



DYNAMIC[®]
LEARNING MAPS

2017–2018 Technical Manual Update

Delaware Supplement

January 2019

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1. Introduction

During the 2017–2018 academic year, the Dynamic Learning Maps® (DLM®) Alternate Assessment System offered assessments of student achievement in mathematics, English language arts (ELA), and science for students with the most significant cognitive disabilities in grades 3 through 8 and high school.

A complete technical manual was created for the first year of operational administration for ELA and mathematics (Dynamic Learning Maps Consortium [DLM Consortium], 2016). Additionally, the 2017–2018 update to the ELA and mathematics technical manual provides updated information for the 2017–2018 administration, including only sections with changes (DLM Consortium, 2018). This volume provides state-specific information for two of those chapters. For a complete description of the DLM system, refer to the *2014–2015 Technical Manual—Year-End Model* (DLM Consortium, 2016). For a complete description of DLM science assessments, refer to the *2015–2016 Technical Manual—Science* (DLM Consortium, 2017b).

1.1. State-Specific Supplement Overview

Chapter 1 provides an overview of the contents of the Delaware state-specific supplement.

Chapter 2 and Chapter 3 do not include data specific to a single state and are not included in the state-specific supplement.

Chapter 4 provides a summary of Delaware teacher responses to a subset of the teacher survey administered in spring 2018. The chapter also includes a summary of Delaware student Access Profile selections.

Chapter 5 and Chapter 6 do not include data specific to a single state and are not included in the state-specific supplement.

Chapter 7 reports the 2017–2018 operational results for Delaware, including student participation data. The chapter details the percentage of students at each performance level; subgroup performance by gender, race, ethnicity, and English learner status; and the percentage of students who showed mastery at each linkage level.

Chapter 8, Chapter 9, Chapter 10, and Chapter 11 are not included in the state-specific supplement. For a complete summary, see the *2017–2018 Technical Manual Update—Year-End Model* (DLM Consortium, 2018).

2. Map Development

Learning map models are a unique key feature of the Dynamic Learning Maps® (DLM®) Alternate Assessment System and drive the development of all other components. For a description of the process used to develop the map models, including the detailed work necessary to establish and refine the DLM maps in light of the Common Core State Standards and the needs of the student population, see Chapter 2 of the *2014–2015 Technical Manual—Year-End Model* (DLM Consortium, 2016).

3. Item and Test Development

For a description of updates to the Dynamic Learning Maps® (DLM®) Alternate Assessment System's item and test development for the 2017–2018 academic year, including a summary of external reviews of items and testlets for content, bias, and accessibility; a description of the operational assessments; and a description of field tests, see Chapter 3 of the *2017–2018 Technical Manual Update—Year-End Model* (DLM Consortium, 2018).

For a complete description of item and test development, including information on the use of evidence-centered design and Universal Design for Learning in the creation of concept maps to guide test development; external review of content; and information on the pool of items available for the pilot, field tests, and 2014–2015 administration, see the *2014–2015 Technical Manual—Year-End Model* (DLM Consortium, 2016).

4. Test Administration

Chapter 4 of the Dynamic Learning Maps® (DLM®) Alternate Assessment System 2017–2018 *Technical Manual Update—Year-End Model* (DLM Consortium, 2018) describes general test administration and monitoring procedures. This chapter supplement presents procedures and data collected in 2017–2018 for the state of Delaware, including teacher survey responses regarding user experience and accessibility and Access Profile selections.

For a complete description of test administration for DLM assessments, including information on administration time, available resources and materials, and information on monitoring assessment administration, see the 2014–15 *Technical Manual—Year-End Model* (DLM Consortium, 2016).

4.1. User Experience With the DLM System

User experience with the spring 2018 assessments was evaluated through the spring 2018 survey, which was disseminated to teachers who had administered a DLM assessment during the spring window. This section summarizes Delaware users' experience with the KITE® system. Additional survey responses are reported in the Accessibility section. For teacher responses to the 2014–2015 version of the survey, see Chapter 4 and Chapter 9 of the 2014–15 *Technical Manual—Year-End Model* (DLM Consortium, 2016).

A total of 253 teachers from Delaware responded to the survey (with a response rate of 79.8%) for 758 students.

Participating Delaware teachers responded to surveys for between one and 18 students. Delaware teachers most frequently reported having 0 to 5 years of experience in ELA, mathematics, and with students with significant cognitive disabilities. The median response to the number of years of experience in each of these areas was 6 to 10 years. Approximately 2% indicated they had experience administering the DLM assessment in all four operational years.

The remainder of this section describes Delaware teachers' responses to the portions of the survey addressing educators' experiences with DLM assessments and KITE Client.

4.1.1. Educator Experience

Survey respondents were asked to reflect on their own experience with the assessments as well as their comfort level and knowledge administering them. Most of the questions required teachers to respond on a four-point scale: *strongly disagree*, *disagree*, *agree*, or *strongly agree*. Responses are summarized in Table 4.1.

Nearly all Delaware teachers (88%) agreed or strongly agreed that they were confident administering DLM testlets. Most respondents (73%) agreed or strongly agreed that the required test administrator training prepared them for their responsibilities as test administrators. Most Delaware teachers also responded that manuals and the Educator Resources page helped them understand how to use the system (79%); that they knew how to use accessibility supports, allowable supports, and options for flexibility (90%); and that the Testlet Information Pages helped them deliver the testlets (86%).

Table 4.1. Teacher Responses Regarding Test Administration

Statement	SD		D		A		SA		A+SA	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Confidence in ability to deliver DLM testlets	3	1.8	17	10.1	100	59.2	49	29.0	149	88.2
Test administrator training prepared respondent for responsibilities of test administrator	7	4.2	39	23.2	96	57.1	26	15.5	122	72.6
Manuals and DLM Educator Resources Page materials helped respondent understand how to use assessment system	5	3.0	30	17.8	114	67.5	20	11.8	134	79.3
Respondent knew how to use accessibility features, allowable supports, and options for flexibility	2	1.2	14	8.3	124	73.8	28	16.7	152	90.5
Testlet Information Pages helped respondent to deliver the testlets	1	0.6	22	13.0	114	67.5	32	18.9	146	86.4

Note: SD = strongly disagree; D = disagree; A = agree; SA = strongly agree; A+SA = agree and strongly agree.

4.1.1.1. KITE System

Teachers were asked questions regarding the technology used to administer testlets, including the ease of use of KITE Client and Educator Portal.

The software used for the administration of DLM testlets is KITE Client. Teachers were asked to consider their experiences with KITE Client and respond to each question on a five-point scale: *very hard*, *somewhat hard*, *neither hard nor easy*, *somewhat easy*, or *very easy*. Table 4.2 summarizes teacher responses to these questions.

Delaware respondents found it to be either *somewhat easy* or *very easy* to log in to the system (64%), to navigate within a testlet (69%), to record a response (76%), to submit a completed testlet (78%), and to administer testlets on various devices (62%). Open-ended survey response feedback indicated testlets were easy to administer and that technology had improved compared to previous years.

Table 4.2. Ease of Using KITE Client

Statement	VH		SH		N		SE		VE		SE+VE	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Enter the site	6	3.8	19	12.1	32	20.4	53	33.8	47	29.9	100	63.7
Navigate within a testlet	1	0.6	15	9.6	32	20.4	51	32.5	58	36.9	109	69.4
Record a response	1	0.6	10	6.4	27	17.2	50	31.8	69	43.9	119	75.7
Submit a completed testlet	1	0.6	5	3.2	29	18.7	50	32.3	70	45.2	120	77.5
Administer testlets on various devices	5	3.2	8	5.1	46	29.5	49	31.4	48	30.8	97	62.2

Note: VH = very hard; SH = somewhat hard; N = neither hard nor easy; SE = somewhat easy; VE = very easy; SE+VE = somewhat easy and very easy.

Educator Portal is an area of the KITE system used to store and manage student data and enter PNP and First Contact information. Teachers were asked to assess the ease of navigating and using Educator Portal for its intended purposes. The data are summarized in Table 4.3 using the same scale used to rate experiences with KITE Client. Overall, Delaware respondents' feedback was mixed to favorable: approximately half of teachers found it to be either *somewhat easy* or *very easy* to navigate the site (50%), enter PNP and First Contact information (52%), manage student data (45%), manage their accounts (52%), or manage tests (48%).

Open-ended survey responses indicated that teachers want less wait time between testlet generation. They also want to be able to generate Testlet Information Pages for the entire class at one time.

Table 4.3. Ease of Using Educator Portal

Statement	VH		SH		N		SE		VE		SE+VE	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Navigate the site	7	4.5	34	21.7	38	24.2	57	36.3	21	13.4	78	49.7
Enter Access Profile and First Contact information	4	2.5	21	13.4	50	31.8	62	39.5	20	12.7	82	52.2
Manage student data	6	3.8	29	18.5	52	33.1	54	34.4	16	10.2	70	44.6
Manage my account	5	3.2	21	13.4	49	31.2	63	40.1	19	12.1	82	52.2
Manage tests	7	4.5	27	17.2	48	30.6	50	31.8	25	15.9	75	47.7

Note: VH = very hard; SH = somewhat hard; N = neither hard nor easy; SE = somewhat easy; VE = very easy; SE+VE = somewhat easy and very easy.

Finally, respondents were asked to rate their overall experience with KITE Client and Educator Portal on a four-point scale: *poor*, *fair*, *good*, or *excellent*. Results are summarized in Table 4.4. The majority of respondents reported a positive experience with KITE Client. A total of 72% of respondents rated their KITE Client experience as *good* or *excellent*, while 57% rated their overall experience with Educator Portal as *good* or *excellent*.

Table 4.4. Overall Experience With KITE Client and Educator Portal

Statement	Poor		Fair		Good		Excellent	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
KITE Client	9	5.7	35	22.3	77	49.0	36	22.9
Educator Portal	12	7.6	55	35.0	79	50.3	11	7.0

Overall, feedback from teachers indicated that KITE Client was easy to navigate and user friendly. Teachers also provided useful feedback about how to improve the Educator Portal user experience, which will be considered for technology development for 2018–2019 and beyond.

4.2. Accessibility

Accessibility supports provided in 2017–2018 were the same as those available in previous years. DLM accessibility guidance, in accordance with DLM Consortium (2017d), distinguishes among accessibility supports that are provided in KITE Client via the Access Profile¹, require additional tools or materials, and are provided by the test administrator outside the system.

¹The Access Profile includes both the PNP profile and the First Contact Survey.

Table 4.5 shows selection rates for the three categories of accessibility supports. The most commonly selected supports in Delaware were spoken audio, human read aloud, and calculator. For a complete description of the available accessibility supports, see Chapter 4 in the *2014–15 Technical Manual—Year-End Model* (DLM Consortium, 2016).

Table 4.5. Accessibility Supports Selected for Students ($N = 913$)

Support	<i>n</i>	%
Supports provided in KITE Client via Access Profile		
Spoken audio	503	55.1
Magnification	132	14.5
Color contrast	69	7.6
Overlay color	39	4.3
Invert color choice	20	2.2
Supports requiring additional tools/materials		
Calculator	400	43.8
Individualized manipulatives	357	39.1
Single-switch system	33	3.6
Alternate form - visual impairment	19	2.1
Two-switch system	*	*
Uncontracted braille	*	*
Supports provided outside the system		
Human read aloud	668	73.2
Test administrator enters responses for student	363	39.8
Partner assisted scanning	95	10.4
Sign interpretation of text	*	*
Language translation of text	*	*

* These data were suppressed because $n < 15$.

Table 4.6 describes Delaware teacher responses to survey items about the accessibility supports used during administration. Teachers were asked to respond to two items using a four-point Likert-type scale (*strongly disagree*, *disagree*, *agree*, or *strongly agree*) or indicate if the item did not apply to the student. The majority of Delaware teachers agreed that students were able to effectively use accessibility supports (82%), and that accessibility supports were similar to ones students used for instruction (85%). These data support the conclusions that the accessibility supports of the DLM alternate assessment were effectively used by students, emulated accessibility supports used during instruction, and met student needs for test administration. Additional data will be collected during the spring 2019 survey to determine whether results improve over time.

Table 4.6. Teacher Report of Student Accessibility Experience

Statement	SD		D		A		SA		A+SA		N/A	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Student was able to effectively use accessibility features.	3	1.6	8	4.4	85	46.4	65	35.5	150	81.9	22	12.0
Accessibility features were similar to ones student uses for instruction.	2	1.1	8	4.4	88	48.4	66	36.3	154	84.7	18	9.9

Note: SD = strongly disagree; D = disagree; A = agree; SA = strongly agree; A+SA = agree and strongly agree. N/A = not applicable.

4.3. Conclusion

During the 2017–2018 academic year, the DLM system was available during two testing windows: an optional instructionally embedded window and the spring window. Implementation evidence was collected in the form of teacher survey responses regarding user experience, accessibility, and Access Profile selections. Results from the teacher survey indicated that teachers felt confident administering testlets in the system, that KITE Client was easy to use, and that Educator Portal posed some challenges but had improved since the prior year.

5. Modeling

The Dynamic Learning Maps® (DLM®) Alternate Assessment System draws upon a well-established research base in cognition and learning theory but relatively uncommon operational psychometric methods to provide feedback about student performance. The approach uses innovative operational psychometric methods to provide feedback about student mastery of skills. For a summary of the psychometric model that underlies the DLM assessment system and modeling evidence from the 2017–2018 year, see Chapter 5 of the *2017–2018 Technical Manual Update—Year-End Model* (DLM Consortium, 2018).

For a complete description of the psychometric model used to calibrate and score the DLM assessments, including the psychometric background, the structure of the assessment system suitability for diagnostic modeling, and a detailed summary of the procedures used to calibrate and score DLM assessments, see Chapter 5 of the *2015–2016 Technical Manual Update—Year-End Model* (DLM Consortium, 2017a).

6. Standard Setting

The standard setting process for the Dynamic Learning Maps® (DLM®) Alternate Assessment System in English language arts (ELA) and mathematics derived cut points for assigning students to four performance levels based on results from the 2014–2015 DLM alternate assessments. For a description of the process, including the development of policy performance level descriptors, the 4-day standard setting meeting, follow-up evaluation of impact data and cut points, and specification of grade- and content-specific performance level descriptors, see Chapter 6 of the *2014–2015 Technical Manual—Year-End Model* (DLM Consortium, 2016).

7. Assessment Results

Chapter 7 of the Dynamic Learning Maps® (DLM®) Alternate Assessment System 2017–2018 *Technical Manual Update—Year-End Model* (DLM Consortium, 2018) describes consortium assessment results for the 2017–2018 academic year, including student participation and performance summaries, and an overview of data files and score reports delivered to state partners. This chapter presents Delaware-specific 2017–2018 student participation data; the percentage of students achieving at each performance level; and subgroup performance by gender, race, ethnicity, and English learner (EL) status. This chapter also reports the distribution of students by the highest linkage level mastered during spring 2018. For a complete description of score reports and interpretive guides, see Chapter 7 of the 2014–2015 *Technical Manual—Year-End Model* (DLM Consortium, 2016).

7.1. Student Participation

During spring 2018, assessments were administered to 1,114 students in Delaware. The assessments were administered by 309 educators in 115 schools and 25 school districts.

Table 7.1 summarizes the number of Delaware students tested in each grade. In grades 3 through 8, over 100 students participated in each grade. In high school, the largest number of students participated in grade 11, and the smallest number participated in grade 9.

Table 7.1. Delaware Student Participation by Grade ($N = 1,114$)

Grade	Students (n)
3	135
4	139
5	143
6	156
7	163
8	159
9	*
10	†
11	171

* These data were suppressed because $n < 15$.

† These data were complementarily suppressed.

Table 7.2 summarizes the demographic characteristics of Delaware students who participated in the spring 2018 administration. The majority of participants were male (65%) and a plurality were white (43%). About 2% of students were monitored or eligible for EL services.

Table 7.2. Demographic Characteristics of Participants ($N = 1,114$)

Subgroup	<i>n</i>	%
Gender		
Male	729	65.4
Female	385	34.6
Race		
White	478	42.9
African American	456	40.9
Two or more races	140	12.6
Asian	30	2.7
American Indian	*	*
Native Hawaiian or Pacific Islander	*	*
Hispanic ethnicity		
No	970	87.1
Yes	144	12.9
English learner (EL) participation		
Not EL eligible or monitored	1,094	98.2
EL eligible or monitored	20	1.8

* These data were suppressed because $n < 15$.

In addition to the spring administration, instructionally embedded assessments are also made available for teachers to administer to students during the year. Results from these assessments do not contribute to final summative scoring but can be used to guide instructional decision-making. A total of 26 Delaware students took at least one instructionally embedded testlet during the 2017–2018 academic year.

Table 7.3 summarizes the number of instructionally embedded test sessions taken in ELA and mathematics. In Delaware, students took 22 ELA testlets and 30 mathematics testlets.

Table 7.3. Number of Instructionally Embedded Test Sessions, by Grade

Grade	English language arts	Mathematics
3	2	3
4	4	5
5	1	3
6	5	7
7	6	8
8	2	2
11	2	2
<i>Total</i>	22	30

7.2. Student Performance

Student performance on DLM assessments is interpreted using cut points, determined during standard setting, which separate student scores into four performance levels. For a full description of the standard-setting process, see Chapter 6 of the *2014–2015 Technical Manual—Year-End Model* (DLM Consortium, 2016). A student receives a performance level based on the total number of linkage levels mastered across the assessed Essential Elements (EEs).

For the spring 2018 administration, student performance was reported using the same four performance levels approved by the DLM Consortium for prior years:

- The student demonstrates Emerging understanding of and ability to apply content knowledge and skills represented by the EEs.
- The student’s understanding of and ability to apply targeted content knowledge and skills represented by the EEs is Approaching the Target.
- The student’s understanding of and ability to apply content knowledge and skills represented by the EEs is At Target.
- The student demonstrates Advanced understanding of and ability to apply targeted content knowledge and skills represented by the EEs.

7.2.1. Overall Performance

Table 7.4 reports the percentage of Delaware students achieving at each performance level from the spring 2018 administration for English language arts (ELA) and mathematics. For ELA, the percentage of Delaware students who achieved at the At Target or Advanced levels ranged from approximately 12% to 42%. In mathematics, the percentage of Delaware students meeting or exceeding Target expectations ranged from approximately 8% to 30%.

Table 7.4. Percentage of Students by Grade and Performance Level

Grade	Emerging (%)	Approaching (%)	Target (%)	Advanced (%)	Target+ Advanced (%)
English language arts					
3 (<i>n</i> = 134)	73.1	14.9	11.9	0.0	11.9
4 (<i>n</i> = 137)	50.4	25.5	19.7	4.4	24.1
5 (<i>n</i> = 141)	50.4	19.1	27.7	2.8	30.5
6 (<i>n</i> = 156)	49.4	18.6	21.8	10.3	32.1
7 (<i>n</i> = 162)	37.0	27.8	23.5	11.7	35.2
8 (<i>n</i> = 159)	29.6	28.3	28.9	13.2	42.1
9*	*	*	*	*	*
10†	†	†	†	†	†
11 (<i>n</i> = 170)	22.4	36.5	37.1	4.1	41.2
Mathematics					
3 (<i>n</i> = 134)	66.4	14.9	14.2	4.5	18.7
4 (<i>n</i> = 138)	56.5	13.0	26.1	4.3	30.4
5 (<i>n</i> = 143)	59.4	25.2	9.8	5.6	15.4
6 (<i>n</i> = 155)	54.8	27.1	12.9	5.2	18.1
7 (<i>n</i> = 163)	71.8	20.2	3.1	4.9	8.0
8 (<i>n</i> = 159)	46.5	34.6	17.0	1.9	18.9
9*	*	*	*	*	*
10†	†	†	†	†	†
11 (<i>n</i> = 169)	52.1	39.1	8.9	0.0	8.9

* These data were suppressed because *n* < 15.

† These data were complementarily suppressed.

7.2.2. Subgroup Performance

Data collection for DLM assessments includes demographic data on gender, race, ethnicity, and EL status. Table 7.5 and Table 7.6 summarize the Delaware disaggregated frequency distributions for ELA and mathematics, respectively, collapsed across all assessed grade levels. Rows labeled Missing indicate the student's demographic data were not entered into the system.

Table 7.5. Delaware Students at Each ELA Performance Level, by Demographic Subgroup ($N = 1,107$)

Subgroup	Emerging		Approaching		Target		Advanced	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Gender								
Male	323	44.5	175	24.1	184	25.3	44	6.1
Female	153	40.2	99	26.0	96	25.2	33	8.7
Race								
White	213	44.8	110	23.2	122	25.7	30	6.3
African American	185	40.8	123	27.2	110	24.3	35	7.7
Two or more races	60	42.9	†	†	38	27.1	*	*
Asian	17	58.6	*	*	*	*	*	*
American Indian	*	*	*	*	*	*	*	*
Native Hawaiian or Pacific Islander	*	*	*	*	*	*	*	*
Hispanic ethnicity								
No	410	42.5	240	24.9	244	25.3	71	7.4
Yes	66	46.5	†	†	36	25.4	*	*
English learner (EL) participation								
Not EL eligible or monitored	471	43.3	268	24.6	273	25.1	76	7.0
EL eligible or monitored	*	*	*	*	*	*	*	*

* These data were suppressed because $n < 15$.

† These data were complementarily suppressed.

Table 7.6. Delaware Students at Each Mathematics Performance Level, by Demographic Subgroup ($N = 1,109$)

Subgroup	Emerging		Approaching		Target		Advanced	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Gender								
Male	416	57.3	191	26.3	95	13.1	24	3.3
Female	219	57.2	103	26.9	45	11.7	16	4.2
Race								
White	277	58.4	119	25.1	61	12.9	17	3.6
African American	251	55.2	135	29.7	52	11.4	17	3.7
Two or more races	82	58.6	32	22.9	†	†	*	*
Asian	20	66.7	*	*	*	*	*	*
American Indian	*	*	*	*	*	*	*	*
Native Hawaiian or Pacific Islander	*	*	*	*	*	*	*	*
Hispanic ethnicity								
No	549	56.8	266	27.5	115	11.9	36	3.7
Yes	86	60.1	28	19.6	†	†	*	*
English learner (EL) participation								
Not EL eligible or monitored	625	57.4	287	26.4	137	12.6	40	3.7
EL eligible or monitored	*	*	*	*	*	*	*	*

* These data were suppressed because $n < 15$.

† These data were complementarily suppressed.

7.2.3. Linkage Level Mastery

As described earlier in the chapter, overall performance in each subject is calculated based on the number of linkage levels mastered across all EEs. Results indicate the highest linkage level the student mastered for each EE. The linkage levels are (in order): Initial Precursor, Distal Precursor, Proximal Precursor, Target, and Successor. A student can be a master of zero, one, two, three, four, or all five linkage levels, within the order constraints. For example, if a student masters the Proximal Precursor level, they also master all linkage levels lower in the order (i.e., Initial Precursor and Distal Precursor). This section summarizes the distribution of students by highest linkage level mastered across all EEs. For each student, the highest linkage level mastered across all tested EEs was calculated. Then, for each grade and subject, the number of students with each linkage level as their highest mastered linkage level across all EEs was summed and then divided by the total number of students who tested in the grade and subject. This resulted in the proportion of students for whom each level was the highest level mastered.

Table 7.7 and Table 7.8 report the percentage of Delaware students who mastered each linkage level as the highest linkage level across all EEs for ELA and mathematics, respectively. For example, across all third-grade ELA EEs, the Initial Precursor level was the highest level that students mastered 6% of the time. For ELA, the average percentage of Delaware students who mastered as high as the Target or Successor linkage level across all EEs ranged from approximately 33% in grade 3 to 63% in grade 8.

For mathematics, the average percentage of Delaware students who mastered the Target or Successor linkage level across all EEs ranged from approximately 17% in grade 5 to 39% in grade 8.

Table 7.7. Students' Highest Linkage Level Mastered Across ELA EEs, by Grade

Grade	Linkage Level					
	No evidence (%)	IP (%)	DP (%)	PP (%)	T (%)	S (%)
3 (<i>n</i> = 134)	3.0	6.0	34.3	23.9	15.7	17.2
4 (<i>n</i> = 137)	3.6	5.1	27.7	7.3	10.9	45.3
5 (<i>n</i> = 141)	0.7	4.3	29.1	13.5	6.4	46.1
6 (<i>n</i> = 156)	1.9	7.1	25.0	19.2	6.4	40.4
7 (<i>n</i> = 162)	3.7	3.7	20.4	15.4	13.0	43.8
8 (<i>n</i> = 159)	3.1	1.9	19.5	12.6	14.5	48.4
9*	*	*	*	*	*	*
10†	†	†	†	†	†	†
11 (<i>n</i> = 170)	2.9	2.4	20.6	17.1	17.1	40.0

Note: IP = Initial Precursor; DP = Distal Precursor; PP = Proximal Precursor; T = Target; S = Successor. * These data were suppressed because *n* < 15. † These data were complementarily suppressed.

Table 7.8. Students' Highest Linkage Level Mastered Across Mathematics EEs, by Grade

Grade	Linkage Level					
	No evidence (%)	IP (%)	DP (%)	PP (%)	T (%)	S (%)
3 (<i>n</i> = 134)	6.7	26.1	32.8	16.4	11.9	6.0
4 (<i>n</i> = 138)	2.9	20.3	15.2	31.9	16.7	13.0
5 (<i>n</i> = 143)	4.2	13.3	46.9	18.9	8.4	8.4
6 (<i>n</i> = 155)	5.8	18.1	20.0	31.6	12.3	12.3
7 (<i>n</i> = 163)	4.9	17.2	20.9	28.8	19.6	8.6
8 (<i>n</i> = 159)	5.7	8.2	18.2	28.9	21.4	17.6
9*	*	*	*	*	*	*
10†	†	†	†	†	†	†
11 (<i>n</i> = 169)	3.6	20.7	47.3	11.2	13.6	3.6

Note: IP = Initial Precursor; DP = Distal Precursor; PP = Proximal Precursor; T = Target; S = Successor. * These data were suppressed because *n* < 15. † These data were complementarily suppressed.

8. Reliability

The Dynamic Learning Maps® (DLM®) Alternate Assessment System uses nontraditional psychometric models (i.e., diagnostic classification models) to produce student score reports. As such, evidence for the reliability of results is based on methods that are commensurate with the models used to produce score reports. For a summary of the methods used to estimate reliability and reliability evidence from the 2017–2018 year, see Chapter 8 of the *2017–2018 Technical Manual Update—Year-End Model* (DLM Consortium, 2018).

For a complete description of the simulation-based methods used to calculate reliability for DLM assessments, including the psychometric background, see Chapter 8 of the *2015–2016 Technical Manual Update—Year-End Model* (DLM Consortium, 2017a).

9. Validity Studies

Evidence in support of the overall validity argument for results produced by the Dynamic Learning Maps® (DLM®) Alternate Assessment System is summarized in the chapters of the *2017–2018 Technical Manual Update—Year-End Model* (DLM Consortium, 2018), the *2014–2015 Technical Manual—Year-End Model* (DLM Consortium, 2016), and the other annual technical manual updates (DLM Consortium, 2017a; DLM Consortium, 2017c). For a description of additional evidence collected during 2017–2018 for the five critical sources of evidence (i.e., evidence based on test content, response process, internal structure, relation to other variables, and consequences of testing), as described in the *Standards for Educational and Psychological Testing* (American Educational Research Association, American Psychological Association, & National Council on Measurement in Education [AERA et al.], 2014), see Chapter 9 of the *2017–2018 Technical Manual Update—Year-End Model* (DLM Consortium, 2018).

10. Training and Professional Development

For a description of the optional professional development available for the Dynamic Learning Maps® (DLM®) Alternate Assessment System during 2017–2018, see Chapter 10 of the *2017–2018 Technical Manual Update—Year-End Model* (DLM Consortium, 2018).

For a complete description of facilitated and self-directed training and professional development for DLM assessments, including a description of training for state and local education agency staff, see Chapter 10 of the *2014–2015 Technical Manual—Year-End Model* (DLM Consortium, 2016).

11. Conclusion and Discussion

The Dynamic Learning Maps® (DLM®) Alternate Assessment System is based on the core belief that all students should have access to challenging, grade-level academic content. Therefore, the DLM assessments provide students with the most significant cognitive disabilities the opportunity to demonstrate what they know and can do. It is designed to map students' learning after a full year of instruction.

The DLM system completed its fourth operational administration year in 2017–2018. The chapters of the *2017–2018 Technical Manual Update—Year-End Model* (DLM Consortium, 2018) provide updated evidence from the 2017–2018 year to support the propositions and assumptions that undergird the assessment system as described at the onset of its design in the DLM theory of action. Chapter 11 of the *2017–2018 Technical Manual Update—Year-End Model* (DLM Consortium, 2018) summarizes that manual's contents and describes plans for future studies. For a complete summary of evidence collected for the DLM theory of action, also see the *2014–2015 Technical Manual—Year-End Model* (DLM Consortium, 2016).

12. References

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