objects	Identify familiar people, objects, places, or events	Associate details with events in a familiar story	Associate details with events in diverse stories	Recount diverse stories with key details
	RL.3.3 — Identify the feelings of characters in a story.		Identify feeling states in self	Identify feeling words	Identify the feelings of characters in familiar stories	Identify the feelings of characters in a story	Identify character feelings and relate to actions
	RL.3.5 — Determine the beginning, middle, and end of a familiar story with a logical order.		Express interest in book sharing	Differentiate between text and pictures	Identify details and beginning and end of a story	Determine the beginning, middle, and end of a familiar story with a logical order	Identify beginning and end of a story
	RI.3.1 — Answer who and what questions to demonstrate understanding of details in a text.		Attend to object characteristics	Identify familiar people, objects, places, or events	Identify concrete details in an informational text	Answer who and what questions to demonstrate understanding of details in a text	Identify words related to explicit information
	RI.3.2 — Identify details in a text.		Seek absent objects	Attend to object characteristics	Identify illustrations for familiar text	Identify concrete detail in informational text	Identify explicit details in informational texts
	RI.3.5 — With guidance and support, use text features including headings and key words to locate information in a text.		Seek absent objects	Identify familiar people, objects, places, or events	Identify illustrations that go with a familiar text	Use basic text features to find information	Use specific text features to locate information
Constructing Understandings of Text	RL.3.4 — Determine words and phrases that complete literal sentences in a text.		Attend to object characteristics	Understand words for absent objects and people	Identify similar or opposite word meanings	Use words to complete a sentence from a story	Identify the meaning of an unknown word using basic context
	EE.L.3.5.a — Determine the literal meaning of words and phrases in context.		Attend to object characteristics	Identify familiar people, objects, places, or events	Identify similar or opposite meaning words	Determine literal meaning of words and phrases	Use words to complete meaningful sentences
	L.3.5.c — Identify words that describe personal emotional states.		Identify feeling states in self	Understand common feeling words	Understand and identify feeling words	Identify feeling words for personal state	Describe internal and external character traits
Using Writing to Communicate	W.3.2.a — Select a topic and write about it including one fact or detail.		Seek absent objects	Displays interest in making marks on paper	Can select a topic from familiar choices	Write about a topic by producing facts and details	Independently selects a topic and produces relevant facts and details
	W.3.4 — With guidance and support produce writing that expresses more than one idea.		Directs attention to objects or people	Displays interest in making marks on paper	Produce writing that expresses one idea	Produce writing that expresses more than one idea	Independently produces writing with multiple ideas

Process

1. Training
2. Range finding
3. Pinpointing
4. Analysis of Impact Data
5. Review of Results and Final Decisions

1. Training

- ## Advance training
  - Presentation of general DLM content and introduction to materials

- ## On-site training
  - Specific to grade/content area of panel
  - Includes discussion of PLDs and practice round with materials

2. Range Finding

- Panelists assign performance levels to each profile
- Summary information is shared and group discusses
- Panelists adjust rankings (if needed)
- Logistic regression is used to identify the probability of a profile being classified to each level

3. Pinpointing

- Profiles closest to a probability of .5 are identified to refine the cuts
- Profiles are sorted into two categories to establish cut: those higher in the category and those not
- Panelists share categories and discuss
- Staff use logistic regression to determine final cuts

4. Analysis of Impact Data

- Data collected by May 13, 2015
- Profiles are shared for each performance level using cut points determined in pinpointing
- Impact data is shared to show the number of students who would be classified to each level
- Panelists review and discuss the results within and across grades

5. Review of Results and Final Decisions

- Staff compile the final judgments of panelists and make final recommendation for each level

- DLM TAC evaluates the recommendations and provides feedback

- State partners review the results of the panel process, including recommended cut points within and across grades

TRACKING GROWTH

Tracking Growth

- Raw numbers
  - linkage level mastered
  - nodes mastered
- Student growth percentiles