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Characteristics of Students Who Take Dynamic Learning Maps® Alternate Assessments: 2018–2019

Technical Report #20-01

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Executive Summary

The reauthorization of the Elementary and Secondary Education Act as the Every Student Succeeds Act (ESSA) in 2015 outlined the requirement that students with the most significant cognitive disabilities take alternate assessments based on alternate achievement standards (AA-AAS). Furthermore, ESSA established a participation threshold that limits the percentage of students that a state may assess with an AA-AAS to no more than one percent of all students in the grades assessed in a state. As states have begun to implement policy changes geared toward meeting this requirement, the population of students taking AA-AAS has begun to shift. The purpose of this report is to describe characteristics of this student population, specifically the students with the most significant cognitive disabilities who took Dynamic Learning Maps® (DLM®) alternate assessments in 2018–2019 in 19 states and a Bureau of Indian Education school. The report summarizes findings in areas of educational placement; communication; accessibility supports; and academic knowledge, skills, and understandings in the areas of reading, writing, mathematics, and science for students who participated in the DLM alternate assessment during the 2018–2019 academic year.

- Sixty-seven percent (67%) of students are identified as having autism, an intellectual disability, or multiple disabilities.
- Fifty-five percent (55%) of students spend less than 40% of their instructional day in a general education classroom.
- Seventy-six percent (76%) of students use speech expressively to communicate.
- Sixty percent (60%) of students who use speech to communicate combine three or more spoken words according to grammatical rules.
- Thirty-eight percent (38%) of students respond appropriately in any modality to phrases and sentences that are spoken or signed.
- Ninety-one percent (91%) of students use a computer either independently or with human support.
- Sixty-nine percent (69%) of students read at or below a first-grade reading level.
- Seventeen percent (17%) of students write words or simple phrases without copying.
- Twenty-two percent (22%) of students consistently add or subtract using numerals.
- Sixteen percent (16%) of students consistently identify similarities and differences.
- Students who use speech to communicate more often demonstrate receptive communication and academic skills than students who do not use speech.

Overall, these results demonstrate the population of students who take the DLM alternate assessment are highly variable across disability categories, classroom placement, and communication and academic skills.

I: Overview

The Every Student Succeeds Act (ESSA) of 2015 placed renewed attention on students with the most significant disabilities, because of the inclusion of more specific guidelines for who should participate in alternate assessments based on alternate achievement standards (AA-AAS). The regulations established requirements that states who adopt alternate achievement standards must follow when determining who qualifies to take alternate assessments, including defining students with the most significant disabilities and establishing a 1% threshold on the number of students who may take AA-AAS (Office of Special Education Programs, 2018). In response to the legislation, states began providing districts with guidance for meeting the 1% threshold (Oklahoma State Department of Education, 2019; Wisconsin Department of Public Instruction, n.d.). As the number of students taking AA-AAS decreases to comply with the 1% threshold, the characteristics of students who take AA-AAS are also shifting.

Purpose

Given the requirements established by ESSA, this report summarizes characteristics of students who took the Dynamic Learning Maps® (DLM®) alternate assessment in the 2018–2019 academic year. The report provides information on students' demographic characteristics, expressive and receptive communication skills, computer access and usage, academic skills, and engagement with and attention to both teacher and computer-based instruction. This report also describes the differences in characteristics between students who use speech to communicate expressively, those who only use sign language or augmentative and alternative communication (AAC), and those who do not use speech, sign language, or AAC.

Students With Significant Cognitive Disabilities

Much of the literature describes students with the most significant cognitive disabilities as those eligible to take AA-AAS (Kearns et al., 2011; Kleinert et al., 2015). Though the expectation is that only 1% of students with disabilities should take AA-AAS, students' communication skills, learning challenges, and support needs within this 1% are quite diverse, adding to the difficulty in adequately defining students with significant cognitive disabilities. Historically, students who are categorized as having an intellectual disability, autism, or multiple disabilities have comprised the majority of students who take AA-AAS (Kleinert et al., 2015; Nash et al., 2016; Towles-Reeves, et al., 2009). Additionally, Kearns et al. (2011) determined approximately 10% of the students within the AA-AAS population were those whose expressive and receptive communication were at the presymbolic level and were also most likely to experience a sensory impairment, low levels of social engagement, deficient motor skills, and health related issues, leading to more complex support needs across all school settings.

When setting eligibility guidelines for who takes AA-AAS, the most often cited characteristics states use to make the determinations are low intellectual and adaptive functioning, a need for intensive individualized instruction and supports, and the use of an alternate curriculum (Thurlow et al., 2017). Additional considerations some states use include parental consent to take the alternate assessment, a students' lack of ability to show what they know on a regular assessment, and significant communication deficits (Thurlow et al., 2017).

Dynamic Learning Maps Alternate Assessment System

The DLM Alternate Assessment System is designed to serve the small and heterogeneous population of students with the most significant cognitive disabilities for whom general statewide assessments are not appropriate, even with accommodations. These students show what they know and can do through academic content that is aligned to grade-level content standards, but at reduced depth, breadth, and complexity. For DLM assessments, alternate content standards, called Essential Elements, were derived from college and career readiness standards and represent the learning targets for DLM assessments for grades 3–12 in English language arts (ELA) and mathematics. Essential Elements for science were derived from the Framework for K–12 Science Education (National Research Council, 2012) for grades 3–5, middle and high school.

There are three general eligibility guidelines for participation in the DLM alternate assessment (Dynamic Learning Maps Consortium, 2016), though states may provide additional interpretation and guidance to determine eligibility. First, the student must have a significant cognitive disability that significantly impacts both intellectual functioning and adaptive behavior. Second, the student is primarily instructed using the DLM Essential Elements as content standards, with Individualized Education Program (IEP) goals and instruction that address knowledge and skills that are appropriate and challenging. Third, the student requires extensive direct individualized instruction and supports, including substantially adapted materials and individualized methods of accessing information, to make measurable progress in the grade-level curriculum (DLM Consortium, 2016).

DLM test delivery is computer based, and the delivery platform considers students' accessibility needs. Computer-delivered assessments are designed to allow students to interact independently with the computer, emphasizing student interaction with content, while allowing assistive technology such as alternate keyboards, touch screen, or switches as needed. Teacher-administered testlets allow the teacher to administer the assessment outside the system, with the test administrator recording student responses. Students who are blind or have visual impairments have access to alternate forms to allow them to access assessment content (DLM Consortium, 2016). Test developers also use knowledge of the variability of students' needs and academic capabilities to develop test content that is appropriate for all students within the population (Bechard et al., 2019). Before administering assessments, teachers complete or annually update the First Contact survey, which is a survey of learner characteristics. Information is collected on student demographics, expressive and receptive communication skills, communication systems used, special education placement, sensory perception, mobility, computer usage, first language, academic skills, and engagement with and attention to instruction. A subset of items measuring academics are used to assign each student to a subject-specific complexity band that is used in the test assignment process.

II: Student Demographics

During the 2018–2019 academic year, 92,080 students took DLM assessments in grades 3–12, as shown in Table 1. Students who take DLM assessments are similarly distributed across grades 3–8, with varied participation among students in grades 9–12, according to individual state guidelines that determine which grades in high school students participate in statewide assessments.

Table 1. Students Participating by Grade Level (*N* = 92,080)

Grade level	*N*	*%*
3	10,767	11.7
4	11,461	12.5
5	12,322	13.4
6	11,598	12.6
7	11,595	12.6
8	12,249	13.3
9	7,718	8.4
10	5,172	5.6
11	8,850	9.6
12	348	0.4

Sixty percent of the students were white, 20% were African-American, and 11% were two or more races. Twenty-one percent of the students were Hispanic, and nearly 67% were male. Just over 16% of students had a health issue, such as a fragile medical condition or seizures that interfered with instruction or assessment.

Disability Category

Students with the most significant cognitive disabilities have a range of primary disability categories concomitant with significant support needs. They may be classified as having autism, a developmental disability, or multiple disabilities, and require intensive and ongoing support across all academic and daily living domains (Taub et al., 2017). While this is a heterogeneous population with a variety of support needs, when summarizing the Individuals with Disabilities Education Improvement Act (IDEA) disability categories of students who take the DLM alternate assessment, the majority of students fall into three disability categories. Close to 70% of students are classified as having either autism (26.4%), an intellectual disability (25.3%), or multiple disabilities (15.4%). Past studies have identified these as the three most prevalent disability categories in AA-AAS (Kleinert et al., 2015; Nash et al., 2016; Towles-Reeves et al., 2009). Table 2 provides the distribution of disability categories for students taking DLM assessments. Some states do not collect a specific disability code, thus “eligible individual” (19.6%) and “documented disability” (1.9%) are used.

Table 2. Disability Category (*N* = 92,080)

Primary disability category	*n*	%
Autism	24,323	26.4
Deaf-blindness	57	0.1
Developmental delay	934	1.0
Emotional disturbance	421	0.5
Hearing impairment	234	0.3
Intellectual disability	23,271	25.3
Multiple disabilities	14,160	15.4
Orthopedic impairment	298	0.3
Other health impaired	4,550	4.9
Specific learning disability	1,345	1.5
Speech or language impairment	1,684	1.8
Traumatic brain injury	455	0.5
Visual impairment	207	0.2
Eligible individual	18,029	19.6
Documented disability	1,736	1.9
Decline to answer	297	0.3
No disability	79	0.1

Students Who Are English Learners

A small subset of students with significant cognitive disabilities are also English learners (ELs). This group of students has received increased attention since ESSA (2015) specified states must provide alternate English language proficiency assessments to students for whom the general English language proficiency assessment is not appropriate, even with accommodations. These students have complex language and communication needs related to their disability and because they are multilingual (Christensen et al., 2018). Additionally, they may face greater challenges when using English at school and another language away from school (Christensen & Mitchell, 2018). Currently, there is no federal definition used to identify these students, making identification difficult. Karvonen and Clark (2019) determined discrepancies between EL prevalence estimates based on EL program participation data and teacher-reported primary language information, and they showed how adequately identifying this group of students can be difficult. Table 3 describes the EL program participation status of students who took DLM assessments, as collected during enrollment in the system. Just under 6% of students received or were eligible for EL funding and/or services.

Table 3. English Learner (EL) Program Participation (*N* = 92,080)

EL participation type	*n*	%
Neither an EL-eligible student nor an EL-monitored student	86,854	94.3
Title III funded	3,304	3.6
State EL/bilingual funded	271	0.3
Both Title III and state EL/bilingual funded	689	0.8
Monitored EL student	181	0.2
Eligible but not currently receiving services	256	0.3
Receives EL services but not Title III or state funded	525	0.6

Teachers respond to items about the student's primary language in the First Contact survey before administering DLM assessments. Table 4 shows the responses to the three primary

language questions teachers answered. Fifteen percent of students taking DLM assessments primarily speak a language other than English in the home, which may indicate a discrepancy between the almost 6% of students who are eligible for or participate in EL services and those who do not receive services but may need and benefit from language services and supports.

Table 4. Students' Primary Language (*N* = 89,677)

Primary language	*n*	%
English is not the student's primary language.	6,917	7.7
English is not the primary language spoken in the student's home.	13,448	15.0
English is not the primary language used for the student's instruction.	589	0.7

Approximately 67% of students with significant cognitive disabilities who are also ELs were categorized as having intellectual disabilities, autism, or multiple disabilities, which is similar to the distribution of all students who take DLM assessments.

Educational Placement

Another important demographic to consider when describing students with the most significant cognitive disabilities is where they receive their instruction. These students have been characterized as needing consistent and repetitive extensive individualized instruction and support (Kurth et al., 2019; Taub et al., 2017), yet schools are also mandated to provide access and participation in the general curriculum to all students (IDEA, 2004). The least restrictive environment requirement in the IDEA states that students should be served in the general education classroom and only be removed to a more restrictive setting when the severity of their disability inhibits them from having their needs met in the general education classroom (IDEA, 2004).

Most students who take DLM assessments (55%; *n* = 50,519) spend less than 40% of their instructional day in a general education classroom, 15% spend between 40% and 79% of their day in a general education classroom, and 25% are served in a separate school. Only 4% of students spend the majority of their day with their general education peers, while the remaining 1% of students are served in a residential facility or are homebound.

III. Student Characteristics

Students who take DLM alternate assessments possess a variety of unique characteristics related to communication, attention to computer and teacher-directed learning, and their hearing and vision that may affect their learning.

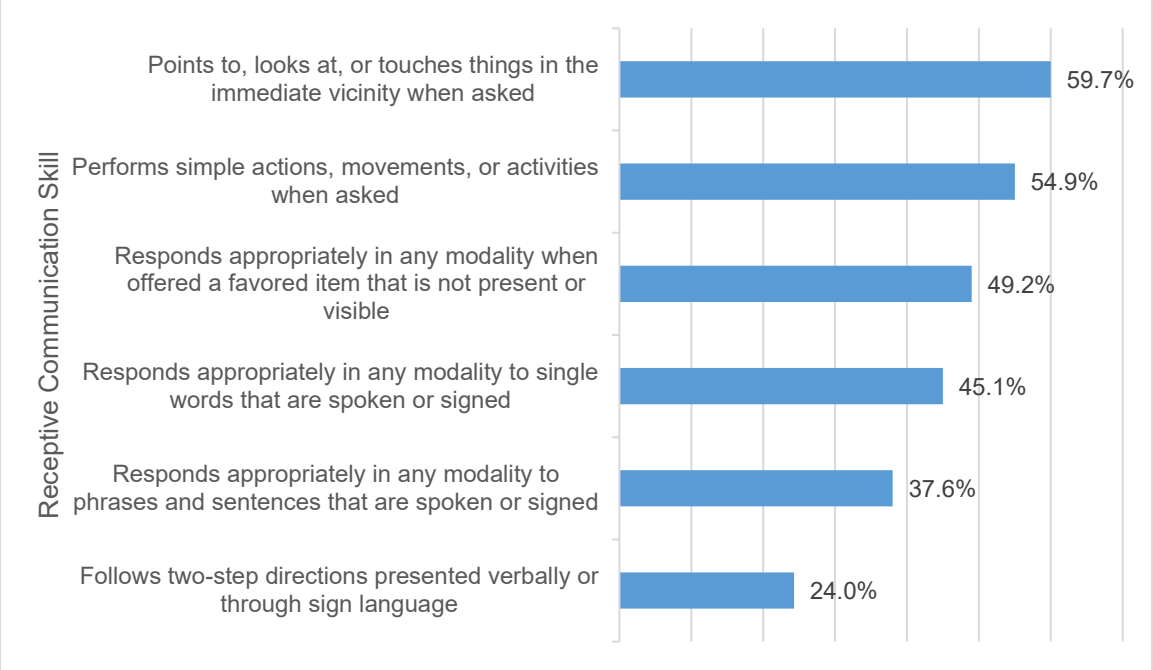
Communication

Understanding students' communication skills is necessary when developing and implementing an IEP, so that students have the necessary aids and services to demonstrate what they know and can do during both instruction and assessment. Within the DLM assessment system, information about a student's expressive communication informs the student's complexity band, which is used in the assessment assignment process (DLM Consortium, 2016).

Receptive Communication

Students demonstrate understanding of spoken or signed language in many ways. Figure 1 summarizes the percentage of students whose teachers indicated they demonstrate each form of receptive communication more than 80% of the time. Nearly one-fourth of students can consistently follow two-step directions presented verbally or through sign language; 55% perform simple actions, movements, or activities when asked; and 60% of students point to, look at, or touch things in their immediate vicinity when asked.

Figure 1. Percentage of Students Who Demonstrated Receptive Communication Skill More Than 80% of the Time (*N* = 92,080)



Expressive Communication

Students with the most significant cognitive disabilities communicate in a variety of ways. Approximately 76% (*n* = 70,209) of students who take DLM assessments use speech to meet expressive communication needs. Of those, 60% combine three or more spoken words according to grammatical rules, 27% use two words spoken at a time, and 13% use only one spoken word at a time.

Students who do not use speech for expressive communication may use sign language, AAC devices, and/or symbols. Approximately 5% (*n* = 4,912) of students use sign language in place of or in addition to speech to meet their expressive communication needs. Of these students, 61% use American Sign Language, with the remaining using a hybrid or personalized signing system (36%) or signed exact English (3%). Only 4% of students using sign language combine three or more signed words according to grammatical rules, 10% use two signed words at a time, and over 85% sign one word at a time. Twenty-three percent (*n* = 21,296) of students use an AAC device in place of or in addition to speech or sign language to meet their expressive communication needs. Of these, 8% combine three or more symbols at a time according to grammatical rules, while 26% use two symbols at a time, and the remaining 66% use one symbol at a time.

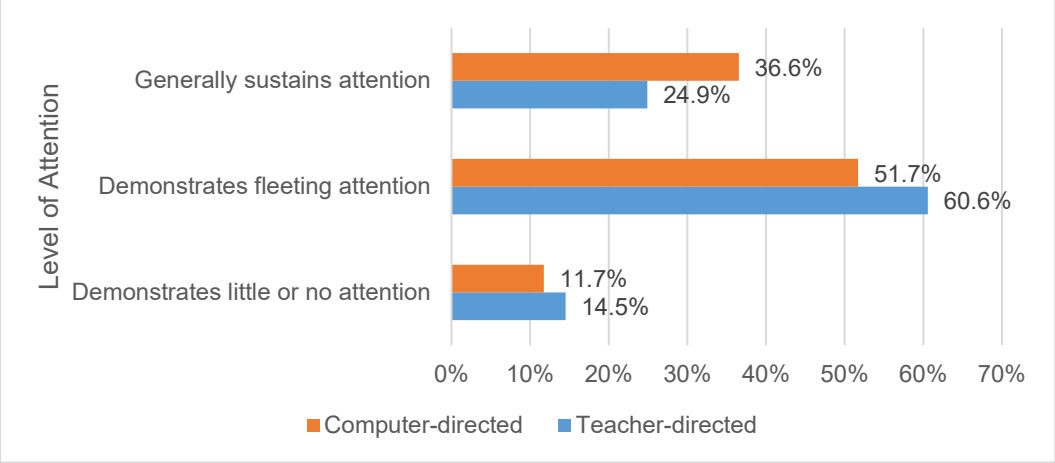
Forty-seven percent (*n* = 43,283) of students use some form of symbols to communicate, though for some students, this is in addition to speech or sign language. When using symbols to communicate, 24% of students choose from ten or more at a time, 14% choose from five to nine, 27% choose from three or four, and 36% from one or two. Students respond to various types of symbols to facilitate their expressive communication, including photos (31%), real objects (26%), line drawing symbol sets (26%), text only (13%), and tactual symbols (12%), while 19% use a voice output technology device.

Of the remaining 7% (*n* = 6,896) of students who do not use speech, sign language, or AAC devices to communicate, 18% use only unconventional vocalization, unconventional gestures, and/or body movement to communicate intentionally; 34% use conventional gestures and vocalizations to communicate intentionally but do not yet use symbols or sign language; and 47% exhibit behaviors that may be reflexive and are not intentionally communicative but can be interpreted by others as communication.

Attention

Teachers were asked to indicate their students' attention to both teacher-directed and computer-directed instruction. Results are displayed in Figure 2. Over half of the students who take DLM assessments demonstrate fleeting attention to either teacher-directed (61%) or computer-directed (52%) instruction. A small percentage of students demonstrate little or no attention to teacher-directed (15%) or computer-directed (12%) instruction.

Figure 2. Responses to Level of Attention to Computer-Directed[a] and Teacher-Directed[b] Instruction



Note. [a]*N* = 79,995. [b]*N* = 86,340.

Sensory Characteristics and Access Needs

Students with the most significant cognitive disabilities often also have hearing, vision, and/or motor skill impairments that can affect their ability to access content across various settings.

Vision

Nearly 5% of students who take DLM assessments are blind or have low vision. Twenty-one percent of these students are legally blind, 33% have low vision, 33% have cortical vision impairment, and 8% are completely blind. Students who are blind or have low vision may access content via large print, tactile media, or through technology supports such as screen readers or closed circuit television magnifiers. Table 5 presents the percentage of students who use vision aids. The highest percentage of students require enlarged print or tactile media.

Table 5. Use of Vision Aids by Students Who Are Blind or Have Low Vision (*N* = 4,320)

Vision aid	*n*	%
Requires enlarged print	3,839	88.87
Requires tactile media	3,221	74.56
Uses screen reader and/or talking word processor	1,605	37.15
Uses screen magnifying device	1,568	36.30
Uses closed circuit television magnifier	205	4.75
Uses a braille writing device	162	3.75
Requires or uses braille	118	2.73
Uses a device with refreshable braille display	24	0.56

Note. Multiple responses could be selected for each student.

Hearing

Nearly 4% of students who take DLM assessments are deaf or hard of hearing; of these students, 23% have severe or profound hearing loss and 36% have moderate to moderately severe hearing loss. Students who are deaf or hard of hearing use various supplementary aids to access content, including hearing aids, amplification devices, and cochlear implants. Table 6 summarizes use of auditory aids for students who are deaf or hard of hearing. Forty-one percent of students who are deaf or hard of hearing use a bilateral hearing aid.

Table 6. Use of Auditory Aids by Students Who Are Deaf or Hard of Hearing (*N* = 3,372)

Auditory aid	*n*	%
Bilateral hearing aid	1,405	41.67
Personal or classroom amplification	1,191	35.32
Unilateral hearing aid	503	14.92
Cochlear implant	362	10.74

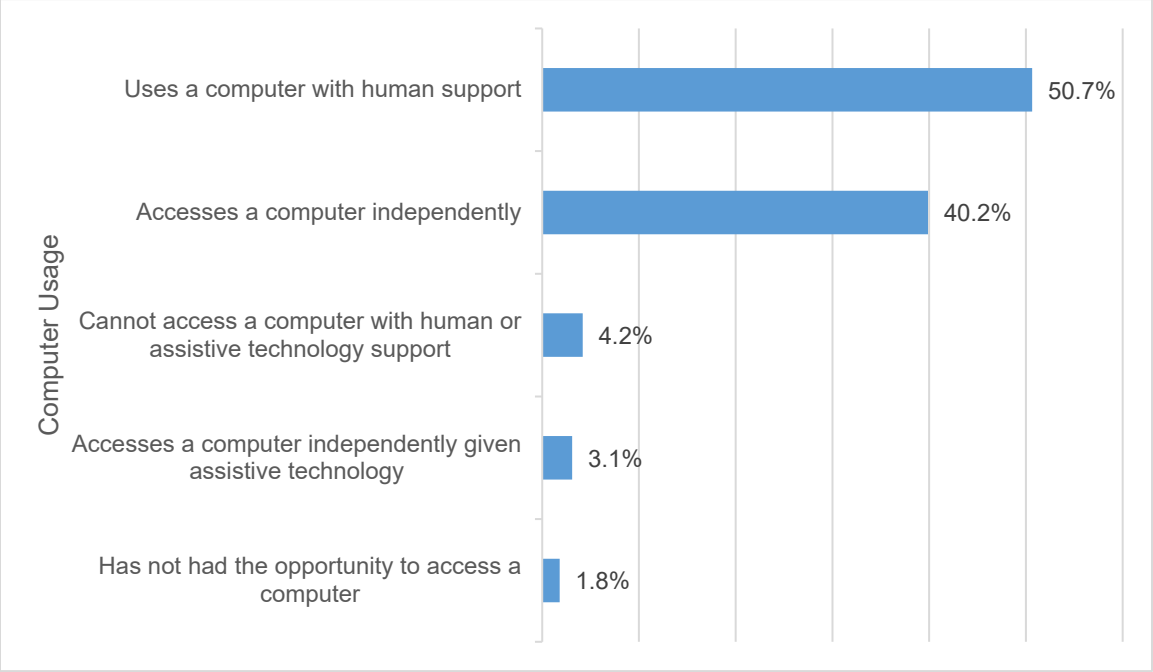
Note. Multiple responses could be selected for each student.

Mobility

Approximately 17% (*n* = 15,966) of students use one hand to perform tasks. Another 15% (*n* = 14,172) of students require physical assistance to perform tasks with their hands, and just over 2% (*n* = 2,115) are not able to use their hands to complete tasks even with assistance.

Student mobility may affect how students indicate what they know and can do on DLM teacher-administered or computer-administered assessments. As shown in Figure 3, approximately 40% of students access a computer independently. However, 4% of students are not able to access a computer even with human or assistive support.

Figure 3. Percentage of Students by Primary Use of a Computer During Instruction *(N* = 91,508)



Students utilize various technology and supports when using computers to access content. Sixty-seven percent (*n* = 61,975) of students who take DLM assessments access a computer with a standard keyboard, 42% use a standard mouse or a head mouse, 47% use a touch screen, 4% use an alternate keyboard, 2% use scanning with one- or two-switch scanning, and less than 1% use eye gaze technology.

For students who are unable to or have not had an opportunity to access a computer (*n* = 5,371), 64% are prevented from doing so because of their disability. Seventeen percent have not had the opportunity to learn how to use a computer and 14% refuse to use a computer. Five percent of students did not have access because there was no equipment available.

IV. Academics

Information about students' academic skills in ELA, mathematics, and science is used to inform student testlet assignment in each subject and ensures content is optimally matched to the students' knowledge, skills, and understandings.

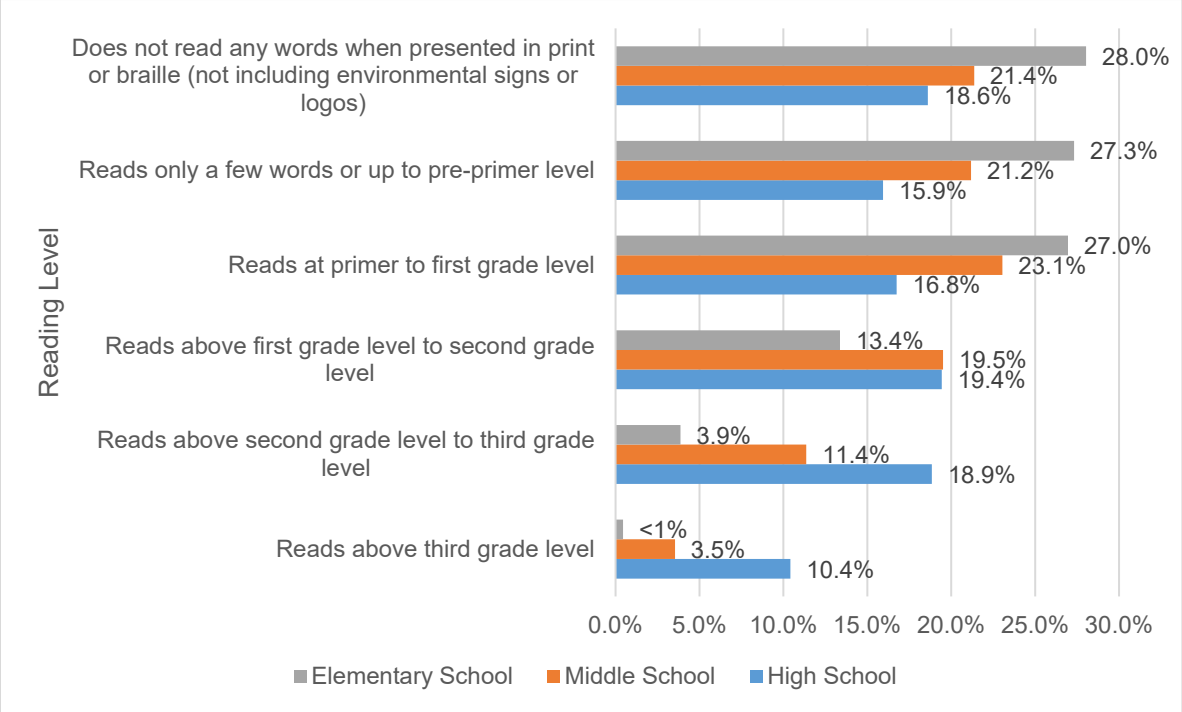
English Language Arts

ELA questions summarize teachers' ratings of students' reading and writing knowledge, skills, and understandings. Forty percent (*n* = 35,972) of students read at a primer to second-grade level. Another 14% read above a second-grade level, while 23% do not read any words when presented in print or braille.

Figure 4 presents reading level disaggregated by grade band. Twenty-eight percent of elementary school students, 21% of middle school students, and 19% of high school students

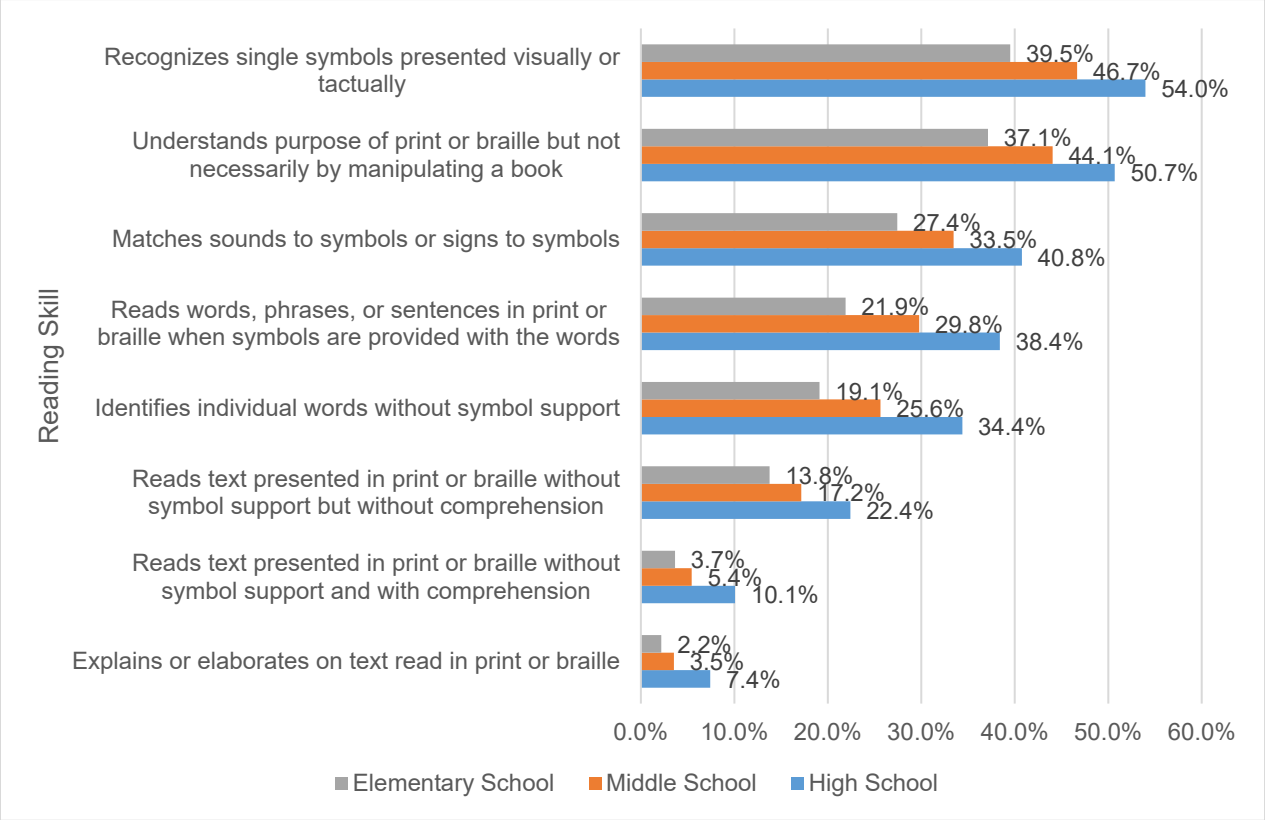
do not read any words when presented in print or braille. Conversely, only 4% of elementary school students read above a second-grade level, compared to 15% of middle school students and 29% of high school students.

Figure 4. Percentage of Students by Grade Band Rated as Performing at Each Reading Level (*N* = 89,467)



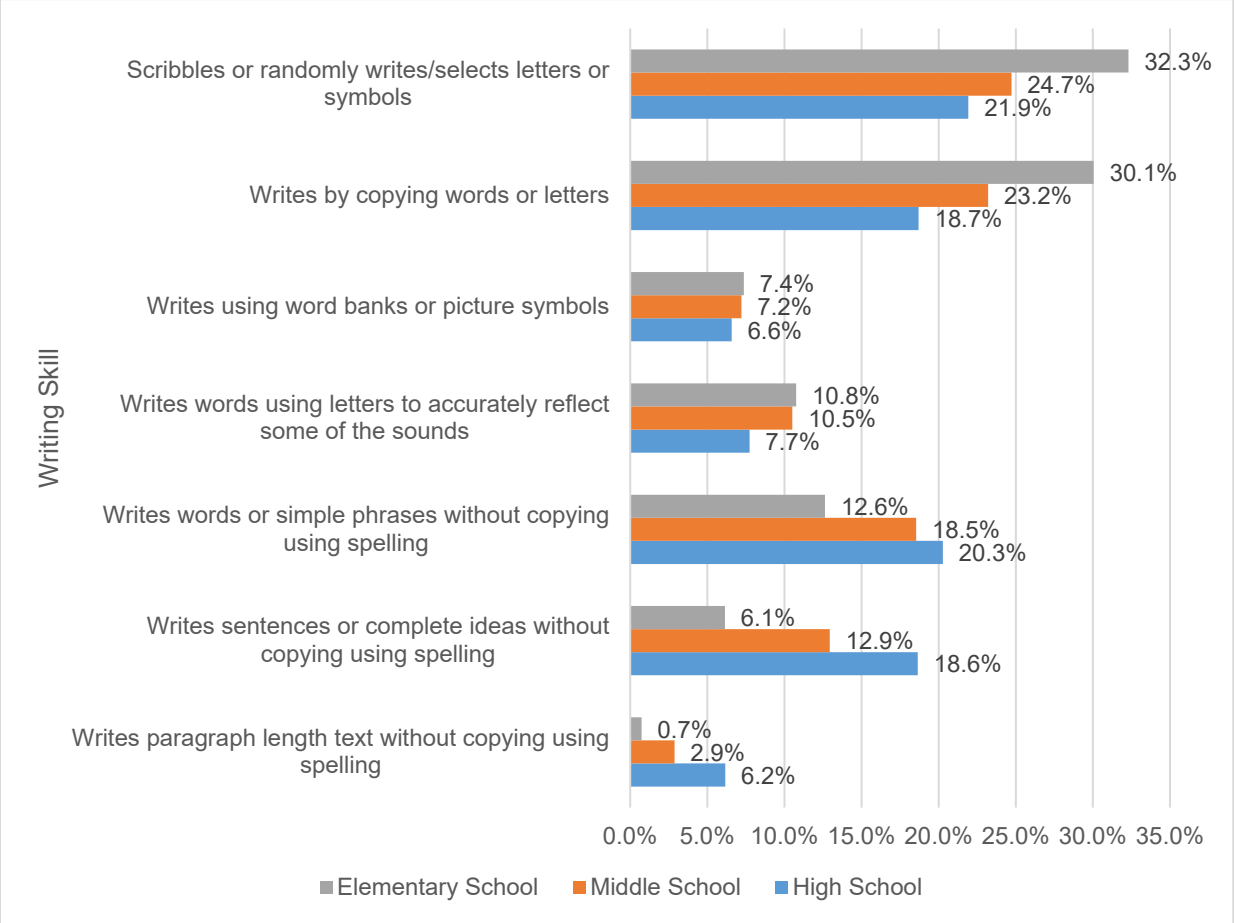
Teachers also rate the percentage of time students demonstrate reading skills. Figure 5 displays the percentage of students by grade band who performed the specified reading skill consistently (i.e., more than 80% of the time). Overall, students are more likely to consistently perform simpler skills, such as recognizing single symbols presented visually or tactually, than more difficult skills, such as reading text presented in print or braille without symbol support and with comprehension. For each skill, there was an increase in the percentage of students who consistently demonstrate the skill from elementary to high school.

Figure 5. Percentage of Students by Grade Band Who Perform Each Reading Skill More Than 80% of the Time (N = 89,467)



Teachers indicate the highest-level writing skill that the student has demonstrated at least once, even if the student does not consistently use this method. Writing includes any method the student uses to write using any writing tool that allows access to all letters of the alphabet. Beyond paper and pencil, this may include traditional keyboards, alternate keyboards, and eye gaze displays of letters. Writing levels vary for students taking DLM assessments. Across all grade bands, 27% (n = 24,086) of students scribble or randomly write or select letters or symbols while 17% (n = 14,955) write words or simple phrases without copying. Figure 6 depicts the highest writing level that describes students' writing skills, summarized by grade band. The largest percentages of students either randomly write letters or copy words.

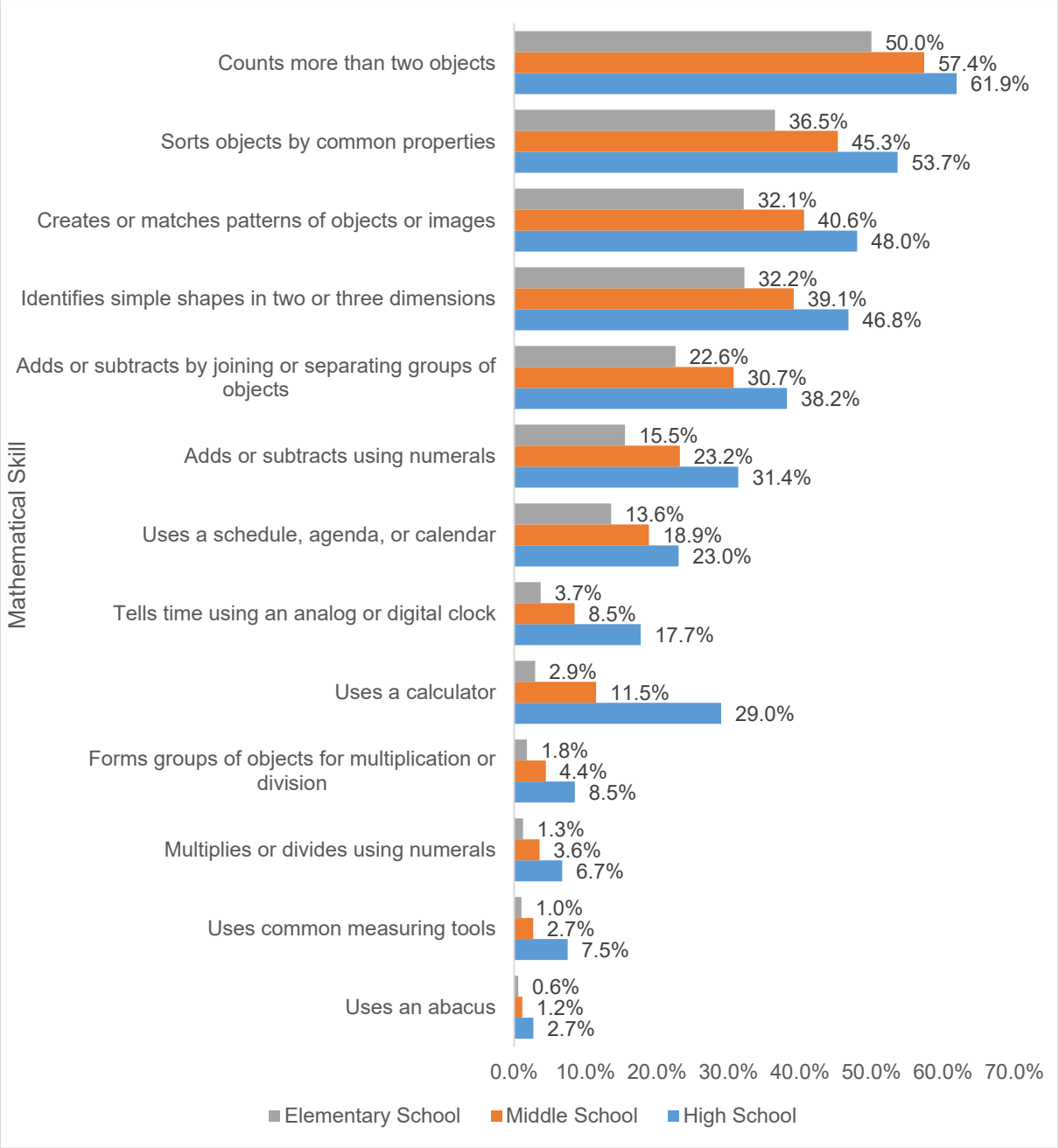
Figure 6. Highest Writing Level by Grade Band That Students Have Demonstrated At Least Once During Instruction (*N* = 89,467)



Mathematics

Mathematics questions summarize teachers' ratings of students' knowledge, skills, and understandings of mathematical concepts. Teachers rate the percentage of time students demonstrate specified mathematics skills. Across all grade bands, 56% (*n* = 49,782) of students consistently count more than two objects, and 22% (*n* = 19,874) consistently add or subtract using numerals. Figure 7 displays the percentage of students who performed mathematics skills consistently (i.e., more than 80% of the time), summarized by grade band. Across grade bands, students more frequently count multiple objects, sort objects by common properties, and create and match patterns of objects, while multiplication and division using numerals and using common measuring tools were less often reported.

Figure 7. Percentage of Students by Grade Band Who Perform Each Mathematics Skill More Than 80% of the Time (*N* = 89,467)

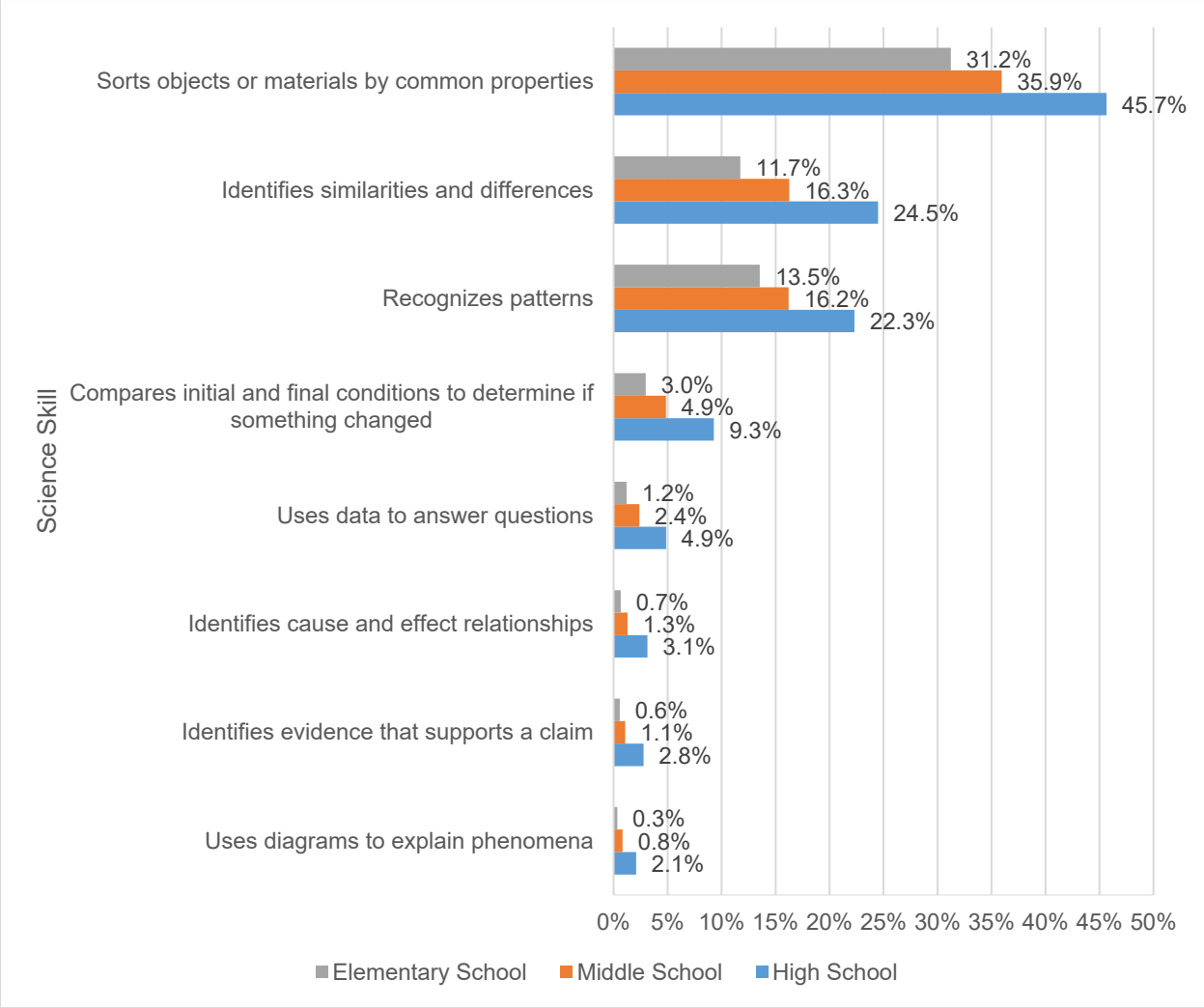


Science

Teachers answered questions about students' knowledge, skills, and understandings related to scientific concepts. Sixteen percent (*n* = 13,567) of students across all grade bands consistently identify similarities and differences, and 5% (*n* = 4,260) consistently compare initial and final conditions to determine if something changed. Figure 8 summarizes the percentage of students who performed the science skill consistently (i.e., greater than 80% of the time), by grade band. Larger percentages of students consistently demonstrated sorting objects or materials by

common properties, identifying similarities and differences, and recognizing patterns. Smaller percentages of students consistently performed skills such as using data to answer questions, identifying evidence that supports a claim, or identifying cause and effect relationships.

Figure 8. Percentage of Students by Grade Band Who Perform Each Science Skill More Than 80% of the Time (*N* = 82,462)



V. Relationship of Expressive Communication With Other Variables

Previous research analyzing students who participate in AA-AAS suggests student communication skills affect literacy and mathematics skills (Erickson & Geist, 2016; Goldstein & Behuniak, 2012; Kearns et al., 2011). Furthermore, students who use or require the use of AAC to effectively communicate have less teacher interaction and are more likely to engage in passive activities than other students with significant cognitive disabilities (Kurth et al., 2016). To further understand the supports needed by students with varying expressive communication skills, students were grouped according to teacher-identified modes of expressive communication. Seventy-six percent of students used speech with or without AAC to communicate, just over 16% of students used sign language or AAC in place of speech, and 7% of students did not use speech, sign language, or AAC to communicate. These groupings were investigated to determine how students who use speech to communicate expressively differ from students who use sign language/AAC or who do not use speech, sign language, or AAC to communicate. We examined this relationship in regard to their educational placement; receptive communication skills; attention to computer- and teacher-directed instruction; and ELA, mathematics, and science skills. To make these comparisons, we created scales for the receptive communication, reading, mathematics, and science First Contact items. Items for educational placement, attention to computer- and teacher-directed instruction, reading level, and writing skills included one item each and did not require a scale.

Responses to the six receptive communication items (see Figure 1), eight reading items (see Figure 5), 13 mathematics items (see Figure 7), and eight science items (see Figure 8) were scaled to provide overall indices of receptive communication, reading, mathematics, and science skills. Teachers selected the frequency with which students demonstrated the specified behaviors using a scale from 1 to 4 (1 = almost never, 0%–20% of the time; 2 = occasionally, 21%–50% of the time; 3 = frequently, 51%–80% of the time; 4 = consistently, 81%–100% of the time). Table 7 displays summary statistics for each rating scale. Students are included in the table if their teacher responded to all items for that scale. Reliabilities for scales range from .93 to .96.

Table 7. Descriptive Statistics for Scaled Items

Scale	*N*	*M*	*SD*	Min	Median	Max	Cronbach's α
Receptive communication	91,395	18.20	5.63	6	20	24	.96
English language arts	89,467	18.91	7.55	8	19	32	.95
Mathematics	89,467	27.60	9.67	13	27	52	.93
Science	82,462	14.98	5.63	8	14	32	.93

Frequency distributions were calculated for each item included in the scales and the items for educational placement, attention to computer- and teacher-directed instruction, reading level, and writing skills across expressive communication categories. Because of the nonnormal distributions of the scales and items, Kruskal–Wallis tests were conducted to evaluate expressive communication differences on educational placement, receptive communication scales, attention to computer- and teacher-directed instruction, reading scales, reading level, writing skills, and the mathematics and science scales. A significant Kruskal–Wallis test

indicates that at least one sample being evaluated is distributed differently from other samples being evaluated but does not identify which samples are different (Conover, 1980), nor does it give an indication to the strength of the differences. The Dwass–Steel–Critchlow–Fligner (DSCF) test is a two-sided procedure that provides an adjustment to prevent Type 1 error (i.e., identifying a significant finding when none exists) and is used after a significant Kruskal–Wallis test to identify which group is favored (Hollander & Wolfe, 1999). Given the large sample sizes used in these analyses, which may lead to small but statistically significant differences, effect sizes were used to evaluate the practical significance of the findings. Effect sizes for the Kruskal–Wallis test are indicated by η^2 and are described as the amount of variance in the dependent variable explained by the independent variable (Tomczak & Tomczak, 2014). They are interpreted as follows: .000 < .01 = no effect; .01 < .06 = small effect; .06 < .14 = intermediate effect; and ≥ .14 = large effect (Lenhard & Lenhard, 2016).

Educational Placement

The IDEA (2004) mandates that students should be served in a general education classroom setting and removed only when the severity of their disability is such that, even with modifications, their needs are not met in a regular classroom. Access to the general education classroom allows students to be taught by a teacher with subject matter expertise and provides opportunities to learn alongside typically developing peers (Carter et al., 2009; Jimenez et al., 2012). Inclusion with typically developing peers is significantly correlated with positive employment and education outcomes for students with significant cognitive disabilities (Heal & Rusch, 1995; White & Weiner, 2004). However, Kleinert et al. (2015) found students with the least expressive communication proficiency were more likely to be served in noninclusive settings.

Students' educational placement is summarized in Table 8 by expressive communication group. Most students who took DLM assessments were served in noninclusive settings. Students who used speech for expressive communication spent more time in inclusive settings with their typically developing peers, while a higher proportion of students who used sign/AAC or who did not use speech attended a separate school. Although there were statistically significant differences in instructional setting, $H(2) = 4{,}625$, $p < .0001$, $\eta^2 = .05$, and all pairwise comparisons were statistically significant ($p < .0001$), the results were not practically significant given the small effect size. Students' expressive communication alone explains only 5% of the variance in students' educational placement.

Table 8. Percentage of Students Served in Each Educational Placement (*N* = 91,380)

Placement	Speech		Sign/AAC		None	
	n	%	*n*	%	*n*	%
80% or more of the day in regular education	2,866	4.1	269	1.8	212	3.2
40%–79% of the day in regular education	12,409	17.8	915	6.1	405	6.1
< 40% of the day in regular education	39,715	57.0	7,158	47.4	3,646	55.1
Separate school	14,158	20.3	6,460	42.8	2,120	32.1
Residential facility	353	0.5	189	1.2	81	1.2
Homebound	161	0.2	115	0.8	148	2.2

Note. AAC = augmentative and alternative communication.

Receptive Communication

Expressive and receptive communication skills are necessary for individuals to be effective communicators. Erickson and Geist (2016) found that students who used speech to communicate demonstrated more receptive language skills than students who used AAC and/or sign language instead of speech. Responses to the receptive communication items by expressive communication category are summarized in Table 9. Across all items, students who used speech more often displayed receptive communication skills than their peers. The distribution of the receptive communication scale (see Table 7) was significantly different across the three groups, $H(2) = 25{,}994$, $p < .0001$, $\eta^2 = .28$. DSCF pairwise comparisons were all statistically significant ($p < .0001$); students who used speech had higher receptive language scale scores than their peers who used sign/AAC or did not have a communication system, and students who used sign/AAC had higher scores than students without a communication system. The effect size is large and indicates that students' expressive communication explains 28% of the variance in students' receptive communication scale scores.

Table 9. Responses to Receptive Communication Items

Item	Speech		Sign/AAC		None	
	n	%	*n*	%	*n*	%
Points to, looks at, or touches thing in the immediate vicinity when asked						
Almost never	884	1.3	3,287	21.7	2,873	43.1
Occasionally	4,711	6.7	4,681	30.9	1,479	22.2
Frequently	13,832	19.7	4,301	28.4	1,019	15.3
Consistently	50,651	72.3	2,898	19.1	1,295	19.4
Performs simple actions, movement, or activities when asked						
Almost never	1,173	1.7	4,056	26.8	3,108	46.8
Occasionally	5,797	8.3	4,756	31.4	1,325	19.9
Frequently	16,186	23.1	4,031	26.6	1,003	15.1
Consistently	46,856	66.9	2,317	15.3	1,208	18.2
Responds appropriately in any modality when offered a favored item that is not present or visible						
Almost never	1,617	2.3	4,551	30.0	3,355	50.5
Occasionally	7,850	11.2	4,990	32.9	1,347	20.3
Frequently	18,265	26.1	3,732	24.6	925	13.9
Consistently	42,257	60.4	1,886	12.4	1,012	15.2
Responds appropriately in any modality to single words that or spoken or signed						
Almost never	1,871	2.7	4,673	30.9	3,359	50.7
Occasionally	9,126	13.1	5,392	35.6	1,487	22.4
Frequently	19,876	28.4	3,701	24.4	880	13.3
Consistently	39,037	55.8	1,381	9.1	902	13.6
Responds appropriately in any modality to phrases and sentences that are spoken or signed						
Almost never	2,607	3.7	5,673	37.5	3.667	55.4
Occasionally	11,783	16.9	5,508	36.4	1,371	20.7
Frequently	22,734	32.5	3,007	19.9	803	12.1
Consistently	32,748	46.9	944	6.2	781	11.8
Follows two-step directions presented verbally or through sign language						
Almost never	7,490	10.7	9,102	60.1	4,535	68.4
Occasionally	17.168	24.6	3,757	24.8	933	14.1
Frequently	24,239	34.7	1,799	11.9	630	9.5
Consistently	21,014	30.0	484	3.2	527	8.0

Note. AAC = augmentative and alternative communication; almost never = 0% to 20% of the time; occasionally = 21% to 50% of the time; frequently = 51% to 80% of the time; consistently = more than 80% of the time. *N* counts vary across items.

Attention to Instruction

Students with the most significant cognitive disabilities display varying levels of attention to both computer and teacher-directed instruction. Students with significant cognitive disabilities who use speech; AAC; or objects, pictures, and signs to communicate display higher levels of engagement with others compared to students who are presymbolic communicators (Kearns et al., 2011; Kurth et al., 2016). Table 10 summarizes students' response to computer- and teacher-directed instruction by expressive communication category. Compared to their peers who do not use speech to communicate, students who used speech to communicate generally sustained attention to both computer- and teacher-directed instruction at higher rates and

displayed little or no attention at much lower rates. There were statistically significant differences in students' level of attention to computer- and teacher-directed instruction (computer-directed instruction: $H(2) = 8{,}100$, $p < .0001$, $\eta^2 = .10$; teacher-directed instruction: $H(2) = 10{,}103$, $p < .0001$, $\eta^2 = .12$), and all DSCF pairwise comparisons were significant ($p < .0001$). Effect sizes were intermediate; students' expressive communication explains only 10% of the variance in students' level of attention to computer-directed instruction and 12% to teacher-directed instruction.

Table 10. Responses to Level of Attention to Computer-Directed[a] and Teacher-Directed[b] Instruction

Level of attention	Speech		Sign/AAC		None	
	n	%	*n*	%	*n*	%
Generally sustains attention						
Computer-directed	26,891	42.4	1,583	12.8	766	18.0
Teacher-directed	19,746	30.2	1,161	7.9	597	9.5
Fleeting attention						
Computer-directed	32,375	51.1	7,142	57.9	1,849	43.5
Teacher-directed	40,523	62.0	9,153	62.3	2,621	41.6
Little or no attention						
Computer-directed	4,150	6.5	3,602	29.2	1,637	38.5
Teacher-directed	5,079	7.8	4,371	29.8	3,089	49.0

Note. AAC = augmentative and alternative communication.
[a] $N = 79{,}995$. [b] $N = 86{,}340$.

Academics

Students with significant cognitive disabilities who use speech to communicate have demonstrated more reading and writing skills than those who use AAC or sign to communicate (Erickson & Geist, 2016). Students who have poor communication skills and/or use AAC have challenges accessing reading and mathematics content (Goldstein & Behuniak, 2012).

Responses to the ELA items by expressive communication category are summarized in Table 11. Across all items, students who used speech displayed ELA skills more often than their peers who used sign/AAC or who did not have a communication system. The distribution of the ELA scale (see Table 7) was significantly different across the three groups, $H(2) = 25{,}061$, $p < .0001$, $\eta^2 = .28$. DSCF pairwise comparisons were all statistically significant ($p < .0001$); students who used speech had higher ELA scale scores than their peers who do not use speech to communicate, and students who used sign/AAC had higher scores than students who did not have a communication system. The large effect size indicates that students' expressive communication explains 28% of the variance in students' ELA scale scores.

Table 11. Responses to English Language Arts Items

Item	Speech		Sign/AAC		None	
	n	%	*n*	%	*n*	%
Recognizes single symbols presented visually or tactually						
Almost never	2,768	4.1	4,996	34.0	3,744	57.9
Occasionally	9,032	13.2	4,539	30.9	1,110	17.2
Frequently	18,334	26.8	3,237	22.0	822	12.7
Consistently	38,172	55.9	1,925	13.1	788	12.2
Understands purpose of print or braille but not necessarily by manipulating a book						
Almost never	6,263	9.2	8,257	56.2	4,509	69.8
Occasionally	9,675	14.2	3,037	20.7	722	11.2
Frequently	15,942	23.3	2,003	13.6	576	8.9
Consistently	36,426	53.3	1,400	9.5	657	10.2
Matches sounds to symbols or signs to symbols						
Almost never	7,341	10.8	9,029	61.4	4,514	69.8
Occasionally	13,205	19.3	3,015	20.5	785	12.1
Frequently	19,751	28.9	1,785	12.2	598	9.3
Consistently	28.009	41.0	868	5.9	567	8.8
Reads words, phrases, or sentences in print or braille when symbols are provided with the words						
Almost never	12,303	18.0	10,835	73.7	4,968	76.9
Occasionally	13,884	20.3	2,057	14.0	573	8.9
Frequently	17,386	25.5	1,214	8.3	440	6.8
Consistently	24,733	36.2	591	4.0	483	7.4
Identifies individual words without symbol support						
Almost never	14,579	21.3	10,754	73.2	4,934	76.3
Occasionally	15,345	22.5	2,176	14.8	597	9.2
Frequently	16,807	24.6	1,207	8.2	484	7.5
Consistently	21,575	31.6	560	3.8	449	7.0
Reads text presented in print or braille without symbol support but without comprehension						
Almost never	19,845	29.0	12,060	82.1	5,218	80.7
Occasionally	16,386	24.0	1,432	9.7	516	8.0
Frequently	17,472	25.6	840	5.7	378	5.9
Consistently	14,603	21.4	365	2.5	352	5.4
Reads text presented in print or braille without symbol support and with comprehension						
Almost never	26,323	38.5	12,913	87.9	5,491	85.0
Occasionally	22,026	32.3	1,258	8.6	504	7.8
Frequently	14,939	21.9	450	3.1	318	4.9
Consistently	5,018	7.3	76	0.5	151	2.3
Explains or elaborates on text read in print or braille						
Almost never	35,357	51.8	14,124	96.1	5,738	88.8
Occasionally	19,440	28.4	462	3.1	376	5.8
Frequently	10,105	14.8	97	0.7	236	3.6
Consistently	3,404	5.0	14	0.1	114	1.8

Note. AAC = augmentative and alternative communication; almost never = 0%–20% of the time; occasionally = 21%–50% of the time; frequently = 51%–80% of the time; consistently = > 80% of the time. *N* counts vary across items.

Table 12 summarizes students' instructional reading level by expressive communication category. Students who used speech to communicate read at higher instructional levels than

students who used sign/AAC or who did not have a communication system. There were significant differences in students' instructional reading levels across expressive communication categories: H(2) = 22,992, $p < .0001$, $\eta^2 = .26$, and all DSCF pairwise comparisons were significant ($p < .0001$). The large effect size indicates that students' expressive communication explains 26% of the variance in students' instructional reading level.

Table 12. Students' Instructional Reading Level (*N* = 89,467)

Reading level	Speech		Sign/AAC		None	
	n	%	*n*	%	*n*	%
Does not read any words when presented in print or braille (not including environmental signs or logos)	6,689	9.8	9,490	64.6	4,607	71.3
Reads only a few words or up to pre-primer level	16,009	23.4	3,219	21.9	686	10.6
Reads at primer to first-grade level	18,804	27.5	1,340	9.1	463	7.2
Reads above first-grade level to second-grade level	14,531	21.3	459	3.1	375	5.8
Reads above second-grade level to third-grade level	8,860	13.0	144	1.0	214	3.3
Reads above third-grade level	3,413	5.0	45	0.3	119	1.8

Note. AAC = augmentative and alternative communication.

Table 13 summarizes students' writing skills by expressive communication category. Students who used speech to communicate write words or simple phrases without copying more often than students who used sign/AAC or who did not have a communication system. There were significant differences in students' writing skills across expressive communication categories: H(2) = 23,695, $p < .0001$, $\eta^2 = .26$, and all DSCF pairwise comparisons were significant ($p < .005$). The large effect size indicates that students' expressive communication explains 26% of the variance in students' writing skills. An unexpected finding is that students who did not use speech or sign/AAC displayed some higher-level writing skills at higher rates than students who used sign/AAC ($p < .001$). This could be attributed to teachers rating students who do not use a traditional writing device lower than they would if they used a pencil. More research is necessary to explain these differences.

Table 13. Highest Level of Students' Writing Skills Demonstrated at Least Once (*N* = 89,467)

Writing	Speech		Sign/AAC		None	
	n	%	*n*	%	*n*	%
Scribbles or randomly writes/selects letters or symbols	8,629	12.6	10,757	73.2	4,700	72.7
Writes by copying words or letters	18,937	27.7	2,372	16.1	813	12.6
Writes using word banks or picture symbols	5,414	7.9	760	5.2	199	3.1
Writes words using letters to accurately reflect some of the sounds	8,450	12.4	270	1.8	184	2.9
Writes words or simple phrases without copying using spelling	14,193	20.8	434	3.0	328	5.1
Writes sentences or complete ideas without copying using spelling	10,210	15.0	95	0.7	178	2.8
Writes paragraph length text without copying using spelling	2,473	3.6	9	0.1	62	1.0

Note. AAC = augmentative and alternative communication.

Responses to the mathematics items by expressive communication category are summarized in Table 14. Across all items, students who used speech displayed mathematics skills more often than their peers who used sign/AAC or did not have a communication system. The distribution of the mathematics scale (see Table 7) was significantly different across the three groups: $H(2) = 25{,}384$, $p < .0001$, $\eta^2 = .28$. DSCF pairwise comparisons were all statistically significant ($p < .0001$); students who used speech had higher mathematics scale scores than their peers who did not use speech, and students who used sign/AAC had higher scores than students who did not have a communication system. The large effect size indicates that students' expressive communication explains 28% of the variance in students' mathematics scale scores.

Table 14. Responses to Mathematics Items

Item	Speech		Sign/AAC		None	
	n	%	*n*	%	*n*	%
Counts more than two objects						
Almost never	2,412	3.5	7,281	49.5	4,108	63.6
Occasionally	6,286	9.2	2,879	19.6	663	10.2
Frequently	13,226	19.4	2,199	15.0	631	9.8
Consistently	46,382	67.9	2,338	15.9	1,062	16.4
Sorts objects by common properties						
Almost never	2,651	3.9	4,848	33.0	3,575	55.3
Occasionally	9,677	14.2	4,232	28.8	1,150	17.8
Frequently	19,723	28.9	3,428	23.3	870	13.5
Consistently	36,255	53.1	2,189	14.9	869	13.4
Creates or matches patterns of objects or images						
Almost never	3,804	5.6	5,722	38.9	3,773	58.4
Occasionally	11,476	16.8	4,240	28.9	1,133	17.5
Frequently	20,506	30.0	3,006	20.4	802	12.4
Consistently	32,520	47.6	1,729	11.8	756	11.7
Identifies simple shapes in two or three dimensions						
Almost never	3,352	4.9	5,824	39.6	3,800	58.8
Occasionally	11,543	16.9	4,193	28.5	1,129	17.5
Frequently	21,552	31.6	3,007	20.5	788	12.2
Consistently	31,859	46.6	1,673	11.4	747	11.6
Adds or subtracts by joining or separating groups of objects						
Almost never	11,303	16.5	11,078	75.4	4,884	75.6
Occasionally	13,294	19.5	1,920	13.1	546	8.4
Frequently	18,505	27.1	1,120	7.6	514	8.0
Consistently	25,204	36.9	579	3.9	520	8.0
Adds or subtracts using numerals						
Almost never	17,252	25.3	12,270	83.5	5,104	79.0
Occasionally	14,387	21.0	1,2280	8.7	473	7.3
Frequently	17,620	25.8	736	5.0	471	7.3
Consistently	19,047	27.9	411	2.8	416	6.4
Uses a schedule, agenda, or calendar						
Almost never	16,258	23.8	8,289	56.4	4,840	74.9
Occasionally	18,518	27.1	3,168	21.5	820	12.7
Frequently	19,111	28.0	1,995	13.6	512	7.9
Consistently	14,419	21.1	1,245	8.5	292	4.5
Tells time using an analog or digital clock						
Almost never	25,278	37.0	12,763	86.8	5,452	84.3
Occasionally	20,241	29.6	1,270	8.6	500	7.7
Frequently	15,197	22.3	504	3.4	340	5.3
Consistently	7,590	11.1	160	1.1	172	2.7
Uses a calculator						
Almost never	32,571	47.7	13,221	90.0	5,576	86.3
Occasionally	13,850	20.3	804	5.5	347	5.4
Frequently	11,358	16.6	372	2.5	285	4.4
Consistently	10,527	15.4	300	2.0	256	3.9
Forms groups of objects for multiplication or division						
Almost never	45,143	66.1	14,123	96.1	5,837	90.3
Occasionally	12,222	17.9	369	2.5	316	4.9
Frequently	7,180	10.5	139	1.0	208	3.2
Consistently	3,761	5.5	66	0.4	103	1.6

Item	Speech		Sign/AAC		None	
	n	%	*n*	%	*n*	%
Multiplies or divides using numerals						
Almost never	50,060	73.3	14,298	97.3	5,954	92.1
Occasionally	9,930	14.5	228	1.6	272	4.2
Frequently	5,389	7.9	99	0.7	165	2.6
Consistently	2,927	4.3	72	0.5	73	1.1
Uses common measuring tools						
Almost never	31,265	45.8	12,977	88.3	5,568	86.1
Occasionally	23,143	33.9	1,434	9.8	575	8.9
Frequently	11,158	16.3	243	1.6	248	3.8
Consistently	2,740	4.0	43	0.3	73	1.1
Uses an abacus						
Almost never	62,797	91.9	14,480	98.5	6,229	96.4
Occasionally	3,127	4.6	169	1.2	136	2.1
Frequently	1,270	1.9	36	0.2	61	0.9
Consistently	1,112	1.6	12	0.1	38	0.6

Note. AAC = augmentative and alternative communication; almost never = 0%–20% of the time; occasionally = 21%–50% of the time; frequently = 51%–80% of the time; consistently = > 80% of the time. *N* counts vary across items.

Responses to the science items by expressive communication category are summarized in Table 15. Across all items, students who used speech displayed science skills more often than their peers who used sign/AAC or did not have a communication system. The distribution of the science scale (see Table 7) was significantly different across the three groups, $H(2) = 19{,}165$, $p < .0001$, $\eta^2 = .23$. DSCF pairwise comparisons were all statistically significant ($p < .0001$); students who used speech had higher science scale scores than their peers, and students who used sign/AAC had higher science scale scores than students who did not have a communication system. The large effect size indicates that students' expressive communication explains 23% of the variance in students' science scale scores.

Table 15. Responses to Science Items

Item	Speech		Sign/AAC		None	
	n	%	*n*	%	*n*	%
Sort objects or materials by common properties						
Almost never	3,460	5.5	4,815	34.9	3,420	55.9
Occasionally	12,025	19.2	4,363	31.6	1,183	19.3
Frequently	19,453	31.1	2,897	21.0	826	13.5
Consistently	27,592	44.1	1,735	12.6	693	11.3
Identifies similarities and differences						
Almost never	9,800	15.7	8,605	62.3	4,339	70.9
Occasionally	19,197	30.7	3,572	25.9	922	15.1
Frequently	20,634	33.0	1,291	9.4	535	8.7
Consistently	12,899	20.6	342	2.5	326	5.3
Recognize patterns						
Almost never	9,015	14.4	8,183	59.3	4,232	69.1
Occasionally	19,253	30.8	3,588	26.0	955	15.6
Frequently	21,373	34.2	1,558	11.3	609	10.0
Consistently	12,889	20.6	481	3.5	326	5.3
Compares initial and final conditions to determine if something changed						
Almost never	25,118	40.2	12,007	86.9	5,121	83.7
Occasionally	20,793	33.3	1,389	10.1	561	9.1
Frequently	12,546	20.0	352	2.6	315	5.2
Consistently	4,073	6.5	62	0.4	125	2.0
Uses data to answer questions						
Almost never	31,790	50.8	12,514	90.6	5,302	86.6
Occasionally	19,808	31.7	1,043	7.6	521	8.5
Frequently	8,974	14.4	212	1.5	229	3.7
Consistently	1,958	3.1	41	0.3	70	1.1
Identifies cause and effect relationships						
Almost never	36,183	57.9	12,318	89.2	5,345	87.3
Occasionally	18,546	29.7	1,208	8.7	539	8.8
Frequently	6,675	10.7	230	1.7	201	3.3
Consistently	1,126	1.8	54	0.4	37	0.6
Identifies evidence that supports a claim						
Almost never	40,663	65.0	13,183	95.5	5,535	90.4
Occasionally	15,507	24.8	520	3.8	358	5.8
Frequently	5,367	8.9	89	0.6	188	3.1
Consistently	993	1.6	18	0.1	41	0.7
Uses diagrams to explain phenomena						
Almost never	46,073	73.7	13,428	97.2	5,652	92.3
Occasionally	11,973	19.2	317	2.3	305	5.0
Frequently	3,762	6.0	53	0.4	129	2.1
Consistently	722	1.1	12	0.1	36	0.6

Note. AAC = augmentative and alternative communication; almost never = 0%–20% of the time; occasionally = 21%–50% of the time; frequently = 51%–80% of the time; consistently = > 80% of the time. *N* counts vary across items.

VI. Discussion

Students with the most significant cognitive disabilities are a small and historically understudied group of students. They have only been included in state accountability requirements over the past 20 years, and many state education agencies are still working toward meeting the 1% threshold on participation in AA-AAS, as mandated by ESSA. As state agencies continue to refine definitions and decision rules around participation, they must also provide local education agencies with guidance in determining who is eligible to take AA-AAS without interfering with IEP team decisions. For these reasons, it is important to better understand the characteristics of the students AA-AAS serve. Because the DLM project now serves students across many states, the consortium is uniquely positioned to contribute important descriptive information to this conversation.

The findings presented in this report reflect the shifting understanding of the characteristics of students with the most significant cognitive disabilities, given the contracting population eligible for AA-AAS. For instance, in 2011, Kearns et al. found that 37% to 56% of students across seven states could independently follow one- to two-step directions, while the 2019 DLM assessment results show only 24% of students consistently follow two-step directions and only 37% respond appropriately to phrases and sentences (i.e., more than 80% of the time). There are similar differences regarding students' academic skills. Towles-Reeves et al. (2009) determined 59% of students in one state could do computational problems with or without a calculator. However, only 12% of students who take DLM assessments consistently (i.e., more than 80% of the time) use a calculator, and only 22% consistently (i.e., more than 80% of the time) add or subtract by using numerals. Kearns et al. (2011) found that 14% to 18% of students were able to read fluently in print or braille from narrative or information texts with literal understanding. Comparatively, teacher ratings suggest that only 10% of students who take DLM assessments read texts without symbol support and with comprehension. Finally, Kearns et al. (2011) found that 13% to 20% of students had no awareness of print or braille, while the current study determined nearly 24% of students do not read any words in print or braille.

While some of these differences could be attributed to differences in samples and how questions are worded across studies, the findings also likely reflect changes in the population as states work toward lowering the percentage of students participating in AA-AAS. It is likely that students who are able to perform more complex communication and academic tasks are less likely to be served by AA-AAS under the 1% threshold. Students demonstrating stronger communication or academic skills who previously may have been eligible may no longer qualify under updated eligibility criteria. The population is expected to continue to shift in coming years as more states reach the 1% threshold on AA-AAS participation.

This population shift has important implications for instruction and assessment. Students with significant cognitive disabilities whose primary mode of expressive communication is speech demonstrate receptive communication, reading, mathematics, and science skills at higher rates than their peers who do not use speech to communicate. As Erickson and Geist (2016) concluded, teachers should teach students who need intensive communication supports symbolic language representations for many words and purposes that can be used across the life span, while also focusing on language in ways that will facilitate academic success. Additionally, students who have traditionally been taught alternate content standards measured by AA-AAS but no longer qualify may instead be taught to the general state academic content standards. Special educators should plan to address any learning gaps as students make this

transition, as well as explore both classroom and assessment accommodations that will help students access academic content and general education assessments when working with general education teachers who may now be teaching students that were previously served in noninclusive settings. For instance, schools that implement a multi-tiered systems of support (MTSS) framework have resources to support students as they transition from AA-AAS. MTSS is a preventative model that treats students with disabilities as general education students first and special education services as supplementary (Thurlow et al., 2020). Whole-school implementation of MTSS focuses on all students across all settings as a normal part of their school day (Horner & Halle, 2020), which may help close learning gaps of students who previously participated in AA-AAS.

Future research should examine how special education teachers are meeting the instructional and assessment needs of their students as their instructional caseloads shift in response to the 1% threshold. Research should also address how teachers meet the unique support needs of the subset of AA-AAS students who do not use speech for expressive communication, as increasing these students' communication skills may lead to greater academic skill acquisition across domains. Furthermore, as students continue to be exposed to higher academic expectations through AA-AAS, longitudinal studies of students can inform if there are teacher perceived skill progressions in communication, reading, writing, mathematics, and science, and any effect this may have on their teaching and instruction practices.

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