Alignment of Dynamic Learning Maps Operational Items to Grade-Level Content Standards

Year-End Models of Testing

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Executive Summary

The purpose of this study was to investigate the relationships between the content structures in the Dynamic Learning Maps (DLM) year-end model assessment system and assessment items. A modification of *Links for Academic Learning* alignment methodology (Flowers, Wakeman, Browder, & Karvonen, 2009) was used to evaluate the coherence of the DLM assessment system. A sample of English language arts (ELA) and mathematics 2014-2015 operational testlets from grades 3 through high school were examined. In ELA, a total of 483 testlets and 910 items were examined for alignment. In mathematics, 418 testlets and 835 items were evaluated. The alignment study focused on the following relationships:

1. College and Career Ready (CCR) Standards to Essential Elements (EEs)
2. EE to Target Level Node(s)
3. Vertical Articulation of Linkage Levels Associated with an EE
4. Learning Map Nodes within a Linkage Level and Assessment Items

DLM uses pools of operational testlets and items: (a) instructionally-embedded, (b) integrated spring, (c) year-end, and (d) end-of-instruction. This alignment study only includes findings for the year-end assessments, which include end-of-year (YE) and end-of-instruction (EOI) pools. A detailed description of all pools and testing models is provided in the full report.

Panelists and Training

Six content experts, three with ELA and three with mathematics expertise, served as panelists who evaluated the alignment of the DLM assessment system. Five of the panelists had experience teaching students with disabilities. Two facilitators oversaw all alignment activities over a two-week period. They conducted all training and assisted panelist with questions. Both facilitators have conducted over 15 alternate assessment alignment studies.

All panelists received training on the DLM assessment system and *Links for Academic Learning* procedures. To ensure facilitators and panelists understood the assessment system, Dr. Meagan Karvonen from DLM attended the training to help explain the system and answer clarifying questions. At the beginning of each alignment activity, the team worked together to come to consensus on the alignment of assessment system components. When panelists disagreed, decision rules were made to ensure consistency. The panelists then independently rated a subset of training items for each evaluated relationship (i.e., CCR standard → EE, EE → Target Level Node, linkage levels vertical articulation, and associated learning map node → assessment items) and agreement between panelists was examined. When the panelists reached 90% agreement, each panelist was given specific tasks for coding. Reliability was checked periodically throughout the tasks to ensure consistent ratings. Over 20% of all ratings were independently coded by two panelists, and the exact agreement between panelists ranged from 87% to 96%.

Results

The following results are aggregated at the testlet pool-level. Grade-level results are reported in the full report and reasons for the non-alignment are provided in Appendix A. Content and performance centrality indices are used to examine the alignment of DLM's assessment components. Content centrality is a measure of the degree of fidelity between the content of the target (CCR, EE, Target Level Node; and linkage levels) and the linked target (EE, Target Level Node, linkage level, and items).

Panelists first rated the degree of content centrality between the CCR standards and the EE. Next the content centrality was rated between the EE and the Target Level Node. Finally, the content centrality between the linkage level and the assessment items was evaluated. Panelists rated each pair as having "no link," "far link," or "near link." Performance centrality is the extent to which the performance focus maintains fidelity as designed by DLM and is rated on a 3-point scale (none, some, or all). A 90% confidence interval (CI) was constructed, using binomial exact method based on the beta distribution, for outcome percentages with both the lower (LL) and upper limits (UL) reported for all estimations**.**

Focus 1: Alignment of College and Career Ready Standards and Essential Elements

All EEs identified in the two test blueprints were included in these analyses. The results of content centrality and performance centrality ratings are shown in Table 1. Across all content areas and testlet pools, 81% to 93% of the EEs were rated as maintaining fidelity to the content in the grade-level CCR standards. This is an acceptable level of alignment given the rigor of grade-level standards and the need to provide access for all students with significant cognitive disabilities. At the grade level (not reported in Table 1), ELA YE model grades 4 and 5 were slightly below the 80% threshold and in mathematics YE model, grades 3, 5, 6, and 8 fell below the 80% recommended threshold. All of the end-of-instruction subject areas (e.g. Algebra 1, Geometry), met the 80% criteria, which is remarkable given the complexity and rigor of the CCR standards. For performance centrality, almost all of the EEs that maintained content centrality to CCR standards maintained *some* or *all* of the performance expectations, ranging from 82% to 100%.

Table 1

Content and Performance Centrality of CCR Standards to Essential Elements

Pool	**EE**	**No**		**Far**		**Near**		**Met[1]**		**CI:90%**	
Content Centrality	*N*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	LL	UL
ELA											
Year-End Models-YE	136	25	18%	93	68%	18	13%	111	**82%**	75%	87%
Year-End Models-EOI	38	6	16%	23	61%	9	24%	32	**85%**	71%	93%
Math											
Year-End Models-YE	145	28	19%	106	73%	11	8%	117	**81%**	74%	86%
Year-End Models-EOI	41	3	7%	33	80%	5	12%	38	**93%**	82%	98%
		None		Some		All		Met[1]		CI:90%	
Performance Centrality	*N*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	LL	UL
ELA											
Year-End Models-YE	111	0	0%	95	86%	16	14%	111	**100%**	97%	100%
Year-End Models-EOI	34	6	18%	22	65%	6	18%	28	**82%**	68%	92%
Math											
Year-End Models-YE	117	20	17%	77	66%	20	17%	97	**83%**	76%	88%
Year-End Models-EOI	38	3	8%	28	74%	7	18%	35	**92%**	81%	98%

Focus 2: Essential Element and Target Level Node(s)

Content and performance centrality of the alignment of EEs to Target Level Node(s) are displayed in Table 2. The number of EEs in Table 2 are different from Table 1 because some EEs corresponded to more than one Target Level Node. All EEs were rated as aligned to the Target Level Nodes with most EEs rated as *near* the Target Level Node. Similar results were found for performance centrality. All EEs were rated as meeting *some* or *all* of the performance expectations found in the Target Level Node. These findings suggest a strong alignment between EEs and Target Level Nodes.

Table 2

Content and Performance Centrality of EEs to Target Level Node(s)

Pool	EE	No		Far		Near		Met		CI:90%	
Content Centrality	*N*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	LL	UL
ELA											
Year-End Models-YE	148			11	7%	137	93%	148	100%	98%	100%
Year-End Models-EOI	38					38	100%	38	100%	92%	100%
Math											
Year-End Models-YE	219			54	25%	165	75%	219	100%	99%	100%
Year-End Models-EOI	49			21	43%	28	57%	49	100%	94%	100%

		None		Some		All		Met		CI:90%	
Performance Centrality	*N*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	LL	UL
ELA											
Year-End Models-YE	148			20	14%	128	86%	148	100%	98%	100%
Year-End Models-EOI	38			5	13%	33	87%	38	100%	92%	100%
Math											
Year-End Models-YE	219			50	23%	169	77%	219	100%	99%	100%
Year-End Models-EOI	49			8	16%	41	84%	49	100%	94%	100%

Focus 3: Vertical Articulation of Linkage Levels for each Essential Element

Panelists evaluated linkage levels (i.e., small collections of ordered nodes associated with each Essential Element) to see if they reflected a progression of knowledge, skills, and understandings. For ELA, a total of 147 linkage levels were reviewed by panelists and 120 (82%) were rated as showing a clear progression from Precursor to Successor nodes. The low rating for the 7th grade was due to panelists reporting that the Initial Precursor was not clearly part of the progression in the ordered nodes. For mathematics, 103 linkage levels were reviewed and 99 linkage levels (96%) were rated as demonstrating a clear progression in the ordered nodes. Results of the vertical articulation of the EEs in the linkage level at the grade level are reported in Table 3.

Table 3

Vertical Articulation of Essential Elements in the Linkage Levels for ELA and Mathematics

ELA Linkage Levels				Mathematics Linkage Levels			
Grade	Total	Clear Progression		Grade	Total	Clear Progression	
	N	*N*	%		*N*	*N*	%
3	17	15	88%	3	11	10	91%
4	17	14	82%	4	16	15	94%
5	19	15	79%	5	15	14	93%
6	19	15	79%	6	11	10	91%
7	18	10	56%	7	10	10	100%
8	20	17	85%	8	14	14	100%
9-10	19	17	89%	9	8	8	100%
11-12	18	17	94%	10	9	9	100%
				11	9	9	100%
All	147	120	82%	All	103	99	96%

Focus 4: Learning Map Nodes within a Linkage Level and Assessment Items

Content and performance centrality ratings for the linkage level nodes to the assessment items are reported in Table 4. Almost all items were rated as having *far* or *near* content centrality to the corresponding linkage level node, ranging from 97% to 100%. Similarly, the performance centrality ratings indicated that almost all items maintained the performance expectations found in the corresponding linkage level node.

Table 4

Content and Performance Centrality of Linkage Levels Nodes to Assessment Items

	Pool	EE	No		Far/Some		Near/All		Met		CI	
		N	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*LL*	*UL*
Year-End Models												
Content Centrality	ELA-YE	669	21	3%	34	5%	614	92%	648	97%	96%	98%
	ELA-EOI	241	8	3%	15	6%	218	90%	233	97%	94%	98%
	Math-YE	622	2	<.5%	11	2%	609	98%	620	100%	99%	100%
	Math-EOI	213			2	<.5%	211	100%	213	100%	99%	100%
Performance Centrality	ELA-YE	669	16	2%	66	10%	586	88%	652	97%	96%	98%
	ELA-EOI	241	6	2%	25	10%	210	87%	235	97%	95%	99%

Math-YE	622	2	<.5%	14	2%	606	97%	620	100%	99%	100%
Math-EOI	213			1	<.5%	212	100%	213	100%	99%	100%

Note. Note. [1]Met is the total number of items and percentage rated as far/near (content centrality) or some/all (performance centrality). YE=end-of-year model and EOI=end-of-instruction model.

The percentages of DLM's cognitive process dimensions (CPD) for all ELA and mathematics items are reported in Table 5. Most ELA items were rated at the *Respond* or *Understand* level, and the mathematics items rated mostly at the *Remember* to *Analyze* CPD levels. Most items were located in the middle of the CPD distribution. These results suggest that the items cover a wide range of cognitive complexity.

Table 5
Cognitive Process Dimensions for ELA and Mathematics Items

	ELA-YE (*N*=669)	ELA-EOI (*N*=241)	Math-YE (*N*=622)	Math-EOI (*N*=213)
Pre-intentional				
Attend				
Respond	40%	31%		
Replicate				
Remember	14%	9%	22%	12%
Understand	45%	56%	42%	48%
Apply		4%	21%	23%
Analyze			13%	14%
Evaluate			2%	4%
Create				

Note. YE = year-end, and EOI = end-of-instruction

Summary

DLM designed a year-end assessment system for all students with significant cognitive disabilities to have access to ELA and mathematics grade-level academic content standards. All of the content structures and items demonstrated adequate to strong linkage to the internal structure of the DLM system; starting with the alignment between the CCR standards and the EEs and ending with the learning map nodes and the items. Evidence from this study validated the internal structure of the DLM system.

DLM designed a method of extending CCR standards to provide access to all students with cognitive disabilities. The linkage levels provide a structure for examining students' progression in ELA and

mathematics, which allows for examining growth. Recommendations for strengthening alignment are included in the full report.

Alignment of Dynamic Learning Maps Operational Items to Grade-Level Content Standards

The purpose of this study was to investigate the relationships between the content structures in the Dynamic Learning Maps (DLM) year-end assessment system and the pools of assessment items. Findings from this study inform the degree to which assessment results support claims about what students know and can do in relation to grade-level CCR standards. Using a modification of the *Links for Academic Learning* methodology (Flowers, Wakeman, Browder, & Karvonen, 2009), the degree of content and performance centrality among the components of the DLM system is reported.

Overview of DLM Alternate Assessment System

DLM assessments are designed for students with the most significant cognitive disabilities and are implemented across multiple states. The DLM Alternate Assessment System is based on large, fine-grained learning maps, which are highly connected representations of how academic skills are acquired, as reflected in research literature. Nodes in the maps represent discrete knowledge, skills, and understandings in English Language Arts (ELA) or mathematics, as well as important foundational skills that provide an understructure for the academic skills.

Conceptual areas, which define the knowledge and skills required to meet the broad claims, are regions of the learning map that are organized around common cognitive processes and content. An Essential Element (EE) is located within a conceptual area based on the cognitive processes and skills required to meet the learning target described by the EE. The claims and conceptual areas apply to all grades in the DLM Alternate Assessment System. The alignment study focused the following four relationships:

1. College and Career Ready (CCR) Standards to Essential Elements (EEs)
2. EE to Target Level Node(s)
3. Vertical Articulation of Linkage Levels associated with an EE
4. Learning Map Nodes within a Linkage Level and Assessment Items

The following alignment questions are addressed in this report:

1. Do the EEs contain essential concepts in CCR standards at reduced depth, breadth, and complexity, while maintaining high expectations for students with significant cognitive disabilities at each grade level?
2. Is there a strong link between the content and performance expected in the Target Level Node(s) and the associated EE?
3. Do the nodes at each Linkage Level reflect a progression of knowledge, skills, and understandings that are precursors to and successors of the Target Level Node(s)?
4. Do the items reflect the content and performance expectations in the associated Learning Map Nodes?

The designed relationship among DLM's assessment components that correspond to the four alignment foci and questions are displayed in Figure 1. The numbers on the Figure (e.g., 1, 2, 3, and 4) correspond to the four alignment questions. Definitions for all the terms can be found in the Glossary below.

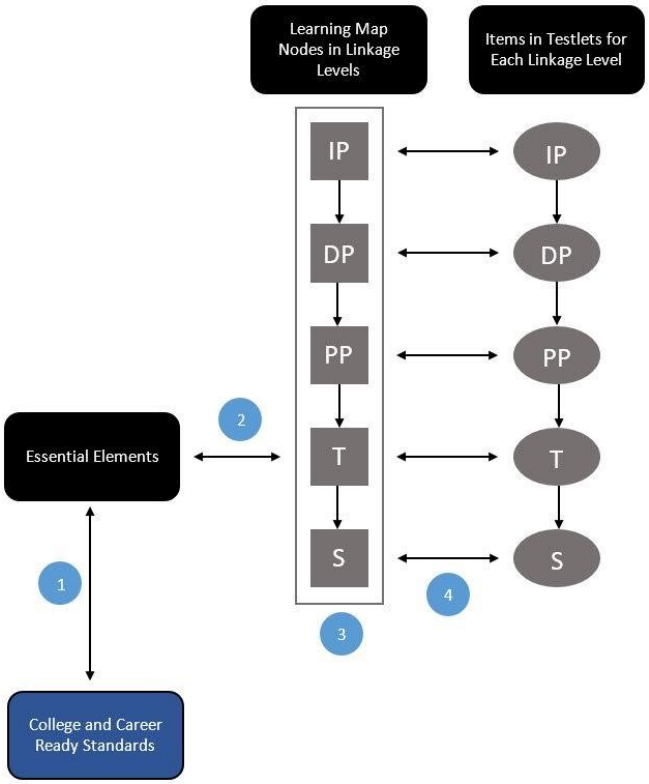

Figure 1. DLM's relationship between the content components and items in the testlets and correspondence to the four alignment questions in this study.

Glossary of Terms

College and Career Ready (CCR) Standards: DLM CCR Standards are based on the Common Core State Standards.

Essential Elements (EEs): DLM EEs are specific statements of knowledge and skills. The purpose of the EEs is to build a bridge from grade-level CCR standards to academic expectations for students with the most significant cognitive disabilities. DLM EEs related to a particular claim and conceptual area clearly link to one another, while the learning map must reflect how knowledge within a claim or conceptual area is acquired.

Nodes: Nodes represent the discrete knowledge, skills, and understanding and provide an understructure for the academic skills.

Linkage Level Nodes: The small collections of ordered nodes are called linkage level nodes. The Target Level Node reflects the grade-level expectation in the EE. There are three levels below the target and one level beyond the target:

1. Initial Precursor
2. Distal Precursor
3. Proximal Precursor
4. Target
5. Successor

Nodes in these five linkage levels are the basis for developing assessment items. The nodes and their relationships are described in mini-maps that item writers use during test development.

Learning Maps: Learning maps are highly connected representations of how academic skills are acquired, as reflected in research literature. The maps are not traditional learning progressions, but include multiple and alternate pathways by which students may develop content knowledge.

Testlets and Items: DLM assessments are delivered as a series of testlets, each of which contains an unscored engagement activity and 3-8 items for a single Linkage Level. Assessment items are written to align to nodes at one of the five linkage levels.

Integrated Model for Testing: Two general testing windows are available. Instructionally-embedded assessment occurs throughout the fall, winter, and early spring. Teachers have some choice of which EEs to assess, within constraints, and may also choose the linkage level for assessment. The system recommends a linkage level for each Essential Element based on the teacher's completion of a First Contact survey that includes questions about students' academic performance and expressive communication. The teacher may accept that recommendation or choose another level. During the spring testing window, all students are re-assessed on several EEs on which they were taught and assessed earlier in the year (referred to as integrated-spring). During the spring window the system assigns the linkage level based on student performance on previous testlets. Scores used for summative purposes are based on mastery estimates for each EE and linkage level at the end of the year (i.e., including their performance on all instructionally-embedded and integrated-spring testlets). The pools of operational assessments for the instructionally embedded and spring windows are separate. The integrated model for testing alignment findings are not included in this report.

Year-End (YE) Model for Testing: In the year-end model, there is a single operational testing window in the spring. All students take testlets that cover the whole year-end model blueprint. Each student is assessed at one linkage level per EE. The initial testlet linkage level is determined by the DLM assessment system in response to the teacher's completion of a First Contact survey that includes questions about the students' academic performance and expressive communication, and an Access Profile detailing the students' accessibility needs. The linkage level for each succeeding testlet varies based on student performance on previous testlets that assessed other EEs. The test results reflect the student's performance at the end of each school year and are used for accountability purposes. The instructionally embedded assessments are available at other times during the year but are optional and do not count toward summative results. This study examined the alignment of the year-end model.

End-of-Instruction (EOI) Model: In two states, the high school blueprints are based on end-of-instruction courses rather than specific grades. The EOI model is evaluated in this alignment study.

Alignment Methodology

The criteria used in this alignment study were developed by the *National Alternate Assessment Center* (NAAC). This report is organized by the two alignment criteria for alternate assessments developed by a collaboration of content experts, special educators, and measurement experts (Flowers, Wakeman, Browder, & Karvonen, 2009). The two criteria are:

(1) The focus of achievement maintains fidelity with the content of the original grade-level standards (content centrality) and when possible, the specified performance (performance centrality); and
(2) The Cognitive Process Dimensions (CPD) differs from grade-level CPD found in content targets, but maintains high expectations for students with significant cognitive disabilities.

Content and Performance Centrality Ratings

The alignment indices and evaluation questions are shown in Table 1. The definition of each index is described in the following sections.

Table 1
Alignment Indices Addressed in DLM Alignment Study

	Evaluation Questions
1. Content Centrality	To what extent does the content focus in the CCRs to EEs, EEs to Target Level Node(s), and associated learning map node to assessment items maintain fidelity as designed by DLM?
2. Performance Centrality	To what extent does the performance focus in the CCRs to EEs, EEs to Target Level Node(s), and associated learning map node to assessment items maintain fidelity as designed by DLM?
3. Cognitive Process Dimensions (CPD)	Do the CPD levels in the assessment item reflect a full range of CPD levels and include challenging academic expectations for students with significant cognitive disabilities?

Content centrality is a measure of the degree of fidelity between the content of the target (CCR, EE, Target Level Node; and linkage levels) and the linked target (EE, Target Level Node, linkage level, and items). For example, an EE requiring students to "identify and define parts of speech" and an academic grade-level content target requiring students to "correctly use parts of speech" would have the same content ("parts of speech"), even though the performance is different ("identify and define" vs. "correctly use"). An EE requiring students to "identify and define parts of speech" and an academic grade-level content target requiring students to "identify and define different punctuation marks" would not have the same content ("parts of speech" vs. "punctuation marks"), although they do have the same performance ("identify and define").

The content centrality rubric applied in this study appears below in Table 2. Panelists first rated the degree of content centrality between the CCR standards and the EE. Next the content centrality was rated between the EE and the Target Level Node. Finally, the content centrality between the linkage level and the assessment items was evaluated. Panelists rated each pair as having "no link," "far link," or "near link." For any rating of "no link," researchers asked panelists to provide a rationale as one of three choices; mismatch, overstretch, or backmapping. A mismatch occurs when the content of the target does not match the linked target. An overstretch occurs when the content of the target is "watered down" and no longer resembles the standard it is linked to (i.e., is two or more grade levels below the linked target). Backmapping occurs when the content of the target does not address content in any grade level standard and is considered a functional activity that is retrofitted to the standard. Content centrality ratings of "far link" and "near link" maintain content fidelity. The alternate expectations for achievement may include a focus on prerequisite skills or some partial attainment of the grade-level

content standards, but students should still have the opportunity to meet high expectations found in grade-level content standards. LAL identifies an acceptable level of content centrality as 80%, which allows for most items to demonstrate linkage to challenging standards but also allows for the examination of prerequisite skills needed to assess growth within and across grades.

Table 2
Content Centrality Rubric

Rating		**Description**
0	No Link	The item/element measures NONE of the content of the academic grade-level content target
1	Far Link	The item/element PARTIALLY MATCHES the performance of the academic grade-level content target and is acceptable for alternate assessments alignment
2	Near Link	The same content is present in the item/element and the academic grade-level content target

Performance centrality represents the degree to which the operational assessment item and the corresponding academic grade-level content target contain the same performance expectation. For example, an EE requiring students to "identify and define parts of speech" and a CCR academic standard requiring students to "identify and define different punctuation marks" would have the same performance expectation ("identify and define"), although the content is different. An EE requiring students to "identify and define parts of speech" and a CCR requiring students to "correctly use parts of speech" would not have the same performance expectation ("identify and define" vs. "correctly use"), although they do have the same content ("parts of speech"). The panelists rated the degree of performance centrality between each component pair as "none," "some," or "all" (see Table 3). Because it is expected that alternate assessments based on alternate academic achievement standards (AA-AAAS) will reduce the breadth and cognitive complexity found in the general assessment, it is expected that a lower level of performance centrality would be found than what is expected for content centrality, but no recommended acceptable level of performance centrality is provided for alternate assessments A 90% confidence interval (CI) is reported for outcome percentages, and was calculated using binomial exact method based on the beta distribution. Both lower limit (LL) and upper limit (UL) are reported for all outcome estimates.

Table 3
Performance Centrality Rubric

Rating		Description
0	None	None of the performance expectations found in the item are evident in the associated academic content target
1	Some	Some of the performance expectations found in the item are evident in the associated academic content target

2	All	The performance expectations found in the items are the same as the expectations in the associated academic content target

Vertical Articulation of Linkage Level Nodes

For the linkage levels, vertical articulation was examined. The goal was not to determine whether the linkage levels reflected the "best" progression or a complete sequence. By design, mini-maps do not show complete progressions and do not show all of the pathways by which students may reach targets. For each EE in the blueprints, the alignment study evaluated the relationships between nodes at the five linkage levels to ensure they were one possible progression as identified by content specialists.

For this alignment study, panelists used their professional judgment to determine whether the ordering of linkage levels reflected an acceptable progression before and after the target. Progressions between linkage levels may exist either because (a) there is an appropriate increase in the cognitive complexity of the skills described by the nodes assigned to the linkage levels or (b) a node or nodes at a lower linkage level represent clear prerequisite knowledge or skills for a node or nodes at a higher linkage level.

For each EE, the alignment study evaluated whether the linkage levels followed a logical order based on the two criteria listed above. When panelists determined that one or both of the two criteria were not met (i.e., either the nodes were not distinguishable across two linkage levels or the nodes were believed to be in reverse order), the location of the problem (e.g., distal to proximal) was identified. Vertical articulation was done as consensus rather than individual panelist ratings.

Cognitive Process Dimensions (CPD)

AA-AAAS are not expected to have the same cognitive process dimensions as those found in grade-level standards, but the designed items in alternate assessments should include high expectations. In evaluating an acceptable level for the cognitive processing, it is desirable to have items distributed across a range of processes starting with the Attend level, which allows access for students at different levels of complexity. The cognitive process dimensions used in the DLM system are shown in Table 4. When items may require more than one cognitive process, the highest process is the one assigned to the item.

Table 4
Cognitive Process Dimensions

Process	Definitions
Pre-intentional	Behavior reflects a general state but does not reflect intentional behavior. Intent is inferred by others (e.g., teachers, parents) through facial expressions, movements, or sounds. This level is not assessed by DLM.
Attend	Orients to objects, people or activity. Indicates selective attention to stimuli in the academic learning environment.
Respond	Intentional response using any mode of expression. Indicates joint attention to materials and activities in the academic learning environment.
Replicate	Perform rote task in familiar or practiced context.
Remember	Retrieve relevant knowledge from long-term memory in a novel context.
Understand	Construct meaning from instructional messages, including oral, written, and graphic communication.
Apply	Carry out or use a procedure in a given situation.
Analyze	Break material into its constituent parts and determine how the parts relate to one another and to an overall structure or purpose.
Evaluate	Make judgments based on criteria and standards.
Create	Put elements together to form a coherent or functional whole; reorganize elements into a new pattern or structure.

Note. Based on Charity Rowland's work on Pre-Intentional Behavior (http://www.communicationmatrix.org/sevenlevels.aspx).

Modifications in Alignment Method for DLM

Alignment involves evaluating the correspondence between student learning standards and test content (American Educational Research Association, American Psychological Association, & National Council on Measurement in Education, 2014). Traditional alignment methods examine the alignment between the grade-level academic content standards and the assessment items. This study did not provide evidence of the direct link between grade-level standards and the DLM assessment testlets/items, but provided evidence of indirect links that are used in the DLM system to provide access for students with significant cognitive disabilities. AA-AAAS must be aligned to states' grade-level academic content standards, but they may assess the grade-level academic content standards with reduced breadth and cognitive complexity than general assessments (US Department of Education, 2015). This study examined the DLM test design, as implemented, to evaluate the assessment components for adequate linkage to the academic grade-level content targets the assessments are designed to measure.

Number of Essential Elements, Target Level Nodes, Linkage Levels, and Items Sampled in Study

The number of EEs, Target Level Nodes, linkage levels, testlets, and assessment items examined in this study are reported in Table 5. Approximately 45% of all DLM items were examined in this study. Results are organized by testlet pool.

Table 5
Number of Essential Elements, Target Level Nodes, Linkage Levels, and Items

Testlet Pool	EE	Target-Nodes	Linkage Levels	Items
	N	*N*	*N*	*N*
ELA – YE	136	148	147	669
ELA - EOI	34	38	37	241
Math - YE	145	219	103	622
Math - EOI	38	49	26	213

Panelists, Training, Reliability of Codes, and Quality Control Check

The alignment team consisted of three ELA experts, three mathematics experts, and one measurement expert. Content experts, who served as panelists who evaluated the alignment, had a range of K-12 experience of 8 to more than 17 years. Five of the panelists had experience teaching special education with at least one expert having experience in every grade, K-12. All panelists held a doctoral degree in their area of expertise, and had participated in conducting professional development related to their content area, as well as taught teachers in higher education in their respective areas. In addition, one panelist was certified by the National Board of Professional Teaching Standards, and two panelists held leadership roles in their school or district. Finally, four of the panelists had been item writers for their state's general and special education assessments, and four had previously worked on alignment studies.

Training was provided by ACERI Partners, LLC, and DLM staff regarding the DLM assessment system prior to starting the alignment work." Materials and resources were reviewed throughout the study to promote understanding of the system. At the beginning of each alignment activity, the team worked together to come to a consensus on the alignment of educational components. When panelists disagreed, decision rules were made to ensure consistency. Then the panelists independently rated a training subset of alignment tasks for each evaluated relationship (i.e., CCR standard → EE, EE → Target Level Node, linkage levels vertical articulation, and associated learning map node → assessment items) and agreement between panelists was examined. When the panelists agreed 90%, each was given specific tasks. Reliability was checked periodically throughout the tasks to ensure consistent ratings.

Interrater reliability was examined by having approximately 20% of all ratings scored independently by two panelists. To provide evidence of the reliability of expert ratings, at least 20% of all materials rated were independently read by a second rater and coded. The table below indicates the percentage of components that received a second read and the percentage of exact agreement between the initial rater and the second rater. The percentage of agreement for the Linkage Level ratings was not reported, as vertical articulation was rated thorough group consensus. The percent of exact agreement ranged from 87% to 96%.

Table 6

Number of Double Coded Components, Agreement, and 90% Confidence Interval

	ELA					Math				
	Agree	Total	**Agree**	CI:90%		Agree	Total	**Agree**	CI:90%	
	N	*N*	***%***	LL	UL	*N*	*N*	***%***	LL	UL
CCR to EE	71	82	**87%**	79%	92%	70	77	**91%**	83%	96%
EE to Target	77	86	**90%**	83%	94%	68	75	**91%**	83%	96%
Items to Node										
YE	134	139	**96%**	91%	99%	113	130	**87%**	82%	91%
EOI	66	70	**94%**	86%	98%	65	75	**87%**	79%	92%

Note. LL is the lower limit and UL is the upper limit for the percentage agreement based on a 90% confidence interval (CI).

The panelists' individually rated forms were compiled into spreadsheets for data analysis. Entered data was verified (100%) for accuracy of data entry. All errors or missing information from the recorded forms was corrected.

A quality control check was conducted as a part of this alignment study. Two members of ACERI staff who have been trained in LAL and have experience conducting alignment studies reviewed all of the data as an outside check of the coding. This check ensured the coding maintained consistency and was transferred appropriately from independent coding sheets to master sheets. Additionally, an ACERI staff member attended one of the coding sessions to review and observe the consensus process. All procedures and coder-developed rules were appropriate. Furthermore, coders were asked to complete an anonymous survey related to the process and their impressions of whether their input was valued, and about the overall final judgments for each step of alignment determination (CCR→EE, EE→Target Level Node). All of the reviewers agreed or strongly agreed that the process led to an acceptable final rating and valid information. Survey results are displayed in Appendix B.

Alignment Results

The alignment results are organized by alignment focus. The alignment study evaluated the following four relationships:

1. College and Career Ready (CCR) Standards to Essential Elements (EEs)
2. EE to Target Level Node(s)
3. Vertical Articulation of Linkage Levels Associated with an EE
4. Learning Map Nodes within a Linkage Level and Assessment Items

States that use the DLM alternate assessment participate in one of two models, the integrated model or the year-end model. In this study, only the year-end models were examined. In the year-end model, there are two pools of testlets/items, which include year-end (YE) and end-of-instruction (EOI).

Focus 1: Alignment of College and Career Ready Standards and Essential Elements

The following alignment question was examined for focus 1: *Do the EEs contain essential concepts in CCR standards at reduced depth, breadth, and complexity, while maintaining high expectations for students with significant cognitive disabilities at each grade level?* Measures of content and performance centrality were estimated to examine this alignment question.

Content Centrality

Content panelists rated content centrality on a three-point scale measuring the degree of alignment (*No Link, Far Link,* and *Near Link*). Content centrality ratings for the alignment between CCR standards and EEs for ELA are reported in Table 7. Most EEs were rated as *far link* (ranging from 53% to 82%). Both 4th and 5th grade had the highest rate of EEs that were rated *no link* (ranging from 24% to 29%). Overall for ELA across all testing models, panelists rated at least 80% of all grade-levels EEs as a *far* or *near* link to the CCR standards except for ELA grades 4 and 5. The most common reason for the lack of content centrality reported by the panelists was the EE was a mismatch to the skill in the CCR standards (17 of 25 EEs). For example, a mismatch is evident in the EE "Use end punctuation when writing a sentence or question" and the CCR standard was "Use a comma to separate coordinate adjectives (e.g., It was a fascinating, enjoyable movie; He wore an old[,] green shirt)." A list of *no link* EEs are found in Appendix A.

Table 7
ELA Content Centrality of CCR Standards to Essential Elements

	Grade	EE	No		Far		Near		Met[1]			
Year-End Models		*N*	*N*	%	*N*	%	*N*	%	*N*	%	LL	UL
YE	3rd	17	2	12%	14	82%	1	6%	15	**88%**	67%	98%
	4th	17	4	24%	11	61%	2	11%	13	**76%**	54%	92%
	5th	17	5	29%	9	53%	3	18%	12	**71%**	48%	88%
	6th	16	3	19%	11	69%	2	13%	13	**81%**	58%	95%
	7th	18	2	11%	13	72%	3	17%	16	**89%**	69%	98%
	8th	17	3	18%	13	76%	1	6%	14	**82%**	60%	95%
	9th – 10th	17	3	18%	9	53%	5	29%	14	**82%**	60%	95%
	11th	17	3	18%	13	76%	1	6%	14	**82%**	60%	95%
	All	136	25	18%	93	68%	18	13%	111	**82%**	75%	87%
EOI	ELA2	17	3	18%	9	53%	5	29%	14	**82%**	60%	95%
	ELA3	17	3	18%	13	76%	1	6%	14	**82%**	60%	95%

	All	34	6	18%	22	65%	6	18%	28	**82%**	68%	92%

Note. [1]Met is the total number of items and percentage rated as far or near.

In mathematics, four of the nine grades year-end test EEs had less than 80% meeting content centrality criteria. The reason for the lack of content centrality reported by panelists was due to the EE not matching the appropriate CCR standard (coded as a mismatch). For example, in grade 5 the EE was "Interpret data from a picture or bar graph" and the CCR standard was "Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots." All of the end-of-instruction subject areas met the 80% criteria, which is remarkable given the complexity and rigor of the CCR standards.

Table 8

Mathematics Content Centrality of CCR Standards to Essential Elements

	Grade	EE	No		Far		Near		Met			
YE		*N*	*N*	%	*N*	%	*N*	%	*N*	%	LL	UL
	3rd	14	4	29%	10	71%		0%	10	**71%**	46%	90%
	4th	18	2	11%	16	89%		0%	16	**89%**	69%	98%
	5th	20	5	25%	15	75%		0%	15	**75%**	54%	90%
	6th	17	6	35%	9	53%	2	12%	11	**65%**	42%	83%
	7th	19	3	16%	14	74%	2	11%	16	**84%**	64%	96%
	8th	16	5	31%	9	56%	2	13%	11	**69%**	45%	87%
	9th	10	1	10%	8	80%	1	10%	9	**90%**	61%	99%
	10th	13	1	8%	8	62%	4	31%	12	**92%**	68%	100%
	11th	18	1	6%	17	94%		0%	17	**94%**	76%	100%
	All	145	28	19%	106	73%	11	8%	117	**81%**	74%	86%
EOI	Alg1	10	1	10%	8	80%	1	10%	9	**90%**	61%	99%
	Alg2	13	1	8%	8	62%	4	31%	12	**92%**	68%	100%
	Geom	18	1	6%	17	94%		0%	17	**94%**	76%	100%
	All	41	3	7%	33	80%	5	12%	38	**93%**	82%	98%

Performance Centrality

Performance centrality concerns the level of expected performance of the standards. Ratings are made on a three-point scale (none, some, all) based on the degree of match between the EE and the CCR standards. ELA performance centrality results are reported in Table 9. In ELA, all the EEs were rated as having *some* or *all* of the performance expectations found in CCR standards.

Table 9

ELA Performance Centrality of CCR Standards to Essential Elements

	Grade	EE	None		Some		All		Met			
Year-End Models		*N*	*N*	%	*N*	%	*N*	%	*N*	%	LL	UL
YE	3rd	15			15	100%		0%	15	**100%**	82%	100%
	4th	13			6	46%	7	54%	13	**100%**	79%	100%
	5th	12			7	58%	5	42%	12	**100%**	78%	100%
	6th	13			12	92%	1	8%	13	**100%**	79%	100%
	7th	16			13	81%	3	19%	16	**100%**	83%	100%
	8th	14			14	100%		0%	14	**100%**	81%	100%
	9th – 10th	14			14	100%		0%	14	**100%**	81%	100%
	11th	14			14	100%		0%	14	**100%**	81%	100%
	All	111			95	86%	16	14%	111	**100%**	97%	100%
EOI	ELA2	14			14	100%		0%	14	**100%**	81%	100%
	ELA3	14			14	100%		0%	14	**100%**	81%	100%
	All	28			28	100%			28	**100%**	90%	100%

In mathematics, 63% to 100% of the EEs had *some* or *all* performance expectations found in CCR standards. Recall that AA-AAAS are not expected to meet a specific level for performance centrality, and the results are reported for descriptive purposes only.

Table 10

Math Performance Centrality of CCR Standards to Essential Elements

	Grade	EE	None		Some		All		Met			
YE		*N*	*N*	%	*N*	%	*N*	%	*N*	%	LL	UL
	3rd	10			10	100%			10	**100%**	74%	100%
	4th	16	6	38%	5	31%	5	31%	10	**63%**	39%	82%
	5th	15	1	7%	11	73%	3	20%	14	**93%**	72%	100%
	6th	11	3	27%	6	55%	2	18%	8	**73%**	44%	92%
	7th	16	5	31%	10	63%	1	6%	11	**69%**	45%	87%
	8th	11	2	18%	7	64%	2	18%	9	**82%**	53%	97%
	9th	9			7	78%	2	22%	9	**100%**	72%	100%
	10th	12	1	8%	8	67%	3	25%	11	**92%**	66%	100%
	11th	17	2	12%	13	76%	2	12%	15	**88%**	67%	98%
	All	117	20	17%	77	66%	20	17%	97	**83%**	76%	88%

EOI	Alg1	9			7	78%	2	22%	9	**100%**	72%	100%
	Alg2	12	1	8%	8	67%	3	25%	11	**92%**	66%	100%
	Geom	17	2	12%	13	76%	2	12%	15	**88%**	67%	98%
	All	38	3	8%	28	74%	7	18%	35	**92%**	81%	98%

Focus 2: Alignment of Essential Element and Target Level Node(s)

The following alignment question was examined for Focus 2: *Is there a strong link between the content and performance expected in the Target Level Node(s) and the associated Essential Element?* Measures of content and performance centrality were estimated to examine this alignment question.

Content Centrality

The content centrality of ELA and Mathematics EEs to Target Level Nodes results are reported in Tables 11 and 12. All the EEs across all content areas and grades were rated as having a *far* or *near* link to the Target Level Node. In fact, most of the ELA EEs were rated as *near* the Target Level Node (71% to 100%) suggesting they have the same content. This suggests a strong alignment between the associated EEs and the Target Level Nodes.

Table 11
ELA Content Centrality of Essential Elements to Target Level Nodes

	Grade	EE	No		Far		Near		Met			
Year-End Models		*N*	*N*	%	*N*	%	*N*	%	*N*	%	LL	UL
YE	3rd	17			1	6%	16	94%	17	**100%**	84%	100%
	4th	17			5	29%	12	71%	17	**100%**	84%	100%
	5th	19			3	16%	16	84%	19	**100%**	85%	100%
	6th	19			2	11%	17	89%	19	**100%**	85%	100%
	7th	18					18	100%	18	**100%**	85%	100%
	8th	20					20	100%	20	**100%**	86%	100%
	9th – 10th	19					19	100%	19	**100%**	85%	100%
	11th	19					19	100%	19	**100%**	85%	100%
	All	148			11	7%	137	93%	148	**100%**	98%	100%
EOI	ELA2	19					19	100%	19	**100%**	85%	100%
	ELA3	19					19	100%	19	**100%**	85%	100%
	All	38					38	100%	38	**100%**	92%	100%

Table 12

Mathematics Content Centrality of Essential Elements to Target Level Nodes

	Grade	EE	No		Far		Near		Met			
YE		*N*	*N*	%	*N*	%	*N*	%	*N*	%	LL	UL
	3rd	18			4	22%	14	78%	18	**100%**	85%	100%
	4th	37			10	27%	27	73%	37	**100%**	92%	100%
	5th	37			4	11%	33	89%	37	**100%**	92%	100%
	6th	18			5	28%	13	72%	18	**100%**	85%	100%
	7th	36			5	14%	31	86%	36	**100%**	92%	100%
	8th	24			5	21%	19	79%	24	**100%**	88%	100%
	9th	19			11	58%	8	42%	19	**100%**	85%	100%
	10th	16			3	19%	13	81%	16	**100%**	83%	100%
	11th	14			7	50%	7	50%	14	**100%**	81%	100%
	All	219			54	25%	165	75%	219	**100%**	99%	100%
EOI	Alg1	19			11	58%	8	42%	19	**100%**	85%	100%
	Alg2	16			3	19%	13	81%	16	**100%**	83%	100%
	Geom	14			7	50%	7	50%	14	**100%**	81%	100%
	All	49			21	43%	28	57%	49	**100%**	94%	100%

Note. Some EEs were aligned to multiple Target Level Nodes.

Performance Centrality

Performance centrality ratings for the alignment of EEs with Target Level Nodes for ELA and Mathematics are reported in Tables 13 and 14. All EEs were rated as having *some* or *all* of the performance expectations found in the Target Level Nodes. This suggests that the performance expectations in the EEs are similar to the performance expectations in the Target Level Nodes.

Table 13

ELA Performance Centrality of Essential Elements to Target Level Nodes

	Grade	EE	None		Some		All		Met			
Year-End Models		*N*	*N*	%	*N*	%	*N*	%	*N*	%	LL	UL
YE	3rd	17			1	6%	16	94%	17	**100%**	84%	100%
	4th	17			5	29%	12	71%	17	**100%**	84%	100%
	5th	19			3	16%	16	84%	19	**100%**	85%	100%
	6th	19			3	16%	16	84%	19	**100%**	85%	100%
	7th	18			1	6%	17	94%	18	**100%**	85%	100%
	8th	20			2	10%	18	90%	20	**100%**	86%	100%
	9th – 10th	19			1	5%	18	95%	19	**100%**	85%	100%
	11th	19			4	21%	15	79%	19	**100%**	85%	100%
	All	148			20	14%	128	86%	148	**100%**	98%	100%
EOI	ELA2	19			1	5%	18	95%	19	**100%**	85%	100%
	ELA3	19			4	21%	15	79%	19	**100%**	85%	100%
	All	38			5	13%	33	87%	38	**100%**	98%	100%

In mathematics, there were occasionally multiple nodes linked to a single EE. When this occurred the panelists rated these as a collection versus individual ratings. This is one reason why there are no ratings of “none” in these findings.

Table 14

Mathematics Performance Centrality of Essential Elements to Target Level Nodes

	Grade	EE	None		Some		All		Met			
YE		*N*	*N*	%	*N*	%	*N*	%	*N*	%	LL	UL
	3rd	18			5	28%	13	72%	18	**100%**	85%	100%
	4th	37			10	27%	27	73%	37	**100%**	92%	100%
	5th	37			7	19%	30	81%	37	**100%**	92%	100%
	6th	18			6	33%	12	67%	18	**100%**	85%	100%
	7th	36			5	14%	31	86%	36	**100%**	92%	100%
	8th	24			9	38%	15	63%	24	**100%**	88%	100%
	9th	19			5	26%	14	74%	19	**100%**	85%	100%
	10th	16			1	6%	15	94%	16	**100%**	83%	100%
	11th	14			2	14%	12	86%	14	**100%**	81%	100%
	All	219			50	23%	169	77%	219	**100%**	99%	100%
EOI	Alg1	19			5	26%	14	74%	19	**100%**	85%	100%
	Alg2	16			1	6%	15	94%	16	**100%**	83%	100%
	Geom	14			2	14%	12	86%	14	**100%**	81%	100%
	All	49			8	16%	41	84%	49	**100%**	94%	100%

Focus 3: Vertical Articulation of Linkage Levels

The following alignment question was examined for Focus 3*: Do the nodes at each Linkage Level reflect a progression of knowledge, skills, and understandings that are precursors to and successors of the Target Level Node(s)?* Panelists evaluated the relationships of the nodes at the five linkage levels and used their professional judgment to determine if the ordering of the linkage level reflected an acceptable progression before and after the Target Level Node.

The number and percentage of linkage levels that were rated as maintaining the progression are reported in Table 15. In ELA, 7th grade ELA had 56% of the linkage levels were rated as having a clear progression. Across all other content areas and grade levels a high percentage of linkage levels were rated demonstrating a clear progression, ranging from 79% to 97%. Panelists reported that the primary reason for the lack of progression was the Initial Precursor (lowest level) was not part of the progression. For example, for EE.RI.4.8, the Initial Precursor, "when attending, react to a change to an object or situation", was identified as an inappropriate foundation for the rest of the nodes within the linkage level (the DP is "identify concrete details in familiar informational texts" and the Target is "can provide the reasons an author includes [i.e. details] that support the points of an informational text"). For EE.RL.6.1 the panelists identified that F-22, "can detect specific members within a broader

category", would be a better match than the Initial Precursor listed as ELA 1102, "can differentiate between text and pictures or braille and tactile graphics/objects that accompany the text". Panelists rated the progression in the mathematics linkage levels much higher than ELA, ranging from 91% to 100%.

Table 15
ELA and Mathematics Vertical Articulation of Linkage Levels

ELA Linkage Levels				Mathematics Linkage Levels			
Grade	Total	Clear Progression		Grade	Total	Clear Progression	
	N	*N*	%		*N*	*N*	%
3	17	15	88%	3	11	10	91%
4	17	14	82%	4	16	15	94%
5	19	15	79%	5	15	14	93%
6	19	15	79%	6	11	10	91%
7	18	10	56%	7	10	10	100%
8	20	17	85%	8	14	14	100%
9	19	17	89%	9	8	8	100%
11	18	17	94%	10	9	9	100%
				11	9	9	100%
All	147	120	82%	All	103	99	96%

Focus 4: Learning Map Nodes within a Linkage Level and Assessment Items

The following alignment question was addressed for Focus 4: *Do the items reflect the content and performance expectations in the associated learning map nodes?* Measures of content and performance centrality were estimated to examine this alignment question.

Content Centrality

ELA content centrality ratings for the two pools are reported in Table 16. Almost all of the items were rated as having a *near* link to the associated node, and the percentage of items rated as *far* or *near* ranged from 93% to 100%.

Table 16

ELA Content Centrality of Assessment Items to Associated Nodes within Linkage Level

	Grade	Items	No		Far		Near		Met		CI	
		N	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	LL	UL
Year-End Models												
ELA-YE	3rd	72	3	4%			69	96%	69	**96%**	90%	99%
	4th	72	4	6%	2	3%	66	92%	68	**94%**	88%	98%
	5th	82	4	5%	3	4%	75	91%	78	**95%**	89%	98%
	6th	69	1	1%	11	16%	57	83%	68	**99%**	93%	100%
	7th	59			1	2%	58	98%	59	**100%**	95%	100%
	8th	67			9	13%	58	87%	67	**100%**	96%	100%
	9th	93	4	4%			89	96%	89	**96%**	90%	99%
	10th	87					87	100%	87	**100%**	97%	100%
	11th	68	5	7%	8	12%	55	81%	63	**93%**	85%	97%
	All	669	21	3%	34	5%	614	92%	648	**97%**	96%	98%
ELA-EOI	Eng 2	118			6	5%	112	95%	118	**100%**	97%	100%
	Eng 3	123	8	7%	9	7%	106	86%	115	**93%**	89%	97%
	All	241	8	4%	15	6%	218	90%	233	**97%**	94%	98%

The mathematics results were similar to the ELA results (see Table 17). Almost all of the items were rated as have a *far* or *near* link to the associate node, ranging from 96% to 100%.

Table 17

Mathematics Content Centrality of Assessment Items to Nodes within Linkage Level

	Grade	Items	No		Far		Near		Met		CI	
		N	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*LL*	*UL*
Year-End Models												
Math-YE	3rd	80					80	100%	80	**100%**	96%	100%
	4th	73					73	100%	73	**100%**	96%	100%
	5th	83					83	100%	83	**100%**	96%	100%
	6th	71			1	1%	70	99%	71	**100%**	96%	100%
	7th	70					70	100%	70	**100%**	96%	100%
	8th	64					64	100%	64	**100%**	95%	100%
	9th	75			2	3%	73	97%	75	**100%**	96%	100%
	10th	57			4	7%	53	93%	57	**100%**	95%	100%

	11th	49	2	4%	4	8%	43	88%	47	**96%**	88%	99%
	All	622	2	<.5%	11	2%	609	98%	620	**100%**	99%	100%
Math-EOI	Alg I	91					91	100%	91	**100%**	97%	100%
	Alg 2	59					59	100%	59	**100%**	95%	100%
	Geom	63			2	3%	61	100%	63	**100%**	95%	100%
	All	213			2	1%	211	100%	213	**100%**	99%	100%

Performance Centrality

ELA and mathematics performance centrality ratings are reported in Tables 18 and 19. Similar performance expectations were found in both the items and the associated node. For ELA, 95% to 100% of the items were rated as have *some* or *all* of the performance expectation found in the node. For mathematics, 96% to 100% of the items were rated as *some* or *all.*

Table 18

ELA Performance Centrality of Assessment Items to Nodes within Linkage Level

	Grade	Items	None		Some		All		Met			
		N	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*LL*	*UL*
Year-End Models												
ELA-YE	3rd	72	3	4%	6	8%	63	88%	69	**96%**	90%	99%
	4th	72	2	3%	4	6%	66	92%	70	**97%**	92%	100%
	5th	82	2	2%	5	6%	75	91%	80	**98%**	93%	100%
	6th	69			12	17%	57	83%	69	**100%**	96%	100%
	7th	59			1	2%	58	98%	59	**100%**	95%	100%
	8th	67			11	16%	56	84%	67	**100%**	96%	100%
	9th	93	4	4%	4	4%	85	91%	89	**96%**	90%	99%
	10th	87			5	6%	82	94%	87	**100%**	97%	100%
	11th	68	5	7%	18	26%	44	65%	62	**91%**	83%	96%
	All	669	16	2%	66	10%	586	88%	652	**97%**	96%	98%
ELA-EOI	ELA2	118			13	11%	105	89%	118	**100%**	97%	100%
	ELA3	123	6	5%	12	10%	105	85%	117	**95%**	91%	98%
	All	241	6	3%	25	10%	210	87%	235	**98%**	95%	99%

Table 19

Mathematics Performance Centrality of Assessment Items to Nodes within Linkage Level

	Grade	EE	None		Some		All		Met		CI	
		N	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*	*LL*	*UL*
Year-End Models												
Math-YE	3rd	80			2	2%	78	98%	80	**100%**	96%	100%
	4th	73					73	100%	73	**100%**	96%	100%
	5th	83					83	100%	83	**100%**	96%	100%
	6th	71					71	100%	71	**100%**	96%	100%
	7th	70					70	100%	70	**100%**	96%	100%
	8th	64					64	100%	64	**100%**	95%	100%
	9th	75					75	100%	75	**100%**	96%	100%
	10th	57			4	7%	53	93%	57	**100%**	95%	100%
	11th	49	2	4%	8	16%	39	80%	47	**96%**	88%	99%
	All	622	2	<.5%	14	2%	606	97%	620	**100%**	99%	100%
Math-EOI	Alg I	91					91	100%	91	**100%**	97%	100%
	Alg 2	59					59	100%	59	**100%**	95%	100%
	Geom	63			1	2%	62	98%	63	**100%**	95%	100%
	All	213			1	<.5%	212	100%	213	**100%**	99%	100%

ELA and Mathematics Item Cognitive Process Dimensions

All the ELA and mathematics items were assigned a CPD level by DLM item writers. Panelists reviewed the DLM-assigned CPD rating and indicated if they agreed with DLM's level. If panelists disagreed with the DLM-assigned CPD level, they reported which CPD they believed was a better rating. The results are reported in Table 20. Generally, panelist agreed with the DLM-assigned CPD level, with exact agreement ranging from 70% to 90% and adjacent agreement ranging from 76% to 94%. Panelists' differences were not systematically higher or lower than the DLM-assigned CPD. A list of the panelists suggested CPD levels are in Appendix A.

Table 20

Panelists' Agreement with the DLM Item CPD Level

	Total	Agreement		CI:90%		Adjacent Agreement		CI:90%	
	N	*N*	%	LL	UL	*N*	%	LL	UL
ELA-YE	616	520	84%	82%	87%	541	88%	85%	90%
ELA-EOI	172	120	70%	63%	76%	130	76%	70%	81%

Math-YE	621	558	90%	88%	92%	583	94%	92%	95%
Math-EOI	213	156	73%	68%	78%	193	91%	87%	94%

DLM-assigned CPD levels for items in the two ELA pools can be found in Tables 21 to 22. Most of the items were distributed between the *Respond* to the *Understand* CPD levels.

Table 21

Cognitive Process Dimension for ELA-YE Items

CPD Code	3rd		4th		5th		6th		7th		8th		9th		10th		11th	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Pre-intentional									1	2%								
Attend	1	1%	1	1%														
Respond	43	60%	37	54%	41	52%	28	42%	24	41%	14	23%	26	31%	15	25%	21	31%
Replicate																		
Remember	15	21%	9	13%	7	9%	4	6%	8	14%	12	20%	11	13%	5	8%	14	21%
Understand	13	18%	21	31%	31	39%	35	52%	26	44%	35	57%	45	54%	37	63%	33	49%
Apply													1	1%	2	3%		
Analyze																		
Evaluate																		
Create																		

Table 22

Cognitive Process Dimension for ELA–EOI Items

CPD Code	ELA2		ELA3	
	N	%	N	%
Pre-intentional				
Attend				
Respond	27	33%	26	30%
Replicate				
Remember	6	7%	9	10%
Understand	47	57%	49	56%
Apply	3	4%	4	5%
Analyze				
Evaluate				
Create				

CPD levels for items in the two mathematics pools can be found in Tables 23 to 24. Most of the items were distributed from the *Remember* to the *Analyze* CPD levels.

Table 23

Cognitive Process Dimension for Math-YE Items

CPD Level	3rd		4th		5th		6th		7th		8th		9th		10th		11th	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Pre-intentional																		
Attend			1	4%	1	5%												
Respond																		
Replicate																		
Remember	7	19%	7	26%	4	18%	16	23%	8	11%	14	22%	22	29%	3	5%	2	4%
Understand	21	57%	12	44%	6	27%	25	35%	38	54%	27	42%	21	28%	28	49%	18	37%
Apply	6	16%	5	19%	8	36%	14	20%	10	14%	11	17%	24	32%	16	28%	16	33%
Analyze	3	8%	2	7%	3	14%	12	17%	13	19%	11	17%	4	5%	10	18%	10	20%
Evaluate							4	6%			1	2%	4	5%			3	6%
Create									1	1%								

Table 24

Cognitive Process Dimension for Math-EOI Items

CPD Code	Alg 1		Alg 2		Geom	
	N	%	N	%	N	%
Pre-intentional						
Attend						
Respond						
Replicate						
Remember	14	15%			11	17%
Understand	29	32%	42	71%	31	49%
Apply	24	26%	14	24%	11	17%
Analyze	20	22%	3	5%	6	10%
Evaluate	4	4%			4	6%
Create						

Summary

The purpose of this study was to investigate the relationships between the content structures in the Dynamic Learning Maps (DLM) year-end assessment system and assessment items. The results indicate that DLM content structures and test design produced an AA-AAAS across grades and content areas with linkage to the internal structure of the DLM system; starting with the linkage between the CCR standards and the EEs and ending with the Target Level Nodes and the items following the logic the assessment was designed to measure. Four alignment questions were examined in this study.

Focus 1 examined the alignment between the CCR standards and the EEs. The alignment question was, *Do the EEs contain essential concepts in college and career ready content standards, at reduced depth, breadth, and complexity, while maintaining high expectations for students with significant cognitive disabilities at each grade level?*

> This is often the most difficult alignment criterion for AA-AAAS to meet due to the cognitive complexity and rigor of the academic content often embedded in the CCR standards. Overall, DLM designed EEs that were aligned to CCR standards with 82% of all ELA EEs and 83% of all mathematics EES rated as *far* or *near* on content centrality. There were some grades where content centrality ratings fell below the recommended 80% benchmark for the year-end assessment model, but caution should be used for all grade-level interpretations because of the small number of EEs at the grade-level (see confidence intervals). The end-of-instruction model exceeded the 80% criteria for all subject areas. The performance centrality results suggest that the EEs are capturing *some* or *all* of the performance expectations found in the CCR standards. This suggests that students have access to academic content that maintains high expectations.

Focus 2 examined the alignment between the EEs and the Target Level Nodes. The alignment question was, *Is there a strong link between the content and performance expected in the Target Level Node(s) and the associated Essential Element?*

> Content and performance centrality results indicated that there as a strong relationship between the EEs and Target Level Nodes with 100% of Target Level Nodes demonstrating fidelity to the content and performance expectations found in the EEs.

Focus 3 examined the linkage level progression of knowledge, skills, and understandings. The alignment question was, *Do the nodes at each Linkage Level reflect a progression of knowledge, skills, and understandings that are precursors to and successors of the Target Level Node(s)?*

> Panelists rated 82% of all ELA linkage levels and 96% of all mathematics linkage levels as showing a clear progression of knowledge, skills, and understandings. The primary reason for the lack of progression in ELA was that panelists did not believe that the Initial Precursor maintained the logical order found in the other linkage level nodes. The results in this report support the hypothesized progression of the linkage levels. The design of the linkage levels provides unique opportunities for examining student growth in academic content areas.

Focus 4 examined the alignment of the assessment items to the learning map nodes, and the question posed was, *Do the items reflect the content and performance expectations in the associated learning map nodes?*

The evidence indicates that items reflect the content and performance expectations found in the associated learning map nodes. For ELA and mathematics, 93% to 100% of the items were rated as having *far* or *near* content centrality. Performance centrality of the items was also high, ranging from 91% to 100% of all items demonstrating *some* or *all* of the performance expectations found in the associated learning map node. Results of the item CPD levels suggested that students have opportunities to access assessment items across a range of cognitive complexity.

Recommendations

While the alignment within the DLM content structures and the items meet all criteria for adequate alignment, DLM might consider additional examination of some of the content areas to strengthen the coherence of the system and linkage to grade-level CCR. Below are some suggestions based on the alignment results:

- Since this study used a sample of items from the pools and the results are intended to provide evidence of alignment for the overall system, it is recommended that a future study examine the content alignment at the student-level.
- DLM can review the comments that panelists made to develop strategies for future content and item development (in Appendix A).
- While this study focused on the Target Level Node and vertical articulation of nodes in the linkage levels, future studies might consider examining the direct relationship between associated learning map nodes and CCR standards.

Appendix A

Panelist Reasons for Lack of Alignment

Contents

Focus 1
CCR to EE
Content Centrality

ELA

Grade	CCR Code	CCR Description	EE Code	EE Description	Reason No Link
3	ELA.W.3.4	With guidance and support from adults, produce writing in which the development and organization are appropriate to task and purpose.	EE.W.3.4	With guidance and support, produce writing that expresses more than one idea.	Mismatch
4	ELA.W.3.4	With guidance and support from adults, produce writing in which the development and organization are appropriate to task and purpose.	EE.W.3.4	With guidance and support, produce writing that expresses more than one idea.	Mismatch
4	ELA.RI.4.3	Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.	EE.RI.4.3	Identify an explicit detail that is related to an individual, event or idea in a historical, scientific, or technical text.	Backmapping
4	ELA.RI.4.5	Describe the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in a text or part of a text.	EE.RI.4.5	Identify elements that are characteristic of informational texts.	Mismatch
4	ELA.RI.4.8	Explain how an author uses reasons and evidence to support particular points in a text.	EE.RI.4.8	Identify one or more reasons supporting a specific point in an informational text.	Mismatch
4	ELA.RI.4.9	Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably.	EE.RI.4.9	Compare details presented in two texts on the same topic.	Overstretch
5	ELA.RI.5.5	Compare and contrast the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in two or more texts.	EE.RI.5.5	Determine if a text tells about events, gives directions, or provides information on a topic.	Mismatch
5	ELA.RL.5.6	Describe how a narrator's or speaker's point of view influences how events are described.	EE.RL.5.6	Determine the point of view of the narrator.	Mismatch
5	ELA.RI.5.8	Explain how an author uses reasons and evidence to support particular points in a text, identifying which reasons and evidence support which point(s).	EE.RI.5.8	Identify the relationship between a specific point and supporting reasons in an informational text.	Mismatch
5	ELA.L.5.4.a	Use context (e.g., cause/effect relationships and comparisons in text) as a clue to the meaning of a word or phrase.	EE.L.5.4.a	Use sentence level context to determine which word is missing from a content area text.	Other
5	ELA.RI.5.9	Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.	EE.RI.5.9	Compare and contrast details gained from two texts on the same topic.	Mismatch
6	ELA.RI.6.5	Analyze how a particular sentence, paragraph, chapter, or section fits into the overall structure of a text and contributes to the development of the ideas.	EE.RI.6.5	Determine how the title fits the structure of the text.	Overstretch
6	ELA.RL.6.6	Explain how an author develops the point of view of the narrator or speaker in a text.	EE.RL.6.6	Identify words or phrases in the text that describe or show what the narrator or speaker is thinking or feeling.	Mismatch
6	ELA.W.6.2.b	Develop the topic with relevant facts, definitions, concrete details, quotations, or other information and examples.	EE.W.6.2.b	Provide facts, details, or other information related to the topic.	Overstretch
7	ELA.L.7.2.a	Use a comma to separate coordinate adjectives (e.g., It was a fascinating, enjoyable movie but not He wore an old[,] green shirt).	EE.L.7.2.a	Use end punctuation when writing a sentence or question.	Mismatch
7	ELA.W.7.2.b	Develop the topic with relevant facts, definitions, concrete details, quotations, or other information and examples.	EE.W.7.2.b	Provide facts, details, or other information related to the topic.	Mismatch
8	ELA.L.8.5.a	Interpret figures of speech (e.g. verbal irony, puns) in context.	EE.L.8.5.a	Demonstrate understanding of the use of multiple meaning words.	Mismatch

Grade	CCR Code	CCR Description	EE Code	EE Description	Reason No Link
8	ELA.RI.8.3	Analyze how a text makes connections among and distinctions between individuals, ideas, or events (e.g., through comparisons, analogies, or categories).	EE.RI.8.3	Recount events in the order they were presented in the text.	Mismatch
8	ELA.W.8.2.c	Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts.	EE.W.8.2.c	Write complete thoughts as appropriate.	Mismatch
9	ELA.L.9-10.5.b	Analyze nuances in the meaning of words with similar denotations	EE.L.9-10.5.b	Determine the intended meaning of multiple meaning words.	Overstretch
9	ELA.RL.9-10.5	Analyze how an author's choices concerning how to structure a text, order events within it (e.g., parallel plots), and manipulate time (e.g., pacing, flashbacks) create such effects as mystery, tension, or surprise.	EE.RL.9-10.5	Identify where a text deviates from a chronological presentation of events.	Overstretch
9	ELA.W.9-10.2.c	Use appropriate and varied transitions to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.	EE.W.9-10.2.c	Use complete, simple sentences as appropriate.	Mismatch
11	ELA.RL.11-12.3	Analyze the impact of the author's choices regarding how to develop and relate elements of a story or drama (e.g., where a story is set, how the action is ordered, how the characters are introduced and developed).	EE.RL.11-12.3	Determine how characters, the setting or events change over the course of the story or drama.	Mismatch
11	ELA.RI.11-12.9	Analyze seventeenth-, eighteenth-, and nineteenth-century foundational U.S. documents of historical and literary significance (including The Declaration of Independence, the Preamble to the Constitution, the Bill of Rights, and Lincoln's Second Inaugural Address) for their themes, purposes, and rhetorical features.	EE.RI.11-12.9	Compare and contrast arguments made by two different texts on the same topic.	Mismatch
11	ELA.W.11-12.2.c	Use appropriate and varied transitions and syntax to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.	EE.W.11-12.2.c	Use complete, simple sentences, as well as compound and other complex sentences as appropriate.	Mismatch

Mathematics

Grade	CCR Code	CCR Description	EE Code	EE Description	Reason No Link
3	M.3.NBT.2	Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction	EE.3.NBT.2	Demonstrate understanding of place value to tens.	Mismatch
3	M.3.NF.2	Understand a fraction as a number on the number line; represent fractions on a number line diagram.	EE.3.NF.1-3	Differentiate a fractional part from a whole.	Mismatch
3	M.3.NF.3	Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.	EE.3.NF.1-3	Differentiate a fractional part from a whole.	Mismatch
3	M.3.OA.4	Determine the unknown whole number in a multiplication or division equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations 8 × ? = 48, 5 = _ ÷ 3, 6 × 6 = ?	EE.3.OA.4	Solve addition and subtraction problems when result is unknown, limited to operands and results within 20.	Mismatch
4	M.4.MD.4.b	Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots	EE.4.MD.4.b	Interpret data from a picture or bar graph.	Mismatch
4	M.4.NF.2	Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =	EE.4.NF.1-2	Identify models of one half (1/2) and one fourth (1/4).	Mismatch
5	M.5.G.1	Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond;	EE.5.G.1-4	Sort two-dimensional figures and identify the attributes (angles, number of sides, corners, color) they have in common.	Mismatch
5	M.5.G.2	Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.	EE.5.G.1-4	Sort two-dimensional figures and identify the attributes (angles, number of sides, corners, color) they have in common.	Mismatch
5	M.5.MD.1	Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems	EE.5.MD.1.a	Tell time using an analog or digital clock to the half or quarter hour.	Mismatch
5	M.5.MD.1	Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems	EE.5.MD.1.c	Indicate relative value of collections of coins.	Mismatch
5	M.5.MD.3	Recognize volume as an attribute of solid figures and understand concepts of volume measurement	EE.5.MD.3	Identify common three-dimensional shapes.	Mismatch
6	M.6.EE.2	Write, read, and evaluate expressions in which letters stand for numbers	EE.6.EE.1-2	Identify equivalent number sentences.	Mismatch

Grade	CCR Code	CCR Description	EE Code	EE Description	Reason No Link
6	M.6.EE.5	Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.	EE.6.EE.5-7	Match an equation to a real-world problem in which variables are used to represent numbers.	Mismatch
6	M.6.NS.1	Interpret and compute quotients of fractions, and solve word problems involving division of fractions, e.g., by using visual fraction models and equations to represent the problem	EE.6.NS.1	Compare the relationships between two unit fractions.	Mismatch
6	M.6.NS.8	Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate	EE.6.NS.5-8	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero).	Mismatch
6	M.6.NS.7	Understand ordering and absolute value of rational numbers	EE.6.NS.5-8	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero).	Mismatch
7	M.7.EE.2	Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. For example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05."	EE.7.EE.2	Identify an arithmetic sequence of whole numbers with a whole number common difference.	Mismatch
7	M.7.G.4	Know the formulas for the area and circumference of a circle, and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle	EE.7.G.4	Determine the perimeter of a rectangle by adding the measures of the sides.	Mismatch
7	M.7.G.5	Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure	EE.7.G.5	Recognize angles that are acute, obtuse, and right.	Mismatch
8	M.8.EE.2	Use square root and cube root symbols to represent solutions to equations of the form x2 = p and x3 = p, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational	EE.8.EE.2	Identify a geometric sequence of whole numbers with a whole number common ratio.	Mismatch
8	M.8.G.5	Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles	EE.8.G.5	Compare any angle to a right angle and describe the angle as greater than, less than, or congruent to a right angle.	Mismatch
8	M.8.NS.1	Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert expansion which repeats eventually into a rational number	EE.8.NS.1	Subtract fractions with like denominators (halves, thirds, fourths, and tenths) with minuends less than or equal to one.	Mismatch
8	M.8.NS.2.a	Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and	EE.8.NS.2.a	Express a fraction with a denominator of 100 as a decimal.	Mismatch

Grade	CCR Code	CCR Description	EE Code	EE Description	Reason No Link
		convert a decimal expansion which repeats eventually into a rational number			
8	M.8.NS.2.b	Use rational approximations of irrational numbers to compare the size of irrational numbers locate them approximately on a number line diagram, and estimate the value of expressions (e.g., pi2))	EE.8.NS.2.b	Compare quantities represented as decimals in real-world examples to hundredths.	Mismatch
9	M.G-MG.2	Apply concepts of density based on area and volume in modeling situations	EE.G-MG.1-3	Use properties of geometric shapes to describe real-life objects.	Mismatch
10	M.A-REI.11	Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately	EE.A-REI.10-12	Interpret the meaning of a point on the graph of a line. For example, on a graph of pizza purchases, trace the graph to a point and tell the number of pizzas purchased and the total cost of the pizzas.	Mismatch
10	M.A-REI.12	Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes	EE.A-REI.10-12	Interpret the meaning of a point on the graph of a line. For example, on a graph of pizza purchases, trace the graph to a point and tell the number of pizzas purchased and the total cost of the pizzas.	Mismatch
11	M.F-LE.3	Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function	EE.F-LE.1-3	Model a simple linear function such as y=mx to show that these functions increase by equal amounts over equal intervals.	Mismatch

Focus 3

Vertical Articulation of Linkage Level

ELA

Grade	EE Code	Narrative
3	EE.RL.3.2	F-83 - Code book does not help clarify. Seems unrelated to progression, but vital to all.
3	EE.RI.3.2	F-83 seems unrelated to progression
4	EE.RI.4.5	Up to 1378 all about text characteristics/features (diagrams maps), 1379 is about structure of informational text/purpose
4	EE.RL.4.2	121-1447 are a logical progression, but 1447 is not an appropriate transition for 1344-1345
4	EE.RI.4.8	F-37 seems like an inappropriate foundation
5	EE.RL.5.2	121-1447 are a logical progression, but 1447 is not an appropriate transition for 1344-1345
5	EE.RL.5.9	143 & 75 do not match rest of progression
5	EE.W.5.2.a	F 114 doesn't seem an appropriate IP
6	EE.RI.6.5	1380-observation would be stronger if included title examples and 1141 needs stronger link to structure
6	EE.RL.6.1	1102 not an appropriate IP (F82 seems better)
6	EE.RI.6.3	DP 669 seems inappropriate
6	EE.W.6.2.a	F114 seems an inappropriate IP
7	EE.RL.7.1	1102 seems an inappropriate IP
7	EE.RL.7.4	F147 seems an inappropriate IP
7	EE.RI.7.6	F175 seems an overstretch for an IP
7	EE.RI.7.8	31- not an appropriate IP; 1410 (T) seems harder than 522 (S)
7	EE.RL.7.3	362 (S) seems easier than 1170 (T)
7	EE.RL.7.5	1102 seems an inappropriate IP
7	EE.L.7.2.a	DP seems unrelated 1365; 282 (S) seems slightly unrelated
7	EE.W.7.2.a	F114 seems like an inappropriate IP
8	EE.RI.8.6	F175 seems an overstretch for an IP
8	EE.RI.8.8	ELA 1479- if the expectation is to simply state what is listed, than this is simple recall; if students must make specific references to an actual argument, progression is accurate but example/observation should be elaborated.
8	EE.W.8.2.b	1676-2298- More information needs to be provided in the observation about the cognitive expectations to "write" facts and details. Does this mean to construct the argument, etc., using the facts and details? If so, the I would give progression 100%.
9	EE.RI.9-10.1	967 seems more complex (citing evidence for inference) than 1242 (determine if citations for explicit vs inference)
9	EE.W.9-10.2.d	1619 (S) seems more simplistic than 2305 (T)
11	EE.W.11-12.2.d	1619 (S) seems more simplistic than 2305 (T)

Mathematics

Grade	EE Code	Narrative
3	EE.3.MD.1	F 76 missing from Code Book, unsure on relation to 194 and LL (M-194 is not applicable)
4	EE.4.MD.2.a	Should "mass" be "weight"?
5	EE.5.MD.1.b	Should "mass" be "weight"?

Focus 4

Associated Learning Map EE to Item

ELA – YE

Grade	Testlet ID	Item ID	Node ID	Reason No Link
3	5696	31474	ELA-1488	Mismatch
3	5747	31765	F-147	Mismatch
3	5747	31769	F-147	Mismatch
4	5652	31338	ELA-1374	Mismatch
4	6337	47997	ELA-1294	Mismatch
4	5518	30810	ELA-1344	Mismatch
4	6246	33762	ELA-1345	Mismatch
5	5089	27568	ELA-1345	Mismatch
5	5089	27576	ELA-1345	Mismatch
5	5654	31333	ELA-795	Mismatch
5	5654	31347	ELA-795	Mismatch
6	5715	31588	ELA-937	Mismatch
9	4676	25477	ELA-1361	Mismatch
9	5117	27723	ELA-1361	Mismatch
9	5117	27742	ELA-1361	Mismatch
9	5790	56472	ELA-1090	Mismatch
11	4709	25634	ELA-1247	Mismatch
11	4931	26733	ELA-1154	Mismatch
11	5225	28351	ELA-1044	Mismatch
11	5225	28353	ELA-1044	Mismatch
11	5056	27423	ELA-1344	Mismatch

ELA-EOI

Grade	Testlet ID	Item ID	Node ID	Reason No Link
Eng3	4709	25634	ELA-1247	Mismatch
Eng3	4709	25638	ELA-1247	Mismatch
Eng3	4821	26187	ELA-1361	Mismatch
Eng3	4821	26190	ELA-1361	Mismatch
Eng3	4931	26733	ELA-1154	Mismatch
Eng3	4931	26738	ELA-1395	Mismatch
Eng3	5649	31320	ELA-1147	Mismatch
Eng3	5649	31321	ELA-1147	Mismatch
Eng3	4709	25634	ELA-1247	Mismatch
Eng3	4709	25638	ELA-1247	Mismatch
Eng3	4821	26187	ELA-1361	Mismatch
Eng3	4821	26190	ELA-1361	Mismatch

Math-YE

Grade	Testlet ID	Item ID	Node ID	Reason No Link
11	5999	56617	M-2722	Mismatch
11	5999	56618	M-2722	Mismatch

Focus 4

Panelist DLM Cognitive Process Dimension (DLM-CPD) Rating

ELA-YE

Grade	Testlet ID	Item ID	CPD-DLM	CPD-Panelist
3	5740	31703	5-Remember	3-Respond
3	4700	25594	3-Respond	6-Understand
3	4700	25605	3-Respond	6-Understand
3	6811	47973	6-Understand	10-Create
3	6811	47974	6-Understand	10-Create
4	5652	31338	3-Respond	6-Understand
4	6337	47997	6-Understand	7-Apply
4	4725	25716	6-Understand	5-Remember
4	5363	29904	5-Remember	3-Respond
4	4771	26146	6-Understand	5-Remember
4	5337	29515	3-Respond	6-Understand
4	5337	29516	3-Respond	6-Understand
4	5518	30807	5-Remember	6-Understand
4	6552	48026	6-Understand	10-Create
4	6552	48027	6-Understand	10-Create
5	5089	27568	5-Remember	3-Respond
5	6131	33278	5-Remember	3-Respond
5	5174	28030	5-Remember	3-Respond
5	5947	32110	6-Understand	3-Respond
5	5947	32113	6-Understand	5-Remember
5	4912	26636	6-Understand	5-Remember
5	7845	48061	6-Understand	10-Create
5	7845	48063	6-Understand	10-Create
5	12214	57308	6-Understand	5-Remember
5	12214	57309	6-Understand	3-Respond
6	4836	26259	5-Remember	3-Respond
6	4836	26260	6-Understand	3-Respond
6	4569	24973	3-Respond	5-Remember
6	5349	29674	6-Understand	3-Respond
6	6344	34019	6-Understand	3-Respond
6	5715	31582	6-Understand	3-Respond
6	4569	40468	6-Understand	5-Remember
6	5362	29804	3-Respond	6-Understand
6	5362	29859	3-Respond	6-Understand
6	5362	29878	3-Respond	6-Understand
6	5362	29888	3-Respond	6-Understand
6	5362	29900	3-Respond	6-Understand
7	5051	27394	3-Respond	5-Remember

Grade	Testlet ID	Item ID	CPD-DLM	CPD-Panelist
7	4495	24606	3-Respond	6-Understand
7	4710	25642	6-Understand	3-Respond
7	4968	26928	3-Respond	5-Remember
7	4970	26947	3-Respond	5-Remember
7	5051	27396	5-Remember	8-Analyze
7	5271	28795	3-Respond	6-Understand
7	5271	28797	3-Respond	6-Understand
8	6321	34009	5-Remember	3-Respond
8	6321	34015	5-Remember	3-Respond
8	5783	31930	6-Understand	3-Respond
8	5783	31934	6-Understand	3-Respond
8	5783	31935	6-Understand	3-Respond
8	4610	25173	5-Remember	3-Respond
8	4610	25174	5-Remember	3-Respond
8	4837	26273	3-Respond	6-Understand
9	5790	56472	6-Understand	5-Remember
9	8491	48239	6-Understand	10-Create
9	8491	48240	6-Understand	10-Create
9	8491	48241	6-Understand	10-Create
9	8491	48242	6-Understand	10-Create
9	8491	48245	6-Understand	10-Create
9	8491	48246	6-Understand	10-Create
9	4642	25289	6-Understand	5-Remember
9	4737	25788	6-Understand	3-Respond
9	4737	25797	6-Understand	3-Respond
9	5094	27622	3-Respond	6-Understand
9	5186	28111	6-Understand	5-Remember
9	5186	28118	6-Understand	5-Remember
9	5790	31954	6-Understand	3-Respond
9	5790	31956	6-Understand	3-Respond
9	5841	32163	6-Understand	3-Respond
9	5841	32167	3-Respond	6-Understand
9	5841	32171	3-Respond	6-Understand
10	5164	27996	6-Understand	3-Respond
10	4627	25231	3-Respond	6-Understand
10	4627	25234	3-Respond	6-Understand
10	5047	27342	6-Understand	3-Respond
10	5047	27345	5-Remember	3-Respond
10	5047	27358	6-Understand	3-Respond
10	8515	48280	6-Understand	10-Create

Grade	Testlet ID	Item ID	CPD-DLM	CPD-Panelist
10	8515	48281	6-Understand	10-Create
10	8515	48282	6-Understand	10-Create
10	8515	48283	6-Understand	10-Create
10	8515	48284	6-Understand	10-Create
10	8515	48285	6-Understand	7-Apply
10	8522	48287	6-Understand	10-Create
10	8522	48288	6-Understand	10-Create
10	8522	48289	6-Understand	10-Create
10	8522	48290	6-Understand	10-Create
10	8522	48291	6-Understand	10-Create
10	8522	48292	6-Understand	7-Apply
11	4931	26733	6-Understand	5-Remember
11	4747	25830	6-Understand	5-Remember
11	4931	26734	6-Understand	5-Remember
11	4931	26738	6-Understand	5-Remember
11	5034	27286	6-Understand	5-Remember
11	5034	27287	6-Understand	5-Remember
11	5020	41161	5-Remember	6-Understand

Note. Yellow highlighting indicates panelist ratings that were more than +/- 1 adjacent to the CPD assigned by DLM

ELA-EOI

Grade	Testlet ID	Item ID	CPD-DLM	CPD-Panelist
Eng2	5790	31958	6-Understand	5-Remember
Eng2	5094	27615	3-Respond	5-Remember
Eng2	5094	27622	3-Respond	5-Remember
Eng2	5790	31954	6-Understand	3-Respond
Eng2	8515	48280	6-Understand	10-Create
Eng2	8515	48281	6-Understand	10-Create
Eng2	8515	48282	6-Understand	10-Create
Eng2	8515	48283	6-Understand	10-Create
Eng2	8515	48284	6-Understand	10-Create
Eng2	8515	48285	6-Understand	7-Apply
Eng2	8522	48287	6-Understand	10-Create
Eng2	8522	48288	6-Understand	10-Create
Eng2	8522	48289	6-Understand	10-Create
Eng2	8522	48290	6-Understand	10-Create
Eng2	8522	48291	6-Understand	10-Create
Eng2	8522	48292	6-Understand	10-Create
Eng2	8522	48293	7-Apply	10-Create
Eng2	4782	25965	6-Understand	5-Remember
Eng2	4782	25977	6-Understand	5-Remember
Eng2	5141	27840	6-Understand	3-Respond
Eng2	5164	27996	6-Understand	5-Remember
Eng2	6033	32942	5-Remember	6-Understand
Eng2	8506	48273	6-Understand	10-Create
Eng2	8506	48274	6-Understand	10-Create
Eng2	8506	48275	6-Understand	10-Create
Eng2	8506	48276	6-Understand	10-Create
Eng2	8506	48277	6-Understand	10-Create
Eng2	8506	48278	6-Understand	7-Apply
Eng3	4821	26190	6-Understand	3-Respond
Eng3	4931	26733	6-Understand	3-Respond
Eng3	4931	26734	6-Understand	3-Respond
Eng3	4931	40694	6-Understand	5-Remember
Eng3	5218	28320	6-Understand	5-Remember
Eng3	5150	34726	3-Respond	6-Understand
Eng3	5150	34730	3-Respond	6-Understand
Eng3	5649	31322	5-Remember	3-Respond
Eng3	8429	48317	3-Respond	6-Understand
Eng3	8429	48332	6-Understand	3-Respond

Grade	Testlet ID	Item ID	CPD-DLM	CPD-Panelist
Eng3	8493	48386	6-Understand	10-Create
Eng3	8493	48388	6-Understand	10-Create
Eng3	8493	48389	6-Understand	10-Create
Eng3	8493	48390	6-Understand	10-Create
Eng3	8493	48392	6-Understand	10-Create
Eng3	8493	48395	6-Understand	10-Create
Eng3	8493	48397	6-Understand	7-Apply
Eng3	8523	48401	6-Understand	10-Create
Eng3	8523	48402	6-Understand	10-Create
Eng3	8523	48403	6-Understand	10-Create
Eng3	8523	48406	6-Understand	10-Create
Eng3	8523	48407	6-Understand	10-Create
Eng3	8523	48409	6-Understand	10-Create
Eng3	8523	48413	6-Understand	10-Create

Note. Yellow highlighting indicates panelist ratings that were more than +/- 1 adjacent to the CPD assigned by DLM

Math-YE

Grade	Testlet ID	Item ID	CPD-DLM	CPD-Panelist
4	4701	25598	6-Understand	7-Apply
4	4701	25608	6-Understand	7-Apply
4	4701	25609	6-Understand	7-Apply
4	4701	25610	6-Understand	7-Apply
6	4574	24986	6-Understand	7-Apply
6	7944	40666	8-Analyze	6-Understand
6	7944	40667	8-Analyze	6-Understand
6	7944	40670	8-Analyze	6-Understand
6	7944	40672	8-Analyze	6-Understand
7	4560	24912	8-Analyze	10-Create
7	4560	24914	8-Analyze	10-Create
7	4601	25103	7-Apply	6-Understand
7	4601	25129	6-Understand	9-Evaluate
7	4865	26379	6-Understand	8-Analyze
7	4865	26396	6-Understand	8-Analyze
7	4865	26399	6-Understand	8-Analyze
7	4675	25467	8-Analyze	6-Understand
7	4675	25469	8-Analyze	6-Understand
7	4675	25472	8-Analyze	6-Understand
7	8419	42594	7-Apply	6-Understand
8	4823	26182	9-Evaluate	7-Apply
8	4862	26381	5-Remember	6-Understand
8	4862	26384	5-Remember	6-Understand
8	4862	47964	5-Remember	6-Understand
9	4868	26417	6-Understand	7-Apply
9	5069	27366	6-Understand	8-Analyze
9	5069	27371	9-Evaluate	7-Apply
9	5069	27372	9-Evaluate	7-Apply
9	5069	27379	9-Evaluate	7-Apply
9	5069	27475	9-Evaluate	7-Apply
9	4864	26397	5-Remember	7-Apply
9	5611	31171	8-Analyze	7-Apply
10	4738	25790	6-Understand	7-Apply
10	4738	25793	6-Understand	7-Apply
10	4738	25798	6-Understand	7-Apply
10	4847	26313	6-Understand	8-Analyze
10	4847	26318	6-Understand	8-Analyze
10	4847	26319	6-Understand	8-Analyze

Grade	Testlet ID	Item ID	CPD-DLM	CPD-Panelist
10	5514	30793	7-Apply	8-Analyze
10	5514	30794	7-Apply	8-Analyze
10	4845	26305	8-Analyze	7-Apply
10	4845	26307	8-Analyze	7-Apply
10	4845	26308	8-Analyze	7-Apply
11	4809	26126	9-Evaluate	8-Analyze
11	4809	50521	9-Evaluate	8-Analyze
11	4809	50522	9-Evaluate	8-Analyze
11	5122	27753	6-Understand	8-Analyze
11	5999	56617	8-Analyze	9-Evaluate
11	5999	56618	8-Analyze	9-Evaluate
11	5133	27792	6-Understand	8-Analyze
11	5133	27799	6-Understand	8-Analyze
11	5133	27802	6-Understand	8-Analyze
11	5133	27804	6-Understand	8-Analyze
11	5818	32059	8-Analyze	6-Understand
11	5818	32061	8-Analyze	6-Understand
11	5818	32064	8-Analyze	6-Understand

Note. Yellow highlighting indicates panelist ratings that were more than +/- 1 adjacent to the CPD assigned by DLM

Math-EOI

Course	Testlet ID	Item ID	CPD-DLM	CPD-Panelist
Alg1	4738	25790	6-Understand	7-Apply
Alg1	4738	25793	6-Understand	7-Apply
Alg1	4738	25798	6-Understand	7-Apply
Alg1	4847	26313	6-Understand	7-Apply
Alg1	4847	26318	6-Understand	7-Apply
Alg1	4847	26319	6-Understand	7-Apply
Alg1	4868	26417	6-Understand	7-Apply
Alg1	4894	26549	8-Analyze	7-Apply
Alg1	4894	26554	8-Analyze	7-Apply
Alg1	4894	26563	8-Analyze	7-Apply
Alg1	4894	57253	8-Analyze	7-Apply
Alg1	5069	27366	6-Understand	8-Analyze
Alg1	5069	27371	9-Evaluate	7-Apply
Alg1	5069	27372	9-Evaluate	7-Apply
Alg1	5069	27379	9-Evaluate	7-Apply
Alg1	5069	27475	9-Evaluate	7-Apply
Alg1	5514	30791	8-Analyze	7-Apply
Alg1	5611	31171	8-Analyze	7-Apply
Alg1	5999	32803	8-Analyze	7-Apply
Alg1	8674	27666	6-Understand	7-Apply
Alg1	8674	27678	6-Understand	7-Apply
Alg1	8674	27691	6-Understand	7-Apply
Alg1	4794	26016	6-Understand	8-Analyze
Alg1	4794	26057	6-Understand	8-Analyze
Alg1	4864	26397	5-Remember	7-Apply
Alg1	4888	26519	5-Remember	6-Understand
Alg2	4881	26457	6-Understand	7-Apply
Alg2	4881	26459	6-Understand	7-Apply
Alg2	4887	26496	6-Understand	7-Apply
Alg2	4887	26498	6-Understand	7-Apply
Alg2	4887	26502	6-Understand	7-Apply
Alg2	4887	26503	6-Understand	7-Apply
Alg2	4887	26504	6-Understand	8-Analyze
Alg2	4887	26507	6-Understand	8-Analyze
Alg2	4887	26509	6-Understand	8-Analyze
Alg2	10917	51195	6-Understand	7-Apply
Alg2	10917	51196	6-Understand	7-Apply
Alg2	10917	51197	6-Understand	7-Apply

Course	Testlet ID	Item ID	CPD-DLM	CPD-Panelist
Alg2	10917	57785	6-Understand	7-Apply
Geom	4998	26083	6-Understand	8-Analyze
Geom	4998	27154	6-Understand	8-Analyze
Geom	4998	27157	6-Understand	8-Analyze
Geom	5122	27753	6-Understand	8-Analyze
Geom	5617	31189	6-Understand	7-Apply
Geom	5617	31190	6-Understand	7-Apply
Geom	5617	31192	6-Understand	7-Apply
Geom	5617	31193	6-Understand	7-Apply
Geom	8632	34823	8-Analyze	6-Understand
Geom	8632	34825	6-Understand	8-Analyze
Geom	8632	34827	6-Understand	8-Analyze
Geom	8632	34830	6-Understand	8-Analyze
Geom	8632	43119	6-Understand	8-Analyze
Geom	8663	31788	9-Evaluate	8-Analyze
Geom	8757	43459	6-Understand	7-Apply
Geom	8757	43461	6-Understand	7-Apply
Geom	8757	57783	6-Understand	7-Apply
Geom	8757	57784	6-Understand	7-Apply

Note. Yellow highlighting indicates panelist ratings that were more than +/- 1 adjacent to the CPD assigned by DLM

Appendix B
Panelist Evaluation Results

Panelist Evaluation Results

	Strongly Disagree	Disagree	Agree	Strongly Agree
The overall goals of the rating session were clear			33%	67%
The rating sessions were well-organized			17%	83%
The training provided was helpful			17%	83%
The materials (codebook, handouts, PowerPoint slides) helped me complete each rating accurately			33%	67%
I understood how to make each type of rating judgment			33%	67%
I had enough time to complete the tasks			33%	67%
When I completed ratings on my own I had sufficient support to ask questions at the time or regroup once we were back together				100%
Overall, I believe my opinions were considered and valued by the group				100%
Overall, I was satisfied with the final rating judgments during the CCSS to EE level ratings.				100%
Overall, I was satisfied with the final rating judgments during the EE to targeted node level ratings.				100%
Overall, I was satisfied with the final rating judgments during the review of the items			17%	83%
I am confident that the rating session produced valid information				100%
Overall, my group's discussions were open and honest				100%
I believe the work completed will be useful in strengthening the DLM system			17%	83%

References

American Educational Research Association, American Psychological Association, and National Council on Measurement in Education (2014). *Standards for Educational and Psychological Testing* is now on sale. The *Testing Standards.*

Flowers, C., Wakeman, S., Browder, D., & Karvonen, M. (2009). An alignment protocol for alternate assessments based on alternate achievement standards. Educational Measurements: Issues and Practice, 28(1), 25-37.

US Department of Education (2015). Peer review of state assessment systems non-regulatory guidance for states. Retrieved on April 20, 2016 from http://www2.ed.gov/admins/lead/account/saa.html