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Characteristics of and Implications for Students Participating in Alternate Assessments Based on Alternate Academic Achievement Standards

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Abstract

Little research has precisely defined the population of students participating in alternate assessments based on alternate academic achievement standards (AA-AAAS). Therefore, the purpose of this article is twofold: (a) explicate the findings of a multistate study examining the characteristics of the population of students participating in AA-AAAS, and (b) discuss the implications of those findings for instruction and assessment that move us closer to understanding what these students know and can do. The article discusses the results of our study within and across these seven states, implications for practitioners, and future research directions that should be considered for both instruction and assessment.

Keywords

alternate assessment, low incidence disabilities, learner characteristics, special education

Although it may seem relatively simple to define the population of students who participate in alternate assessments based on alternate academic achievement standards (AA-AAAS), this initial step of assessment design cannot be underestimated. This step is essential to understanding the demonstration of competence in academic domains (Kleinert, Browder, & Towles-Reeves, 2009). Furthermore, adequately describing the population represents a fundamental testing standard, "the population(s) for which a test is appropriate should be clearly delimited" (American Educational Research Association, American Psychological Association, & National Council on Measurement in Education, 1999, p. 17), providing a foundation for test validity.

AA-AAAS are designed for a small percentage of the student population (students with significant cognitive disabilities) for whom the regular assessment, even with appropriate accommodations, would be an inappropriate measure of student progress within the general education curriculum (Individuals with Disabilities Education Improvement Act [IDEA], 2004). The U.S. Department of Education (2005) referred to students with the most significant cognitive disabilities, as "the small number of students who are (1) within one or more of the existing categories of disability under the IDEA … and (2) whose cognitive impairments may prevent them from attaining grade-level achievement standards, even with the very best instruction" (p. 23).

AA-AAAS are themselves "an expectation of performance that differs in complexity from a grade-level achievement standard" (U.S. Department of Education, 2005, p. 20). Further, although AA-AAAS for students with significant cognitive disabilities may differ in breadth and complexity from grade-level achievement standards, they must still be linked to grade-level academic content (U.S. Department of Education, 2004). The U.S. Department of Education (2005) estimated that approximately 1% of all students have significant cognitive disabilities that qualify them to participate in an AA-AAAS. In practice, this very small percentage of the total school population ranges from 0.4% to 2.5% across states (Thurlow, Altman, Cormier, & Moen, 2008).

It is this group of students who have historically challenged measurement experts and educators who seek to

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understand what these students know and can do for a variety of intents and purposes (Kleinert et al., 2009). Given the requirements to link AA-AAAS to grade-level content standards, it becomes even more imperative to define the learning characteristics of this population and their subsequent implications for assessment.

Students With Disabilities and Alternate Assessments

The 2006 Annual Report to Congress on the Individuals with Disabilities Education Improvement Act of 2004 reported the percentage of students by category for all students receiving special education services. These data are important in understanding the demographics for students participating in the AA-AAAS. Specifically, the largest category in special education is specific learning disability (48%), followed by speech/language impairments (19%), mental retardation (10%), and emotional disturbance (8%); U.S. Department of Education, 2006). Although it is possible that students from all categorical labels, including high-incidence disability categories, may participate in AA-AAAS, the categories of mental retardation (10% of all students receiving special education services), autism (2%), and multiple disabilities (2%) represent the primary categories for students participating in AA-AAAS (National Alternate Assessment Center, 2005).

In their study to validate alternate assessments in reading and math, Tindal et al. (2003) described the participating students as representing the following IDEA categories: mental retardation (57%, n = 249), autism (17%, n = 73), specific learning disabilities (4%, n = 16), orthopedic impairments (6%, n = 25), and other health impairments (5%, n = 21). Browder, Karvonen, Davis, Fallin, and Courtade-Little (2005), in a study of the effectiveness of teacher training on improving student alternate assessment scores, described the students in their control and experimental groups (n = 285, n = 28, respectively) as representing 26% and 36% students with autism, respectively; 50% and 60% students with moderate to profound intellectual disabilities, respectively; and 17% and 4% students with multiple disabilities, respectively, with 7% of the control group identified as "other." In a subsequent study, Yovanoff and Tindal (2007) described participants as representing 82% serious cognitive disabilities and 18% "speech/language and learning disabilities" (p. 190). Yovanoff and Tindal did not, however, define more precisely the category of "serious cognitive disabilities" within that study.

Student Learning Variables

The learners participating in AA-AAAS experience notable difficulties in expressive and receptive communication and often require augmentative/alternative communication systems (AAC; Almond & Bechard, 2005; Towles-Reeves, Kearns, Kleinert, & Kleinert, 2009). Specifically, Towles-Reeves et al. found in a multistate study that approximately 80% of students in the AA-AAAS were using symbolic oral speech or AAC to communicate a variety of intents. An additional 10% to 12% communicated with emerging use of symbols by using pictures, objects, or gestures to express a variety of intents, whereas a smaller 8% to 10% had no clear use of words, pictures, objects, or gestures to communicate expressively. Of this smaller group who had no clear use of pictures, objects, or signs, approximately 2% had inconsistent receptive responses, a necessary indicator of symbolic language and an obvious assessment requirement. In addition, the smallest group (2%) had very low levels of engagement and required assistance with motor tasks.

Additional challenges for this population of students include attention to salient features of a concept or skill sequence and motor problems (Towles-Reeves et al., 2009), both of which increase the difficulty of item development for assessment conditions. Instructionally, these students need increased time for skill acquisition, fluency, maintenance, and generalization, with each phase requiring specific programming (Kleinert et al., 2009). In addition, students in this population often experience health care needs that present challenges for both instruction and assessment (Towles-Reeves et al., 2009). Finally, academic curriculum access has been significantly limited for this population (Browder, Spooner, Ahlgrim-Delzell, Wakeman, & Harris, 2008; Browder, Wakeman, Spooner, Ahlgrim-Delzell, & Algozzine, 2006; Courtade, Spooner, & Browder, 2007; Kleinert et al., 2009).

For students with significant cognitive disabilities as for all students, symbolic communication through speech or augmentative systems remains the cornerstone in the acquisition of reading, mathematics, and science concepts and skills. Language learners must use symbols repeatedly, interactively, and generatively during meaningful and ongoing activities in language-rich environments (Mirenda, 2003). Competent use of language for multiple purposes, audiences, and contexts facilitates the meta-linguistic skills required for reading comprehension (Rankin, Harwood, & Mirenda, 1994). Understanding the communication competence of students in the AA-AAAS is thus essential.

Purpose of the Current Study

As noted previously, little research has precisely defined the population of students participating in this assessment. The purpose of this article is twofold: (a) explicate the findings of a multistate study examining the communication, reading, and math skills of the population of students participating in their states' respective AA-AAAS across age and grade bands, and (b) discuss the implications of those findings for the purpose of improving instruction, accessing services and supports, and designing more reliable instruments for measuring their performance.

Table 1. State Demographics, Participation Rates in Alternate Assessments Based on AA-AAAS, and Response Rates for the Learner Characteristics Inventory

State	Geography	Participation rate	No. of responses	No. participating in AA-AAAS	Response rate
State 1	Northeast	0.96%	2,918	2,918	100%
State 2	Midwest	1.17%	2,593	2,593	100%
State 3	Eastern	1.14%	3,595	4,768	75%
State 4	Northeast	0.99%	722	774	93%
State 5	Southeast	0.70%	2,134	2,444	87%
State 6	Eastern	0.76%	468	516	91%
State 7	West	0.94%	219	467	47%

Note: Data were gathered from the states rather than from the Learner Characteristics Inventory. AA-AAAS = alternate assessment based on alternate academic achievement standards.

Table 2. IDEA Categorical Distributions

IDEA disability category distribution	State 1	State 2	State 3	State 4	State 5	State 6	State 7
Mental retardation	—	50.5%	62.3%	36.3%	73.6%	47.2%	36.1%
Multiple disabilities	—	9.9%	20.7%	16.1%	<1.0%	24.4%	23.7%
Autism	—	17.2%	13.9%	26.5%	16.5%	17.5%	14.2%
Other health impairment	—	7.7%	1.3%	7.9%	3.1%	4.1%	10.8%
Emotional disability	—	2.7%	<1.0%	2.2%	0.0%	<1.0%	1.1%
Specific learning disability	—	6.2%	<1.0%	4.0%	0.7%	1.5%	2.3%
Traumatic brain injury	—	1.3%	<1.0%	1.8%	<1.0%	1.5%	2.8%
Speech language impairment	—	<1.0%	0.0%	1.6%	<1.0%	1.4%	0.0%
Orthopedic impairment	—	<1.0%	<1.0%	<1.0%	3.3%	<1.0%	1.7%
Hearing impairment	—	1.9%	<1.0%	2.8%	1.1%	<1.0%	7.4%
Deafblind	—	<1.0%	<1.0%	0.0%	0.0%	<1.0%	<1.0%
Visual impairment	—	<1.0%	<1.0%	<1.0%	0.0%	<1.0%	<1.0%

Note: Data were gathered from the states rather than from the LCI instrument. State 1 did not provide these data. IDEA = Individuals with Disabilities Education Improvement Act.

Participating States and Student Sample

Seven states participated in this investigation for the 2006–2007 school year. These included two northeastern, two eastern, one southeastern, one midwestern, and one western state. The participation rate in AA-AAAS in these states ranged from 0.70% to 1.17% of the total assessed population in each state. The total assessed population of these seven states was 14,480 students, and the total sample of Learner Characteristics Inventory (LCI) responses represented 12,649 students. This resulted in a total response rate of 87%, with individual states' response rates ranging from 47% to 100%. The differences in response rates between states can be attributed to the method of data collection; states that included the LCI with the assessment materials had higher response rates, whereas the state that used a survey separate from the assessment (State 7) had the lowest response rate.

The IDEA eligibility categories were considered in addition to specific learner characteristics. It is interesting to note that all disability categories were represented in the sample; however, mental retardation was the largest category within each state for students in the AA-AAAS, though there were wide variances in other categories. For example, the percentage of students with specific learning disabilities ranged from less than 1% of all students in the AA-AAAS to a high of 6.2% (State 3), and the percentage of students with a primary disability of hearing impairment ranged from less than 1% to a high of 7.4% (State 7). There was a particularly wide range in the use of the multiple disability category (< 1.0%–24.4%). Table 1 illustrates the participation rates and response rates for each state; Table 2 represents the IDEA categorical distributions for each of the participating states as obtained from state assessment demographic data or additional demographic data collected simultaneously with the LCI.

Instrumentation

To gauge the extent to which student characteristics necessarily impact assessment conditions, results, and inferences, a further description beyond disability categories is clearly needed for students in the AA-AAAS. Specifically, we designed a tool to provide information about the population of students taking the AA-AAAS based on their specific characteristics (Kearns, Kleinert, Kleinert, & Towles-Reeves, 2006). The LCI (Kearns et al., 2006) included 10 items designed to address the characteristics described previously. These included receptive and expressive communication, hearing, vision, motor, engagement, health/attendance, and a reading and mathematics indicator based on a broad range skill progression. In addition, we included a dichotomous variable regarding use of AAC. Validity and reliability information for the LCI has been reported elsewhere (Towles-Reeves et al., 2009). In the initial pilot of this instrument, the average interrater agreement per variable was 95%, indicating the instrument was a sufficiently reliable tool to investigate the learning characteristics of students with significant cognitive disabilities.

States 1 through 6 included the LCI items with their respective AA-AAAS census electronic registration or as part of a scanable sheet, along with other demographic items required for completion for all students participating in the assessment. Teachers completed the inventory items for each student. State 7 used an online survey package (Zoomerang, 2008) to gather the data separately from the administration of the assessment.

Data Analysis

All data were entered and analyzed in SPSS 16.0. Descriptive statistical procedures (i.e., means, frequencies) were used to analyze the data for each of the seven states. Findings from our analyses of the following variables are presented in this article, specifically, expressive communication; receptive language; use of AAC; reading; and math across age/grade bands at elementary, middle, and high school levels.

Expressive Language/Communication and Receptive Communication

The expressive and receptive communication items from the LCI were analyzed for all seven states. To communicate expressively, most students in each state (61%–79%) used verbal or written words, signs, Braille, or language-based AAC to request, initiate, and respond to questions; describe things or events; and express refusal. These symbolic communicators or true language users (Bates, 1979) represented the majority of students participating in AA-AAAS. A smaller group of the population in each state (13%–26%) used understandable communication through such modes as gestures, pictures, objects/textures, points, and so on, to clearly express a variety of intentions. These students are illocutionary communicators (Bates, 1979) or emerging symbolic language users who are easily understood but use nonstandardized means of communication. An even smaller group of students (7%–17%) primarily used cries, facial expressions, change in muscle tone, and so on, to communicate, but these students had no clear use of objects/textures, regularized gestures, pictures, signs, and so forth, for communication. These students were thus communicating at a presymbolic level expressively or at a perlocutionary level of communication development (Bates, 1979). Table 3 represents the levels of expressive communication exhibited by the students participating in each state's AA-AAAS and illustrates clear similarities in the distribution of expressive communication characteristics of these students across the seven states.

Table 3. Levels of Expressive Communication of Students Participating in Alternate Assessments Based on Alternate Academic Achievement Standards

	Symbolic language		Emerging symbolic		Presymbolic communication	
State	*N*	%	*N*	%	*N*	%
State 1	2,053	70.4	537	18.4	328	11.2
State 2	1,950	75.2	446	17.2	197	7.6
State 3	2,828	78.6	469	13.0	299	8.3
State 4	478	67.3	182	25.6	50	7.0
State 5	1,281	61.3	447	21.4	363	17.4
State 6	363	77.6	62	13.2	43	9.2
State 7	163	75.1	37	17.1	17	7.8
Total	9,116	72.4	2,180	17.3	1,297	10.3

Receptively, the majority of students in each state fell into two primary groups: those students who independently followed one- to two-step directions presented through words (e.g., words could be spoken, signed, printed, or any combination) while *not requiring* additional cues (37%–56%) or those students who *required* additional cues (e.g., gestures, pictures, objects, or demonstrations/models) to follow one- to two-step directions (34%–51%). A smaller group (7%–13%) alerted to sensory input from another person (auditory, visual, touch, movement) but required actual physical assistance to follow simple directions. Finally, 6% (or less) of the population in each state displayed an uncertain response to sensory stimuli (e.g., sound/voice, sight/gesture, touch, movement, smell). Table 4 illustrates the receptive language/communication responses by students in the AA-AAAS in each of the seven states. Again, the distributions of receptive language functioning across states represented similar patterns.

Expressive Language and Other Characteristics

To identify the students with the "most significant cognitive disabilities," we considered the level of expressive language/communication levels and the presence of other complicating student factors. Across all seven states, students communicating at a presymbolic level of expressive and receptive language development were also more likely to have limitations in motor skill development (needs personal assistance or uses a wheelchair for most activities) and low levels of engagement (does not alert or alerts to others). The percentages of students communicating at a presymbolic level of expressive and receptive language development with both of these additional limitations ranged from 68% in State 5 to 86% in State 6. The presence of these additional disabilities appeared to increase as the level of expressive language/communication decreased for students in all seven states.

Table 4. Levels of Receptive Language of Students Participating in Alternate Assessments Based on Alternate Academic Achievement Standards

	Follows directions		Requires cues		Alerts to input		Uncertain response	
State	N	%	N	%	N	%	N	%
State 1	1,309	44.9	1,265	43.4	281	9.6	63	2.2
State 2	1,266	48.8	1,091	42.1	203	7.8	33	1.3
State 3	1,898	52.8	1,341	37.3	268	7.5	90	2.5
State 4	264	37.1	364	51.1	72	10.1	12	1.7
State 5	935	44.1	804	37.9	267	12.6	116	5.5
State 6	255	54.5	169	36.1	35	7.5	9	1.9
State 7	122	56.2	73	33.6	16	7.4	6	2.8
Total	6,049	47.9	5,107	40.4	1,142	9.0	329	2.6

Use of AAC and Communication Development

In the seven states, results suggest that between 24% and 77% of the students identified as communicating at a presymbolic level were provided an AAC system. In addition, 37% to 57% of students identified as emerging symbolic language users had some form of an augmentative communication system. For those students who were symbolic communicators, 6% to 20% of students used AAC across the seven states respectively. Table 5 illustrates these findings.

We separated, and then averaged, the data from the seven states to examine the distribution of communication and language development across the grade spans from elementary through high school. We hypothesized that language skill development would improve across time (i.e., years in school) resulting in a larger percentage of students described as communicating at a symbolic level in middle/high school and smaller percentages of pre- and emerging symbolic language users at middle and high school levels. Our findings, however, suggest that in six of our seven states, the percentages of students communicating at pre-, emerging, or symbolic expressive communication remained essentially the same at all three grade bands. Although symbolic language users represented the largest percentage of students across all three levels of elementary, middle, and high school, the percentage of students who were symbolic language users across the seven states was only minimally higher at the high school level than it was at the elementary level (76%–67%, respectively). The one exception to this pattern was State 7, in which 67% of the students in the AA-AAAS were communicating expressively at a symbolic level at the elementary level and 92% at the high school level.

Across all seven states, emerging language users represent the next highest percentage at 20% in elementary school, 18% at middle school, and 13% in high school with a 7% decrease from elementary to high school. Students communicating at a presymbolic level of language development represent the smallest percentage of students at 8% to 13% across all three levels. However, there was only a 3% decrease in the percentage of presymbolic communication users when comparing elementary and high school students in these states' AA-AAAS. Table 6 presents the data for expressive language across the grade spans.

Table 5. Percentage of Students Who Use Augmentative Communication Systems

	Symbolic language users		Emerging symbolic language users		Presymbolic communicators	
State	N	%	N	%	N	%
State 1	380	18.5	270	50.3	160	48.8
State 2	185	9.5	205	46.0	102	51.8
State 3	177	6.3	205	43.7	158	52.8
State 4	97	20.3	104	57.1	36	72.0
State 5	106	8.3	167	37.4	123	33.9
State 6	22	6.1	29	46.8	33	76.7
State 7	13	8.0	16	43.2	4	23.5

Reading and Mathematics Skills on the LCI and Movement Across Grade Spans

We further examined how teachers described skill levels in reading and mathematics for their students in the AA-AAAS. We conducted an analysis of the LCI reading and mathematics items across the six states which gathered LCI data on these items and considered the distribution at each grade band for five of the states: elementary, middle, and high school (State 2's data did not allow for this analysis).

Reading

In States 3, 4, 6, and 7, teachers noted that 1% to 4% of the population read fluently with critical understanding in print or Braille. States 1, 2, and 5 did not provide this option for this item on the inventory. In States 1 through 4 and 6, 14% to 18% of the students were rated as able to read fluently with basic (literal) understanding from paragraphs/short passages with narrative/informational texts in print or Braille. State 7 reported

Table 6. Distribution of Expressive Communication Across Grade Spans

	State 1	State 2	State 3	State 4	State 5	State 6	State 7	Average (% *N*)[a]
Elementary								
Presymbolic	12.7%	—	9.8%	8.4%	19.6%	17.1%	8.1%	12.6%
Emerging	20.3%	—	15.1%	30.0%	23.0%	16.5%	16.3%	20.2%
Symbolic	67.0%	—	75.1%	61.6%	57.4%	66.5%	75.6%	67.2%
Middle								
Presymbolic	10.7%	—	7.3%	4.9%	15.3%	5.2%	4.1%	7.9%
Emerging	17.2%	—	12.7%	25.1%	19.4%	13.9%	17.6%	17.6%
Symbolic	72.1%	—	79.9%	70.0%	65.4%	81.0%	78.4%	74.2%
High								
Presymbolic	9.7%	—	7.9%	6.8%	16.6%	4.1%	12.5%	9.5%
Emerging	17.7%	—	10.8%	12.2%	22.8%	4.1%	12.5%	13.2%
Symbolic	72.6%	—	81.3%	81.1%	60.6%	91.8%	75.0%	76.4%

Note. State 2 chose not to provide data regarding student grade level.
a. Average may not equal exactly 100% because of rounding errors.

Table 7. Levels of Reading Ability of Students Participating in the Alternate Assessment Based on Alternate Academic Achievement Standards

	Reads fluently with critical understanding		Reads fluently with basic understanding		Reads basic sight words		Aware of text/Braille		No observable awareness of print or Braille	
State	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%
State 1	—	—	487	16.7	1,342	46.0	516	17.7	573	19.6
State 2	—	—	474	18.3	1,256	48.4	458	17.7	405	15.6
State 3	74	2.1	522	14.5	1,787	49.6	754	20.9	468	13.0
State 4	10	1.4	101	14.2	332	46.6	153	21.5	117	16.4
State 5	—	—	—	—	—	—	—	—	—	—
State 6	18	3.8	70	15.0	183	39.1	119	25.4	78	16.7
State 7	5	2.3	73	33.6	71	32.7	40	18.4	28	12.9

Note: States 1 and 2 chose not to use the highest response level for this item. State 5 chose not to gather these data.

34% of students in the AA-AAAS were able to read with basic understanding. The largest frequency of students across these states (33%–50%) was rated as reading basic sight words, simple sentences, directions, bullets, and/or lists in print or Braille but not fluently from text with understanding. A smaller percentage of students (18%–25%) was rated as not yet having a sight word vocabulary, but being aware of text/Braille, following directionality, making letter distinctions, or telling a story from pictures. Finally, teachers noted from 13% of 20% of students in the AA-AAAS had no observable awareness of print or Braille. Table 7 highlights these data for each state.

Reading Across Grade Bands

As with communication, we wanted to see if broad skill levels in reading and mathematics reflected any differences between elementary, middle, and high school. In elementary school, the largest percentage of students were reading sight words (42%; range = 34%–49%), followed by developing an awareness of print (26%; range = 19%–35%), and no awareness of print or Braille (18%; range = 12%–22%). Fluent reading skills with literal and critical understanding represent the smallest percentages at an average of 13% for literal understanding (range = 7%–20%) and 2% for critical understanding (range = 1%–4%). State 5 did not administer this item on the inventory, and due to data collection limitations, State 2 was not included in this analysis.

The results in the middle school grade band indicated a similar distribution pattern with the top three items. Again, the largest percentage of the distribution fell into the categories of sight word vocabulary (44%; range = 28%–51%), developing an awareness of print (19%; range = 16%–21%), and no awareness of print or Braille (13%; range = 11%–19%). The average percentage of fluent reading with basic understanding almost doubled (22%; range = 16%–42%) from the elementary to middle school grade spans, whereas the average percentage of fluent reading with critical understanding increased only slightly (3%; range = 1%–5%).

Finally, at the high school level, the largest percentage of students again fell into the sight word vocabulary category (44%; range = 31%–52%). However, the distribution of students reading fluently with basic understanding was the second highest percentage at this grade band (24%; range = 16%–44%), compared to 22% at the middle school and 13%

Table 8. Levels of Mathematics Ability of Students Participating in the Alternate Assessment Based on Alternate Academic Achievement Standards

	Applies computational procedures to solve problems		Does computational procedures with or without a calculator		Counts with 1:1 correspondence to at least 10		Counts by rote to 5		No observable awareness or use of numbers	
State	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%
State 1	115	3.9	1,281	43.9	737	25.3	281	9.6	504	17.3
State 2	217	8.4	1,216	46.9	575	22.2	226	8.7	359	13.8
State 3	127	3.5	2,049	57.0	769	21.4	206	5.7	445	12.4
State 4	33	4.7	224	31.7	250	35.4	89	12.6	111	15.7
State 5	—	—	—	—	—	—	—	—	—	—
State 6	29	6.2	209	44.7	106	22.6	60	12.8	64	13.7
State 7	9	4.1	111	51.1	59	27.2	13	6.0	25	11.5

Note: State 5 chose not to gather these data.

at the elementary level. The third highest category for high school students in the AA-AAAS was no awareness of print (15%; range = 4%–21%). The smallest categories at the high school level included students who were developing an awareness of print (14%; range = 6%–22%) and reading fluently with critical understanding (4%; range = 0%–13%).

Mathematics

Similarly in mathematics, across the seven states, 4% to 8% of students applied computational procedures to solve real-life or routine word problems from a variety of contexts. The largest category of students (32%–57%) was able to complete computational procedures with or without a calculator. From 21% of students (State 3) to 35% of students (State 4) were described as performing at the more basic level of counting with one-to-one correspondence to at least 10, and/or making numbered sets of items. A smaller percentage still (6%–13%) were described as being able to count by rote to 5 but without the higher skill sequences of one-to-one correspondence or computation. Finally, teachers noted that approximately 12% to 17% of students had no observable awareness or use of numbers. Table 8 illustrates these data.

Mathematics Across Grade Bands

We conducted a similar analysis of mathematics skills by grade bands across the five states that provided grade-band data. At the elementary level, the largest percentage of students used a calculator to solve basic math problems (36%; range = 26%–48%). The next largest group counted with correspondence and made sets of items (31%; range = 28%–35%). Students who counted by rote (12%; range = 8%–17%) or who had no awareness of numbers (16%; range = 9%–20%) made up smaller percentages of students. Not surprisingly, the smallest percentage applied computational procedures to solve real world or routine problems (4%; range = 3%–6%).

An analysis of the middle school mathematics items indicated a 16% increase in the percentage of students using a calculator from elementary to middle school (36% to 52% across the five states), but with only a 4% decrease for no awareness or use of numbers and a 4% decrease for the rote counting category. Likewise, the distribution of responses for high school students indicated few differences for students at middle and high school levels (except for the percentage of students who could apply computational procedures to real life problems, which increased from 4% to 7%). State 5 did not administer this item on the inventory; and because of data collection, State 2 was not included in this analysis.

Other Student Characteristics

In addition to the items just described, the LCI also includes items related to vision, hearing, motor, health/attendance, and engagement. Engagement refers to the extent to which the student engages in social interactions. The percentages across the states were similar for all of these indicators. The majority of the population in this sample had vision within normal limits or corrected vision within normal limits (M = 91.8%, range = 89%–96%), hearing within normal limits or corrected (M = 93.8%, range = 92%–97.9%), and no significant motor dysfunction (M = 80.6%, range = 75.8%–85%), although the mean percentage of students with no significant motor dysfunction was somewhat lower than that of hearing or vision. The largest percentage of the population initiated and/or responded to social interactions (M = 89.4%, range = 84%–92%) and attended school at least 90% of the days with a mean of 87.4% (range = 84.3%–89.7%). Of interest, the percentage of students who had low levels of attendance because of health issues (M = 2%, range = 1.1%–3.4%) was only slightly higher than the percentage of students who had irregular attendance because of issues *other* than health (M = 1.5%, range = 1.1%–1.9%).

Discussion

The purpose of this article was to describe the student populations in the AA-AAAS of seven different states. Our initial premise for this article is based on the work of Marion and Pellegrino (2006); these authors noted that the essential components of validity for alternate assessments depend, in part, on the extent to which the population can accurately be described and a progression of learning articulated. The instrument we used to gather the data in the seven states (Kearns et al., 2006) was designed with the explicit purpose of describing the student population in each state's AA-AAAS as accurately as possible.

The analysis of data from these states, all of which are assessing approximately 1% of the total population, provides us with detailed information about the characteristics of the learners in the AA-AAAS. These students represent a variety of disability categories and a wide range of skills within each disability category. Yet to date, there is only one other study that has attempted to compare the students participating in the AA-AAAS across states (Towles-Reeves et al., 2009). Our findings across the seven states suggest that although all disability categories were represented in our sample, the majority of students represented the mental retardation, multiple disabilities, and autism IDEA categories. Furthermore, across the seven states, students were differentiated by levels of receptive and expressive language use. The majority of learners in this population communicated at a symbolic level of expressive and receptive language development, used oral speech or AAC to communicate a wide variety of intents, and could follow one- to two-step directions independently. The next largest percentage of learners included those who used emergent symbolic expressive and receptive communication. They used objects, pictures, signs, and gestures in addition to oral speech to communicate a variety of intents and needed additional cues for assistance to follow directions. The third group included students communicating receptively and expressively at a presymbolic level of communication development. These students used cries, facial expressions, and body movements, but the intent of their communicative output had to be interpreted by the listener/observer. In addition, receptively these students alerted to sensory information but needed extensive physical assistance to respond, whereas others had inconsistent receptive responses and/or low levels of alerting behaviors in the presence of external stimuli. Of the three groups, two (presymbolic and emerging symbolic) represent significant developmental differences that, in turn, impact the acquisition/demonstration of skills in reading and mathematics. However, it is important to note that both communication development and acquisition of cognitive skills/concepts can have a reciprocal, positive effect as each improves (American Speech, Language, and Hearing Association, 2000, 2003, 2006). Finally, of the students who were communicating at the pre- and emerging level of symbolic language development, on average, only about half of them (46%–51%) accessed or used AAC.

The students who could be identified as having the "most significant cognitive disabilities" were those learners who, in addition to functioning at a presymbolic level of receptive and expressive communication, also were more likely to have other characteristics (low levels of social engagement, limited motor skills, more likely to experience one or more sensory impairments, and more likely to have health-related issues that impacted regular school attendance) that increased the complexity of their needs. These students represented approximately 10% of the students taking the AA-AAAS in the states in our study, truly represent the terminology "most significant cognitive disabilities" (U.S. Department of Education, 2005), and may represent the most challenging set of students for designing instruction and assessments including AA-AAAS.

Implications of AA-AAAS

Federal requirements (U.S. Department of Education, 2005) are clear in that states' AA-AAAS, even though they can be based on academic achievement standards representing reduced breadth, depth, and complexity, must still be linked to *grade-level academic content standards*. Academic content standards are, by definition, based on symbolic representations of knowledge, and these representations become increasingly complex and abstract at higher grade levels. At the heart of academic achievement is communication. Thus, our overall finding across these seven states that the percentage of students reported as symbolic communicators increased less than 9% from the elementary (67% of all students in these states' alternate assessments) to the high school grade levels (76%) is disconcerting. Finally, although only a small percentage of our sample, the 1% to 2% of the population who have irregular attendance for reasons other than health is also concerning as irregular attendance impacts the opportunity to learn.

Of interest, the state (State 6) that had the greatest increase in the percentage of learners at the symbolic language level from elementary to high school (67%–92%) and the greatest reduction in the number of presymbolic learners across those grade levels (17% to 4%) also had the greatest percentage of presymbolic learners who reportedly had access to AAC (77% of all presymbolic learners in that state's AA-AAAS). It would be of interest to know what type of AAC such students were using. It is possible that these students may have already been at a higher symbolic level and that they simply needed an AAC system to express the symbolic language comprehension that they already had but for which they had not received "credit." This is an area ripe for further investigation and implies the need for standardization of terms and improved mutual understanding of communication development across those disciplines involved in teaching students with the most significant cognitive disabilities, especially educators and speech/language pathologists in the schools. It is also a strong rationale for the need to implement AAC at a greater rate than we see typically from the overall findings of our research across states. This decrease in presymbolic learners was especially noteworthy between elementary and middle schools levels in this state—12.6% to 7.9%. Although we must interpret these data with caution, as they represent cross-sectional data (and not longitudinal data for the same students), they suggest that AAC is an essential element if many students in the AA-AAAS are to develop formal communication systems and have the opportunity to meaningfully access grade-level academic curriculum.

Unless we ensure that all students are given the fundamental tools to communicate and that they are given sustained, systematic instruction on the use of those communicative tools, we cannot expect that they will increase their communicative *or* their academic competence. For students with the most significant cognitive disabilities, this implies that we employ a transdisciplinary team model of services (Orelove, Sobsey, & Silberman, 2004) that actively involves speech-language therapists, other related service personnel, the parents, and student, as well as the general and special education teachers.

Specifically, from a validity perspective, we wanted to describe the population of students in ways that extend what we know about their disabilities but also illustrated what they know and can do. This is indicated by the similarities within and across the communication, reading, and mathematics results from all seven states. Our findings suggest that most students in the population are reading vocabulary words and solving math problems with a calculator; these general descriptors are true for students in the AA-AAAS in elementary school, middle school, and high school. Although we did find evidence of gains in reading fluency (reading with basic understanding) in the higher grades, it is not clear why the percentage of students with these more advanced reading and math skills did not appear to increase appreciably from elementary to middle school and from middle to high school across the five states that provided us with grade-band data.

Our results suggest a consistent pattern of learning in reading and mathematics across those five states. However, the extent to which this learning pattern represents the "highest expectations possible" as required by the No Child Left Behind guidance (U.S. Department of Education, 2005) is as yet unknown. Currently, the data suggest the "highest expectations" we have for these students represent sight word reading and calculator math for those with symbolic communication. More problematic is that we do not expect basic communication to improve. This may well be reflected in the low usage of AAC for students both at the emergent symbolic and presymbolic levels. Despite years of research documenting the positive reciprocal effect of AAC usage and cognitive/symbolic learning, our data do not indicate that AAC (with the exception of one state) is widely used in the population of students in the AA-AAAS. Students who may appear to function at a presymbolic or emergent symbolic level of expressive communication may not be able to demonstrate their true communication levels if AAC has not been offered.

Limitations

This article provides only a small glimpse of students participating in AA-AAAS. The seven states in this study volunteered to participate and may not be representative of all states. The states in this study assessed approximately 1% or less of the total assessed population statewide within their respective AA-AAAS; we did not include a state that assessed substantially more than 1% in its AA-AAAS. Thurlow et al. (2008) reported that states range considerably in the percentage of their total student population who take the AA-AAAS (0.4%–2.5%). In addition, the samples from States 3 and 7 may not be truly representative of the students in their respective AA-AAAS, as indicated by low return rates in those states (75% and 43%, respectively).

Second, the LCI is a teacher report instrument used solely to enhance the description of the student population. The intent of developing an instrument with a small number of items was to facilitate gathering data on the learning characteristics of these students without placing an exorbitant amount of time and effort upon teachers. As such, the results may not be as accurate as a direct observation instrument. The instrument is also a gross categorization of abilities on a continuum of skills. Our purpose was to gather data quickly and easily without the need for intensive teacher training. As a result, this gross categorization may not be as sensitive to students' ability levels when compared with other measures.

Third, and most important, our analyses of student skill progression in communication, reading, and math across the grade bands are based on cross-sectional and not longitudinal data. We cannot say with any certainty that a similar pattern would have held had we studied the same set of students over time. Clearly, such a longitudinal study is needed to confirm our preliminary results across grade bands in these communication and academic areas.

Fourth, the variation across the states in the percentage of students in each IDEA disability category reported as participating in the AA-AAAS may also partially reflect the considerable variation in how states assign students to IDEA categories in the first place. Thus, differences in the percentages of students in each IDEA category participating in the alternate assessment across states may not primarily reflect who gets identified for the assessment but in how states have originally assigned students to those disability categories. This is in itself an important reason why researchers and policymakers need a common, descriptive measure across states to define the characteristics of students participating in the AA-AAAS.

Fifth, we must note that there are varying terms currently found in the literature to describe the development of communication from presymbolic to symbolic (Bates, 1976; Bates, Thal, Whitesell, Fenson, & Oakes, 1989; Browder, Ahlgrim-Delzell, Courtade-Little, & Snell, 2006; Koul, Schlosser, & Sandibrian, 2001; Mirenda, 2003, Rowland & Schweigert, 1990). In developing the LCI we chose to use the descriptors and definitions that have been used across multiple disciplines for many years, so that transdisciplinary teams—which include speech/language pathologists who direct communication interventions and develop AAC programs and psychologists as well as educators—can share the same clear understanding of what constitutes symbolic language and what earlier communicative development facilitates its growth. In designing the LCI, we separated the students who used true, formalized language (print, speech, sign, formalized augmentative communication systems) at Level 1 of expressive communication from those who used some symbols (such as real objects, single pictures, gestures, points, etc.) in Level 2 of expressive communication, to determine the complexity of their communication development. We recognize that not all researchers in this area would interpret symbolic communication in the same sense that we used for our scale. The LCI has been shown, however, to be scored across educators and secondary raters, many including speech/language pathologists, with an agreement rate of 95% during the instrument's development.

Sixth, although we did ask respondents specifically about health/attendance issues, we did not require specificity in the indicator for irregular attendance for reasons *other* than health. Further explication of this variable is warranted as irregular attendance is problematic regardless of the reason but has additional implications for exploring behavior as a function of communication.

Finally, the state (State 6) that evidenced the greatest gains in communication levels across grade bands also used the expressive language item on the LCI to determine the format in which students participated in that state's AA-AAAS. That this LCI measure played a role in accountability may well have influenced the communication data reported by teachers from that state and reduces our confidence in these findings. However, it is important to note that the same decision rules applied across *each* of the grade bands in that state, so that reported differences *across* grade bands would likely reflect real differences in student communication levels for the students who participated in the AA-AAAS at each grade-level in that state.

Future Research

Despite the limitations of this study, the findings across these seven states are largely consistent. Although this was not a longitudinal study of the same students in each state, but rather a preliminary "snapshot" of students with significant cognitive disabilities within each state at the elementary, middle, and high school levels, we nevertheless expected to see higher levels of communication development and increased competence in reading and mathematics across the grade bands. Future research is warranted to identify an appropriate curriculum progression in academic content that goes beyond sight word reading and calculator math, and the extent to which we find across time increasingly more students at each grade level achieving that progression. Indeed, research in reading for this population suggests that these students can develop reading skills (Browder, Wakeman, et al., 2006).

For students with the most significant cognitive disabilities (i.e., those communicating both receptively and expressively at a presymbolic level with other complex characteristics), significant research and professional development are warranted in facilitating communication through learning activities in academic content. Given the paucity of students at the presymbolic level who also have AAC (with the exception of State 6), it is clear that educators need to work much more collaboratively with related service personnel, and especially with speech/language pathologists in their schools, to ensure that students have the communication tools to achieve within the general curriculum, as well as to increase their overall competence across life domains.

Finally, it would be helpful to compare the results of this instrument with individual student AA-AAAS scores, to determine the extent to which the characteristics of learners impact individual and state assessment results. If students in an accountability system always produce low or high scores based on the severity of their disability, and not as a function of the instruction they receive, instructional improvement will obviously be compromised. The end result may be that students who are the most vulnerable who are the ones "left behind."

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