DYNAMIC®
LEARNING MAPS

# *2018–2019 Technical Manual Update*

Delaware Science Supplement

**February 2020**

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**W. Jake Thompson, Ph.D.**, *Psychometrician*
**Brianna Beitling**, *Psychometrician Assistant*
**Elizabeth Kavitsky**, *Research Project Specialist*
**Amy Clark, Ph.D.**, *Associate Director for Operational Research*
**Brooke Nash, Ph.D.**, *Associate Director for Psychometrics*

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**Greg Camilli, Ph.D.**, *Rutgers University*
**Karla Egan, Ph.D.**, *Independent Consultant*
**Robert Henson, Ph.D.**, *University of North Carolina-Greensboro*
**James Pellegrino, Ph.D.**, *University of Illinois-Chicago*
**Edward Roeber, Ph.D.**, *Assessment Solutions Group/Michigan Assessment Consortium*
**David Williamson, Ph.D.**, *Educational Testing Service*
**Phoebe Winter, Ph.D.**, *Independent Consultant*

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# 1. Introduction

During the 2018–2019 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 science (Dynamic Learning Maps Consortium [DLM Consortium], 2017). Additionally, the 2018–2019 update to the science technical manual provides updated information for the 2018–2019 administration, including only sections with changes (DLM Consortium, 2019a). 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, 2016b). For a complete description of DLM science assessments, refer to the *2015–2016 Technical Manual—Science* (DLM Consortium, 2017).

## 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 an update on test administration for Delaware during the 2018–2019 year. The chapter provides updated information about adaptive routing in the system, Personal Needs and Preferences Profile selections, and teacher survey results regarding educator experience and system accessibility.

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 2018–2019 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. Finally, the chapter provides descriptions of changes to score reports and data files during the 2018–2019 administration.

Chapter 8, Chapter 9, Chapter 10, and Chapter 11 are not included in the state-specific supplement. For a complete summary, see the *2018–2019 Technical Manual Update—Science* (DLM Consortium, 2019a).

# 2. Essential Element Development

Essential Elements (EEs) are a key feature of the Dynamic Learning Maps® (DLM®) Alternate Assessment System, and serve as the conceptual and content basis for the DLM alternate assessment for science. For a description of the process used to develop the EEs, including the detailed work necessary to align them to the *Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas* (National Research Council, 2012) and the Next Generation Science Standards (NGSS Lead States [NGSS], 2013), and to the needs of the student population, see Chapter 2 of the *2015–2016 Technical Manual—Science* (DLM Consortium, 2017).

# 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 2018–2019 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 *2018–2019 Technical Manual Update—Science* (DLM Consortium, 2019a).

For a complete description of item and test development, including a summary of item and testlet information; external reviews of items and testlets for content, bias, and accessibility; a description of operational assessments; and a description of field tests, see Chapter 3 of the *2015–2016 Technical Manual—Science* (DLM Consortium, 2017).

# 4. Test Administration

Chapter 4 of the Dynamic Learning Maps® (DLM®) Alternate Assessment System *2018–2019 Technical Manual Update—Science* (DLM Consortium, 2019a) describes general test administration and monitoring procedures. This chapter supplement presents procedures and data collected in 2018–2019 for the state of Delaware, including a summary of total testing time, the adaptive delivery of testlets in the spring window, teacher survey responses regarding user experience and accessibility, and Personal Needs and Preferences (PNP) profile selections.

For a complete description of test administration for DLM assessments, including information on available resources and materials and information on monitoring assessment administration, see the *2015–2016 Technical Manual—Science* (DLM Consortium, 2017).

## 4.1. Administration Evidence

This section describes evidence collected during the spring 2019 operational administration of the DLM Science alternate assessment. The categories of evidence include data relating to administration time and the adaptive delivery of testlets in the spring window.

### *4.1.1. Administration Time*

Estimated administration time varies by student and subject. During the spring testing window, estimated total testing time was between 45-135 minutes per student, with each testlet taking approximately 5-15 minutes. Actual testing time per testlet varies depending on each student's unique characteristics.

Kite® Student Portal captured start and end dates and time stamps for every testlet. Actual testing time per testlet was calculated as the difference between start and end times. Table 4.1 shows the distribution of test times per testlet. Most testlets took approximately 2-3 minutes to complete. Testlets time out after 90 minutes.

Table 4.1. Distribution of Response Times per Testlet in Minutes

| Grade | Min | Median | Mean | Max | 25Q | 75Q | IQR |
|---|---|---|---|---|---|---|---|
| 3-5 | 0.17 | 2.06 | 2.64 | 52.15 | 1.38 | 3.05 | 1.67 |
| 6-8 | 0.15 | 1.97 | 2.61 | 56.37 | 1.20 | 3.23 | 2.03 |
| 9-12 | 0.22 | 2.23 | 2.74 | 77.08 | 1.53 | 3.23 | 1.70 |

*Note:* 25Q = lower quartile; 75Q = upper quartile; IQR = interquartile range.

### *4.1.2. Adaptive Delivery*

During the spring 2019 test administration, the science assessment was adaptive between testlets, following the same routing rules applied in prior years. That is, the linkage level associated with the next testlet a student received was based on the student's performance on the most recently administered testlet, with the specific goal of maximizing the match of student knowledge and skill to the appropriate linkage level content.

- The system adapted up one linkage level if the student responded correctly to at least 80% of the items measuring the previously tested EE. If the previous testlet was at the highest linkage level (i.e., Target), the student remained at that level.
- The system adapted down one linkage level if the student responded correctly to less than 35% of the items measuring the previously tested EE. If the previous testlet was at the lowest linkage level (i.e., Initial), the student remained at that level.
- Testlets remained at the same linkage level if the student responded correctly to between 35% and 80% of the items on the previously tested EE.

The linkage level of the first testlet assigned to a student was based on First Contact survey responses. The correspondence between the First Contact complexity bands and first assigned linkage levels are shown in Table 4.2.

Table 4.2. Correspondence of Complexity Bands and Linkage Level

| First Contact complexity band | Linkage level |
|---|---|
| Foundational | Initial |
| 1 | Initial |
| 2 | Precursor |
| 3 | Target |

For a complete description of adaptive delivery procedures, see Chapter 4 of the *2015–2016 Technical Manual—Science* (DLM Consortium, 2017).

Following the spring 2019 administration, analyses were conducted to determine the mean percentage of testlets that adapted up a linkage level, stayed at the same linkage level, or adapted down a linkage level from the first to second testlet administered for students within a grade band or course and complexity band. The aggregated results can be seen in Table 4.3.

Due to small sample size, data regarding the adaptation of linkage levels was only available for Delaware students assigned to Complexity Band 1 and Band 2. For elementary and middle school students in Band 1, the majority of students adapted up to a higher linkage level (ranging from 63% to 71%). The tendency for Complexity Band 1 students to adapt up to a higher linkage level is an expected finding given that the Foundational and Band 1 students are both assigned content at the Initial linkage level. Additional analyses are planned to evaluate the adaptation pathways for students assigned to Band 1 in order to determine if changes to the assignment process are needed.

Results also indicate that students assigned to Band 2 were more variable with respect to the direction in which they move between the first and second testlets. Several factors may help explain these results, including more variability in student characteristics within this group and content-based differences across grade bands. Further exploration is needed in this area. For a description of previous findings, see Chapter 4 of the *2015–2016 Technical Manual—Science* (DLM Consortium, 2017), and the *2016–2017 Technical Manual Update—Science* (DLM Consortium, 2018a).

Table 4.3. Adaptation of Linkage Levels Between First and Second Science Testlets ($N$ = 463)

| Grade | Foundational | | Band 1 | | Band 2 | | | Band 3 | |
|---|---|---|---|---|---|---|---|---|---|
| | Adapted Up (%) | Did Not Adapt (%) | Adapted Up (%) | Did Not Adapt (%) | Adapted Up (%) | Did Not Adapt (%) | Adapted Down (%) | Did Not Adapt (%) | Adapted Down (%) |
| 3–5 | * | * | 71.0 | 29.0 | 18.0 | 54.0 | 28.0 | * | * |
| 6–8 | * | * | 62.7 | 37.3 | * | * | * | * | * |
| Biology | * | * | * | * | 24.1 | 33.3 | 42.6 | * | * |

* These data were suppressed because $n < 50$.

*Note:* Foundational and Band 1 correspond to testlets at the lowest linkage level, so testlets could not adapt down a linkage level. Band 3 corresponds to testlets at the highest linkage level in science, so testlets could not adapt up a linkage level.

### *4.1.3. Administration Incidents*

As in all previous operational years, testlet assignment during the spring 2019 assessment window was monitored to ensure students were correctly assigned to testlets. Administration incidents that have the potential to affect scoring are reported to states in a supplemental Incident File. Improving on the previous operational years, no incidents were observed during the spring 2019 science administration. Assignment to testlets will continue to be monitored in subsequent years to track any potential incidents and report them to state partners.

## 4.2. Implementation Evidence

This section describes evidence collected during the spring 2019 operational implementation of the DLM Science alternate assessment. The categories of evidence include survey data relating to user experience and accessibility.

### *4.2.1. User Experience with the DLM System*

User experience with the 2018–2019 assessments was evaluated through the spring 2019 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 2015–2016 version of the survey, see Chapter 4 and Chapter 9 of the *2015–2016 Technical Manual—Science* (DLM Consortium, 2017).

A total of 166 teachers from Delaware responded to the survey (with a response rate of 81%) for 361 students.

Participating Delaware teachers responded to surveys for between one and 9 students. Delaware teachers reported having an average of 8 years of experience in science and 9 years of experience with students with significant cognitive disabilities. The median response to the number of years of experience in science was 7 years, and the median experience with students with significant cognitive disabilities was 8 years. Approximately 8% 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 Student Portal and Educator Portal.

#### 4.2.1.1. 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 4.4.

Nearly all Delaware teachers (92%) agreed or strongly agreed that they were confident administering DLM testlets. Most respondents (82%) agreed or strongly agreed that the required test administrator training prepared them for their responsibilities as test administrators. Most Delaware teachers also responded that they used the manuals and the Educator Resources page (90%) and that they had

access to curriculum aligned with the content measured by DLM assessments (80%).

Table 4.4. Teacher Responses Regarding Test Administration

| Statement | SD | | D | | A | | SA | | A+SA | |
|---|---|---|---|---|---|---|---|---|---|---|
| | *n* | % | *n* | % | *n* | % | *n* | % | *n* | % |
| I was confident in my ability to deliver DLM testlets. | 0 | 0.0 | 8 | 7.6 | 45 | 42.9 | 52 | 49.5 | 97 | 92.4 |
| I used manuals and/or the DLM Educator Resource Page materials. | 2 | 1.9 | 9 | 8.6 | 56 | 53.3 | 38 | 36.2 | 94 | 89.5 |
| Required test administrator training prepared me for the responsibilities of a test administrator. | 4 | 3.9 | 14 | 13.6 | 50 | 48.5 | 35 | 34.0 | 85 | 82.5 |
| I have access to curriculum aligned with the content measured by DLM assessments. | 5 | 4.8 | 16 | 15.2 | 55 | 52.4 | 29 | 27.6 | 84 | 80.0 |

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

#### 4.2.1.2. Kite System

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

The software used for the administration of DLM testlets is Kite Student Portal. Teachers were asked to consider their experiences with Kite Student Portal and respond to each question on a four-point scale: *very hard*, *somewhat hard*, *somewhat easy,* or *very easy*. Table 4.5 summarizes teacher responses to these questions.

Delaware respondents found it to be either *somewhat easy* or *very easy* to record a response (92%), to submit a completed testlet (90%), to navigate within a testlet (89%), to enter the site (87%), and to administer testlets on various devices (81%).

Table 4.5. Ease of Using Kite Student Portal

| | VH | | SH | | SE | | VE | | SE+VE | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Statement** | ***n*** | **%** | ***n*** | **%** | ***n*** | **%** | ***n*** | **%** | ***n*** | **%** |
| Record a response | NA | NA | 7 | 8.4 | 30 | 36.1 | 46 | 55.4 | 76 | 91.5 |
| Submit a completed testlet | 1 | 1.2 | 7 | 8.4 | 29 | 34.9 | 46 | 55.4 | 75 | 90.3 |
| Navigate within a testlet | 3 | 3.6 | 6 | 7.2 | 31 | 37.3 | 43 | 51.8 | 74 | 89.1 |
| Enter the site | 3 | 3.6 | 8 | 9.6 | 36 | 43.4 | 36 | 43.4 | 72 | 86.8 |
| Administer testlets on various devices | 5 | 6.0 | 11 | 13.3 | 33 | 39.8 | 34 | 41.0 | 67 | 80.8 |

*Note:* VH = very hard; SH = somewhat hard; 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. To address teachers' feedback from prior administrations, the appearance and functionality of Educator Portal was updated during the summer of 2018. The update focused on the improvement of user experience, accessibility, and a general improvement to the look, feel, and functionality of Educator Portal without causing undue disruption to how educators use the application. Updates made to Educator Portal during the summer of 2018 included: updating the user interface to be more intuitive, have a more logical flow, display auto-populated fields, and restrict users from saving incomplete records; reordering tabs to be more intuitive; updating the color scheme to be consistent across the application; and rewriting data upload error messages in nontechnical language instead of programming language.

Teachers were asked to assess the ease of navigating and using Educator Portal for its intended purposes. The data are summarized in Table 4.6 using the same scale used to rate experiences with Kite Student Portal. Overall, Delaware respondents' feedback was generally favorable: the majority of teachers found it to be either *somewhat easy* or *very easy* to enter PNP and First Contact information (83%), manage their accounts (84%), manage tests (78%), manage student data (83%), or navigate the site (78%). The percentages of respondents responding *somewhat easy* or *very easy* increased from 2017–2018, reflecting the improvements made to the system (DLM Consortium, 2018b).

Table 4.6. Ease of Using Educator Portal

| Statement | VH | | SH | | SE | | VE | | SE+VE | |
|---|---|---|---|---|---|---|---|---|---|---|
| | *n* | % | *n* | % | *n* | % | *n* | % | *n* | % |
| Manage my account | 3 | 3.6 | 10 | 12.0 | 38 | 45.8 | 32 | 38.6 | 70 | 84.4 |
| Enter PNP/Access Profile and First Contact information | 3 | 3.6 | 11 | 13.3 | 38 | 45.8 | 31 | 37.3 | 69 | 83.1 |
| Manage student data | 4 | 4.8 | 10 | 12.0 | 41 | 49.4 | 28 | 33.7 | 69 | 83.1 |
| Navigate the site | 8 | 9.6 | 10 | 12.0 | 36 | 43.4 | 29 | 34.9 | 65 | 78.3 |
| Manage tests | 4 | 4.8 | 14 | 16.9 | 36 | 43.4 | 29 | 34.9 | 65 | 78.3 |

*Note:* VH = very hard; SH = somewhat hard; SE = somewhat easy; VE = very easy; SE+VE = somewhat easy and very easy.

Finally, respondents were asked to rate their overall experience with Kite Student Portal and Educator Portal on a four-point scale: *poor, fair, good,* or *excellent*. Results are summarized in Table 4.7. The majority of respondents reported a positive experience with Kite Student Portal. A total of 80% of respondents rated their Kite Student Portal experience as *good* or *excellent*, while 76% rated their overall experience with Educator Portal as *good* or *excellent*.

Table 4.7. Overall Experience With Kite Student Portal and Educator Portal

| Statement | Poor | | Fair | | Good | | Excellent | | Good + Excellent | |
|---|---|---|---|---|---|---|---|---|---|---|
| | *n* | % | *n* | % | *n* | % | *n* | % | *n* | % |
| Student Portal | 7 | 8.4 | 10 | 12.0 | 36 | 43.4 | 30 | 36.1 | 66 | 79.5 |
| Educator Portal | 9 | 10.8 | 11 | 13.3 | 44 | 53.0 | 19 | 22.9 | 63 | 75.9 |

Overall, feedback from teachers indicated that Kite Student Portal and Educator Portal was easy to navigate and user friendly. Teachers also provided useful feedback about how to continue to improve the Educator Portal user experience, which will be considered for technology development for 2019-–2020 and beyond.

### *4.2.2. Accessibility*

Accessibility supports provided in 2018–2019 were the same as those available in previous years. The *DLM Accessibility Manual* (DLM Consortium, 2019b), distinguishes accessibility supports that are provided in Kite Student Portal via the Personal Needs and Preferences Profile, require additional tools or materials, or are provided by the test administrator outside the system.

Table 4.8 shows selection rates for the three categories of accessibility supports. The most commonly selected supports in Delaware were human read aloud, test administrator enters responses for student, and calculator. For a complete description of the available accessibility supports, see

Chapter 4 in the *2015–2016 Technical Manual—Science* (DLM Consortium, 2017).

Table 4.8. Accessibility Supports Selected for Students ($N$ = 407)

| Support | *n* | % |
|---|---|---|
| **Supports provided in Kite Student Portal** | | |
| Spoken audio | 104 | 25.6 |
| Magnification | 54 | 13.3 |
| Color contrast | 33 | 8.1 |
| Overlay color | * | * |
| Invert color choice | * | * |
| **Supports requiring additional tools/materials** | | |
| Calculator | 193 | 47.4 |
| Individualized manipulatives | 160 | 39.3 |
| Single-switch system | * | * |
| Alternate form - visual impairment | * | * |
| Two-switch system | * | * |
| Uncontracted braille | * | * |
| **Supports provided outside the system** | | |
| Human read aloud | 316 | 77.6 |
| Test administrator enters responses for student | 187 | 45.9 |
| Partner assisted scanning | 44 | 10.8 |
| Sign interpretation of text | * | * |
| Language translation of text | * | * |

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

Table 4.9 describes teacher responses to survey items about the accessibility supports used during administration. Teachers were asked whether the student was able to effectively use available accessibility supports and whether the accessibility supports were similar to the ones used for instruction. The majority of teachers agreed that students were able to effectively use accessibility supports (93%), however most teachers did not agree that the accessibility supports were similar to ones students used for instruction (83%). While states and districts have differing policies for whether to include accessibility supports on the student's IEP, less than half of responses (40%) indicated supports were included.

Table 4.9. Teacher Report of Student Accessibility Experience

| | Agree | | Disagree | |
|---|---|---|---|---|
| **Statement** | ***n*** | **%** | ***n*** | **%** |
| Student was able to effectively use accessibility features. | 85 | 93.4 | 6 | 6.6 |
| Accessibility features were similar to ones student uses for instruction. | 1 | 16.7 | 5 | 83.3 |

Of the teachers who reported that their student was unable to effectively use the accessibility supports (7%), the most commonly reported reason in Delaware was that the student could not provide a response even with the support provided (83%).

Table 4.10. Reason Student was Unable to Effectively Use Available Accessibility Supports

| **Reason** | ***n*** | **%** |
|---|---|---|
| Student could not provide a response even with support | 5 | 83.3 |
| Student was unfamiliar with support | 2 | 33.3 |
| Student needed a support which was not available or allowed | 1 | 16.7 |
| Technology problem | 0 | 0.0 |
| Student refused support during testing | | |

Teachers have several allowable options for flexibility while assessing students. Of these options for flexibility, teachers most frequently reported using breaks (70%), reinforcement (61%), or individualized student response mode (31%). Additionally, 21% of teachers reported adapting or substituting materials.

Table 4.11. Options for Flexibility Teachers Reported Utilizing for a Student

| Option | *n* | % |
|---|---|---|
| Breaks | 63 | 70.0 |
| Use of reinforcement | 55 | 61.1 |
| Individualized student response mode | 28 | 31.1 |
| Blank paper | 21 | 23.3 |
| Navigation across screens | 18 | 20.0 |
| None of these | 12 | 13.3 |
| Generic definitions | 11 | 12.2 |
| Alternate representation of answer options | 10 | 11.1 |
| Special equipment for positioning | 5 | 5.6 |
| Graphic organizer | 4 | 4.4 |
| Display testlet on interactive whiteboard | 2 | 2.2 |

While overall these data support the conclusion that the accessibility supports of the DLM alternate assessment were effectively used by students, additional data will be collected during spring 2020 to determine whether additional improvements can be made to ensure all students can access DLM assessments.

## 4.3. Conclusion

During the 2018–2019 academic year, the DLM system was available during two testing windows: an optional instructionally embedded window and the required spring window. Implementation evidence was collected in the form of teacher survey responses regarding user experience, accessibility, and Profile selections. Results from the teacher survey indicated that teachers felt confident administering testlets in the system, that Kite Student Portal was easy to use, and that Educator Portal 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 2018–2019 year, see Chapter 5 of the *2018–2019 Technical Manual Update—Science* (DLM Consortium, 2019a).

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—Science* (DLM Consortium, 2017).

# 6. Standard Setting

The standard setting process for the Dynamic Learning Maps® (DLM®) Alternate Assessment System in science derived cut points for assigning students to four performance levels. For a description of the process, including the development of policy performance level descriptors, the 3-day standard setting meeting, follow-up evaluation of impact data and cut points, and specification of grade-specific performance level descriptors, see Chapter 6 of the *2015–2016 Technical Manual—Science* (DLM Consortium, 2017).

# 7. Assessment Results

Chapter 7 of the Dynamic Learning Maps® (DLM®) Alternate Assessment System *2018–2019 Technical Manual Update—Science* (DLM Consortium, 2019a) describes consortium assessment results for the 2018–2019 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 2018–2019 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 2019. Finally, this chapter describes updates made to score reports and data files during spring 2019. For a complete description of score reports and interpretive guides, see Chapter 7 of the *2015–2016 Technical Manual—Science* (DLM Consortium, 2017).

## 7.1. Student Participation

During spring 2019, science assessments were administered to 472 students in Delaware. The assessments were administered by 196 educators in 94 schools and 22 school districts.

Table 7.1 summarizes the number of Delaware students assessed in each grade and course. More than 100 students participated in each of the elementary (grades 3-5) and the middle school (grades 6-8) grade bands. In biology (grades 9-12) almost 200 students participated.

Table 7.1. Delaware Student Participation by Grade or Course ($N$ = 472)

| Grade | Students ($n$) |
|---|---|
| 5 | 146 |
| 6 | * |
| 7 | * |
| 8 | 162 |
| Biology | 161 |

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

Table 7.2 summarizes the demographic characteristics of Delaware students who participated in the spring 2019 administration. The majority of participants were male (67%) and white (41%). Less than 1% of students were monitored or eligible for EL services.

Table 7.2. Demographic Characteristics of Participants ($N$ = 472)

| Subgroup | *n* | % |
|---|---|---|
| **Gender** | | |
| Male | 315 | 66.7 |
| Female | 157 | 33.3 |
| **Race** | | |
| White | 193 | 40.9 |
| African American | 181 | 38.3 |
| Two or more races | 79 | 16.7 |
| Asian | † | † |
| American Indian | * | * |
| **Hispanic ethnicity** | | |
| No | 403 | 85.4 |
| Yes | 69 | 14.6 |
| **English learner (EL) participation** | | |
| Not EL eligible or monitored | † | † |
| EL eligible or monitored | * | * |

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

In addition to the spring administration, instructionally embedded science assessments are also made available for teachers to administer to students during the year. Results from the instructionally embedded science assessments do not contribute to final summative scoring but can be used to guide instructional decision-making. A total of 14 Delaware students took at least one instructionally embedded testlet during the 2018–2019 academic year.

Table 7.3 summarizes the number of instructionally embedded test sessions taken in science. In Delaware, students took 16 total testlets during the instructionally embedded window.

Table 7.3. Number of Instructionally Embedded Science Test Sessions, by Grade or Course ($N$ = 16)

| Grade | *n* |
|---|---|
| 5 | 4 |
| 6 | 0 |
| 7 | 0 |
| 8 | 4 |
| Biology | 8 |

## 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 *2015–2016 Technical Manual—Science* (DLM Consortium, 2017). A student receives a performance level based on the total number of linkage levels mastered across the assessed Essential Elements (EEs).

For the spring 2019 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 2019 administration for science.

The spring 2019 results were fairly consistent with performance in prior years, with the majority of students achieving at either the Emerging or Approaching the Target performance levels. At the elementary level, the percentage of students who achieved at the At Target or Advanced levels was 11%; in middle school grades 18% achieved at the At Target or Advanced levels; and in high school end-of-instruction biology, the percentage was 20%.

Table 7.4. Percentage of Students by Grade and Performance Level

| Grade | Emerging (%) | Approaching (%) | Target (%) | Advanced (%) | Target+ Advanced (%) |
|---|---|---|---|---|---|
| 5 ($n$ = 146) | 72.6 | 16.4 | 9.6 | 1.4 | 11.0 |
| 6* | * | * | * | * | * |
| 7* | * | * | * | * | * |
| 8 ($n$ = 162) | 53.1 | 28.4 | 17.3 | 1.2 | 18.5 |
| Biology ($n$ = 161) | 60.2 | 19.9 | 14.9 | 5.0 | 19.9 |

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

### *7.2.2. Subgroup Performance*

Data collection for DLM assessments includes demographic data on gender, race, ethnicity, and EL status. Table 7.5 summarizes the Delaware disaggregated frequency distributions for science, collapsed across all assessed grade levels.

Table 7.5. Students at Each Performance Level, by Demographic Subgroup ($N$ = 472)

| Subgroup | Emerging | | Approaching | | Target | | Advanced | |
|---|---|---|---|---|---|---|---|---|
| | *n* | % | *n* | % | *n* | % | *n* | % |
| **Gender** | | | | | | | | |
| Male | 193 | 61.3 | 70 | 22.2 | † | † | * | * |
| Female | 98 | 62.4 | 33 | 21.0 | † | † | * | * |
| **Race** | | | | | | | | |
| White | 114 | 59.1 | 43 | 22.3 | † | † | * | * |
| African American | 113 | 62.4 | 38 | 21.0 | † | † | * | * |
| Two or more races | 48 | 60.8 | 21 | 26.6 | * | * | * | * |
| Asian | * | * | * | * | * | * | * | * |
| American Indian | * | * | * | * | * | * | * | * |
| **Hispanic ethnicity** | | | | | | | | |
| No | 245 | 60.8 | 87 | 21.6 | † | † | * | * |
| Yes | 46 | 66.7 | 16 | 23.2 | * | * | * | * |
| **English learner (EL) participation** | | | | | | | | |
| Not EL eligible or monitored | 290 | 61.6 | 103 | 21.9 | † | † | * | * |
| 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, and Target. A student can be a master of zero, one, two, or all three linkage levels, within the order constraints. For example, if a student masters the Precursor level, they also master the Initial linkage level. 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, 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. This resulted in the proportion of students for whom each level was the highest level mastered.

Table 7.6 reports the percentage of Delaware students who mastered each linkage level as the highest linkage level across all EEs for each grade. For example, across all fifth-grade EEs, the Initial level was the highest level that students mastered 38% of the time. The percentage of students who mastered as high as the Target linkage level ranged from approximately 35% in end-of-instruction biology to 44% in grade eight.

Table 7.6. Students' Highest Linkage Level Mastered Across Science EEs, by Grade

| Grade | Linkage Level | | | |
|---|---|---|---|---|
| | No evidence (%) | Initial (%) | Precursor (%) | Target (%) |
| 5 ($n$ = 146) | 6.2 | 38.4 | 19.2 | 36.3 |
| 6* | * | * | * | * |
| 7* | * | * | * | * |
| 8 ($n$ = 162) | 5.6 | 17.9 | 32.7 | 43.8 |
| Biology ($n$ = 161) | 3.7 | 36.6 | 24.8 | 34.8 |

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

## 7.3. Data Files

Data files were made available to DLM state partners following the spring 2019 administration. Similar to prior years, the General Research File (GRF) contained student results, including each student's highest linkage level mastered for each EE and final performance level for the subject for all students who completed any testlets. In addition to the GRF, the DLM Consortium delivered several supplemental files. Consistent with prior years, the Special Circumstances File provided information about which students and EEs were affected by extenuating circumstances (e.g., chronic absences), as defined by each state. State partners also received a supplemental file to identify exited students. The exited students file included all students who exited at any point during the academic year. In the event of observed incidents during assessment delivery, state partners are provided with an Incident File describing students impacted.

Consistent with prior delivery cycles, state partners were provided with a two-week review window following data file delivery to review the files and invalidate student records in the GRF. Decisions about whether to invalidate student records are informed by individual state policy. If changes were made to the GRF, state partners submitted final GRFs via Educator Portal. The final GRF was used to generate score reports.

In addition to the GRF and its supplemental files, participating states were provided with two additional de-identified data files: a teacher survey data file and a test administration observations data file. The teacher survey file provided state-specific teacher survey responses, with all identifying information about the student and educator removed. The test administration observations file provided test administration observation responses with any identifying information removed. For more information regarding teacher survey content and response rates, see Chapter 4 of the *2018–2019 Technical Manual—Science* (DLM Consortium, 2019a). For more information about test administration observation results, see Chapter 9 of the *2018–2019 Technical Manual—Science* (DLM Consortium, 2019a).

## 7.4. Score Reports

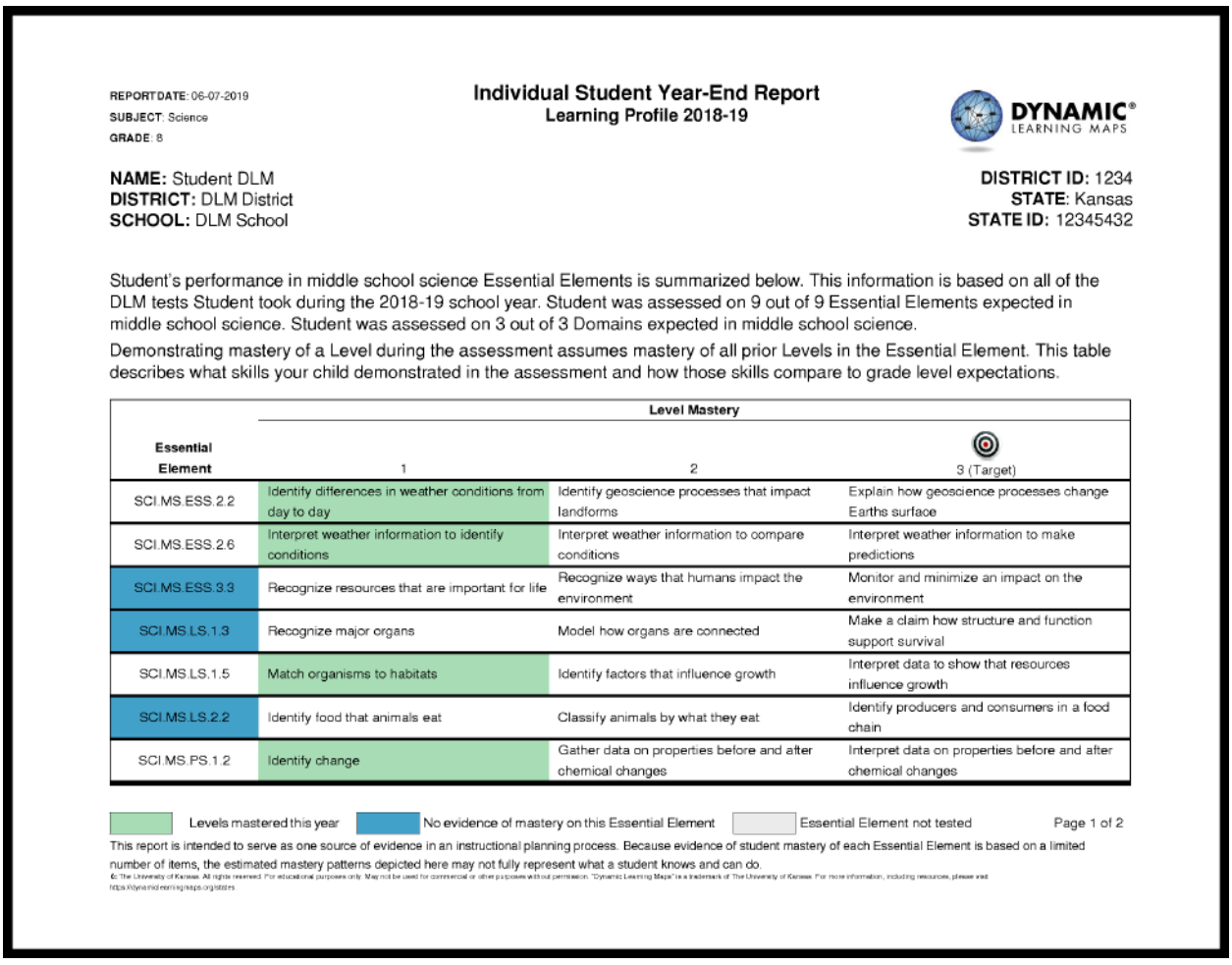
The DLM Consortium provides assessment results to all member states to report to parents/guardians, educators, and state and local education agencies. Individual Student Score Reports summarized student performance on the assessment by subject. Several aggregated reports were provided to state and local education agencies, including reports for the classroom, school,

district, and state. No changes were made to the structure of aggregated reports during spring 2019. Changes to the Individual Student Score Reports are summarized below. For a complete description of score reports, including aggregated reports, see Chapter 7 of the *2014–2015 Technical Manual—Integrated Model* (DLM Consortium, 2016a).

### *7.4.1. Individual Student Score Reports*

During the 2018–2019 year, minor changes were made to the Individual Student Score Reports. A website was added to the footnote of the report which linked to additional resources related to the DLM assessment and understanding student results. On the Performance Profile portion of the report, a text description of the bar graphs was added to aid in interpretation. On the Learning Profile portion of the report, a cautionary statement was added to the footer to also aid in interpretation of results.

A sample Learning Profile reflecting the 2019 changes is provided in Figure 7.1. A sample Performance Profile portion of the report reflecting the 2019 changes is provided in Figure 7.2.



REPORT DATE: 06-07-2019
SUBJECT: Science
GRADE: 8

**Individual Student Year-End Report**
**Learning Profile 2018-19**

DYNAMIC® LEARNING MAPS

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

**DISTRICT ID:** 1234
**STATE:** Kansas
**STATE ID:** 12345432

Student's performance in middle school science Essential Elements is summarized below. This information is based on all of the DLM tests Student took during the 2018-19 school year. Student was assessed on 9 out of 9 Essential Elements expected in middle school science. Student was assessed on 3 out of 3 Domains expected in middle school science.

Demonstrating mastery of a Level during the assessment assumes mastery of all prior Levels in the Essential Element. This table describes what skills your child demonstrated in the assessment and how those skills compare to grade level expectations.

| | Level Mastery | | |
|---|---|---|---|
| Essential Element | 1 | 2 | 3 (Target) |
| SCI.MS.ESS.2.2 | Identify differences in weather conditions from day to day | Identify geoscience processes that impact landforms | Explain how geoscience processes change Earths surface |
| SCI.MS.ESS.2.6 | Interpret weather information to identify conditions | Interpret weather information to compare conditions | Interpret weather information to make predictions |
| SCI.MS.ESS.3.3 | Recognize resources that are important for life | Recognize ways that humans impact the environment | Monitor and minimize an impact on the environment |
| SCI.MS.LS.1.3 | Recognize major organs | Model how organs are connected | Make a claim how structure and function support survival |
| SCI.MS.LS.1.5 | Match organisms to habitats | Identify factors that influence growth | Interpret data to show that resources influence growth |
| SCI.MS.LS.2.2 | Identify food that animals eat | Classify animals by what they eat | Identify producers and consumers in a food chain |
| SCI.MS.PS.1.2 | Identify change | Gather data on properties before and after chemical changes | Interpret data on properties before and after chemical changes |

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

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This report is intended to serve as one source of evidence in an instructional planning process. Because evidence of student mastery of each Essential Element is based on a limited number of items, the estimated mastery patterns depicted here may not fully represent what a student knows and can do.

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Figure 7.1. Example page of the Learning Profile for spring 2019.

REPORT DATE: 06-07-2019
SUBJECT: Science
GRADE: 8

**Individual Student Year-End Report**
**Performance Profile 2018-19**

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

**DISTRICT ID:** 1234
**STATE:** DLM State
**STATE ID:** 12345432

**Performance Profile, continued**

- identify foods that animals eat

In earth and space science, the student can

- interpret basic weather symbols
- compare differences in basic weather conditions

## Domain

Bar graphs summarize the percent of skills mastered by domain. Not all students test on all skills due to availability of content at different levels per standard.


More information about Student's performance on each of the Essential Elements that make up the Domains is located in the Learning Profile.

For more information, including resources, please visit https://dynamiclearningmaps.org/states.

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Figure 7.2. Example page of the Performance Profile for spring 2019.

## 7.5. Quality Control Procedures for Data Files and Score Reports

No changes were made to the manual or automated quality control procedures for spring 2019. For a complete description of quality control procedures, see Chapter 7 in the *2015–2016 Technical Manual—Science* (DLM Consortium, 2017).

## 7.6. Conclusion

Following the spring 2019 administration, five data files were delivered to state partners: GRF, special circumstance code file, exited students file, teacher survey data file, and test administration observations file. No incidents were observed during the spring 2019 administration, so an incident file was not needed. Overall, between NA% and NA% of Delaware students achieved at the At Target or Advanced levels across grades, which is consistent with prior years. Minor changes were made to score reports to assist in the interpretation of results.

# 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 2018–2019 year, see Chapter 8 of the *2018–2019 Technical Manual Update—Science* (DLM Consortium, 2019a).

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—Science* (DLM Consortium, 2017).

# 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 *2018–2019 Technical Manual Update—Science* (DLM Consortium, 2019a), the *2015–2016 Technical Manual—Science* (DLM Consortium, 2017), and the other annual technical manual updates (DLM Consortium, 2018a, 2018b). For a description of additional evidence collected during 2018–2019 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 et al. [AERA et al.], 2014), see Chapter 9 of the *2018–2019 Technical Manual Update—Science* (DLM Consortium, 2019a).

# 10. Training and Instructional Activities

Chapter 10 of the Dynamic Learning Maps® (DLM®) Alternate Assessment System *2015–2016 Technical Manual—Science* (DLM Consortium, 2017) describes the training offered in 2015–2016 to state and local education agency staff, the required test administrator training, the optional science module for test administrators, and the optional science instructional activities. No changes were made to training or optional science resources in 2018–2019. 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 *2015–2016 Technical Manual—Science* (DLM Consortium, 2017).

# 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 science assessment completed its fourth operational administration year in 2018–2019. The chapters of the *2018–2019 Technical Manual Update—Science* (DLM Consortium, 2019a) provide updated evidence from the 2018–2019 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 *2018–2019 Technical Manual Update—Science* (DLM Consortium, 2019a) 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 *2015–2016 Technical Manual—Science* (DLM Consortium, 2017).

# 12. References

American Educational Research Association, American Psychological Association, & National Council on Measurement in Education. (2014). *Standards for educational and psychological testing*. Washington, DC, American Educational Research Association.

Dynamic Learning Maps Consortium. (2016a). *2014–2015 Technical Manual—Integrated Model* (tech. rep.). University of Kansas, Center for Educational Testing and Evaluation. Lawrence, KS.

Dynamic Learning Maps Consortium. (2016b). *2014–2015 Technical Manual—Year-End Model* (tech. rep.). University of Kansas, Center for Educational Testing and Evaluation. Lawrence, KS.

Dynamic Learning Maps Consortium. (2017). *2015–2016 Technical Manual—Science* (tech. rep.). University of Kansas, Center for Educational Testing and Evaluation. Lawrence, KS.

Dynamic Learning Maps Consortium. (2018a). *2016–2017 Technical Manual Update—Science* (tech. rep.). University of Kansas, Center for Accessible Teaching, Learning, and Assessment Systems (ATLAS). Lawrence, KS.

Dynamic Learning Maps Consortium. (2018b). *2017–2018 Technical Manual Update—Science* (tech. rep.). University of Kansas, Center for Accessible Teaching, Learning, and Assessment Systems (ATLAS). Lawrence, KS.

Dynamic Learning Maps Consortium. (2019a). *2018–2019 Technical Manual Update—Science* (tech. rep.). University of Kansas, Center for Accessible Teaching, Learning, and Assessment Systems (ATLAS). Lawrence, KS.

Dynamic Learning Maps Consortium. (2019b). *Accessibility Manual for the Dynamic Learning Maps Alternate Assessment, 2019–2020* (tech. rep.). University of Kansas, Center for Accessible Teaching, Learning, and Assessment Systems (ATLAS). Lawrence, KS.

National Research Council. (2012). *A Framework for K-12 science education: Practice, crosscutting concepts, and core ideas*. Washington, DC, The National Academies Press.

NGSS Lead States. (2013). *Next Generation Science Standards: For States, by States*. Washington, DC, The National Academies Press.