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An Analysis of the Learning Characteristics of Students Taking Alternate Assessments Based on Alternate Achievement Standards

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This study examined the learner characteristics of students in alternate assessments based on alternate achievement standards in three geographically and demographically different states. On the basis of the results, it can be argued that students in alternate assessments fall into at least two distinct subgroups. The first set of learners have either symbolic or emerging symbolic levels of communication, evidence social engagement, and possess at least some level of functional reading and math skills. The second set of students have not yet acquired formal, symbolic communication systems; may not initiate, maintain, or respond to social interactions consistently; and have no awareness of print, Braille, or numbers. The authors provide implications and considerations of the findings of the *Learner Characteristics Inventory* for states and practitioners in developing alternate assessments based on alternate achievement standards.

Keywords: *alternate; assessment; learner characteristics; disabilities; special education*

As a field, alternate assessment for students with disabilities is in its infancy. Originating in Kentucky in 1992 (Kleinert, Kearns, & Kennedy, 1997), alternate assessment was originally conceptualized for students with more severe disabilities (Kleinert & Thurlow, 2001). Alternate assessment was mandated nationally by the Individuals With Disabilities Education Act Amendments of 1997 (IDEA 97) as a mechanism for inclusion in large-scale educational assessments for those students who could not participate in general education state and district assessments, even with accommodations and modifications. Although IDEA 97 did not limit alternate assessment to students with the most significant disabilities, most states designed their original alternate assessments for that small population of students. The No Child Left Behind Act of 2001 (NCLB) and subsequent regulations reinforced the requirement that states develop alternate assessments for students with significant cognitive disabilities and allowed states to set alternate achievement standards on alternate assessments designed for those students. Regardless of whether alternate or grade-level achievement standards are set, all assessment options are to be aligned to grade-level content standards (U.S. Department of Education, 2004).

Alternate assessments based on alternate achievement standards (AA-AAS) for students with significant cognitive disabilities must evidence rigorous technical quality comparable with that of large-scale assessments for all students. For the "infant" field of alternate assessment, this is no easy task. When IDEA 97 was passed, states had only two examples of a statewide

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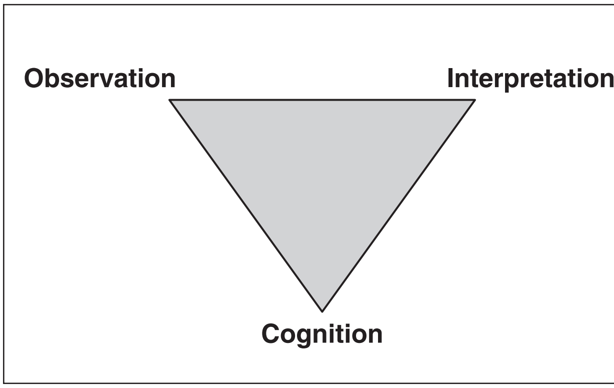
alternate assessment to consider (Kleinert et al., 1997; Kleinert, Haigh, Kearns, & Kennedy, 2000) and only 3 years to design alternate assessments of their own. It is not surprising, then, that states have varied widely in the alternate assessment formats they have developed, in how they have aligned their alternate assessments to the state academic content standards identified for all students, and in the technical qualities of their alternate assessments. Furthermore, with the exception of studies of Kentucky's alternate assessment (see Kampfer, Horvath, Kleinert, & Kearns, 2001; Kleinert & Kearns, 1999; Kleinert, Kennedy, & Kearns, 1999; Turner, Baldwin, Kleinert, & Kearns, 2000) and subsequent work by Browder and colleagues (Browder et al., 2003; Flowers, Ahlgrim-Delzell, Browder, & Spooner, 2005), little is known about how alternate assessments have affected teacher practice, access to the general curriculum, and, most important, student outcomes. The challenges are extremely complex. At this time, many states not only are struggling with issues of the technical quality of alternate assessment but are in the midst of engaging in a challenging paradigm shift from functional or below-grade-level developmental instruction and assessment for some students with disabilities to instruction and assessment linked to grade-level academic content standards for all students.

A Conceptual Framework

The framework for our research comes from the National Research Council's Committee on the Foundations of Assessment's conception of the *assessment triangle* (Pellegrino, Chudowsky, & Glaser, 2001). The triangle focuses attention on how models of large-scale assessment reflect the characteristics of good teaching and learning, specifically, how diverse groups of students demonstrate that learning within the academic domains.

The assessment triangle consists of "a model of student cognition in the domain, a set of beliefs about the kinds of observations that will provide evidence of the students' competencies, and an interpretation process for making sense of the evidence" (Pellegrino et al., 2001, p. 44). Pellegrino et al. (2001) defined three pillars on which every assessment must rest: "a model of how students represent knowledge and develop competence in the subject domain, tasks or situations that allow one to observe students' performance, and an interpretation method for drawing inferences from the performance evidence thus obtained" (p. 2). They suggested that these pillars make up an assessment triangle and that this triangle—cognition, observation, and interpretation—must be articulated, aligned, and coherent for inferences drawn from an assessment to have integrity. The triangle is illustrated in Figure 1. In this study, we intended to examine a critical part of the assessment triangle, the cognition vertex, and, more precisely, one element of that vertex: the learner characteristics of students who are assessed with AA-AAS.

Figure 1
The Assessment Triangle



Source: Pellegrino et al. (2001).

The students for whom AA-AAS are appropriate represent two problems that challenge traditional measurement theory. First, they represent a small percentage (estimated in NCLB regulation as 1% or less) of the total assessed population of students with and without disabilities. Second, they are reportedly a highly diverse group, particularly with regard to learner characteristics, available response repertoires, and often competing complex medical conditions (Heward, 2006; Orelove, Sobsey, & Silberman, 2004). However, few empirical data exist to verify the extent to which students with these learning characteristics are represented in the assessed population.

Who Are These Students?

According to IDEA 97 and the Individuals With Disabilities Education Improvement Act of 2004, alternate assessments are designed for a very small percentage of the student population, for whom traditional assessments, even with appropriate accommodations, would be inappropriate measures of progress within the general education curriculum. Indeed, these students represent multiple categories of disability under IDEA, including mental retardation, autism, and multiple disabilities (U.S. Department of Education, 2002-2003). Qualitative data collected from state participation criteria for alternate assessments (Midsouth Regional Resource Center, 2004) suggest that the following characteristics describe the population. These students typically (a) have individualized education programs, (b) have cognitive disabilities, (c) require instruction under multiple conditions to generalize learning, and (d) may receive "functional curricula." However, there is little evidence of how states are monitoring the use of participation guidelines in making assessment decisions and thus how consistently states are identifying students according to their own participation criteria. In a further attempt to describe this population, Almond and Bechard (2005) found in an AA-AAS pilot across five states that these students were most likely to have different curricular focuses, require communication supports and assistive technology, and require physical supports.

Validity Evaluation

On the basis of the conceptual framework of Pellegrino et al. (2001), the learning characteristics of the assessed population have significant implications for an assessment's validity. Specifically, the validity evaluation of an assessment should consider two questions. First, it is necessary to know whether the assessment is appropriate for the intended population. Second, in high-stakes accountability environments, it is important to ensure that the appropriate population is in fact the population being assessed. This study represents the first systematic attempt to address these two questions.

Method

Research Design

A survey research design was used to gather data on the learning characteristics of students participating in the AA-AAS in three states. Table 1 outlines the options for each of the three states in data collection. Although the survey could be completed in different modalities (i.e., online or on paper), the directions for completing the survey were all consistent: (a) Teachers were to complete the *Learner Characteristics Inventory* (LCI) for each student participating in the AA-AAS, and (b) for each item on the survey, teachers were to choose the answer that most appropriately described the student. The following outlines the specific data collection options used in each state.

Table 1
Data Collection Techniques for the Learner Characteristics Inventory in States 1, 2, and 3

State	Data Collection Technique
1	Online survey
	Paper-and-pencil version brought to scoring site
	Paper-and-pencil version completed at scoring site
2	Online survey
3	Online survey

All special education teachers in State 1 were sent an e-mail inviting them to complete the LCI for each student participating in the AA-AAS during the 2005-2006 school year. In the e-mail, teachers were offered three ways to complete the LCI:

1. Teachers could click on a link that directed them to the inventory, which they could complete for each child participating in the alternate assessment (thus, a teacher with three students in the alternate assessment would complete the LCI for each of the three students). If teachers completed the LCI online, they were asked to print the completion page at the end of the survey and bring it to the scoring site when dropping off the assessment. In this way, they would not be asked again if they had completed the inventory for their students.
2. Teachers could complete the inventory by printing out the version attached to the invitation e-mail. Teachers were asked to print the inventory for each student participating in the alternate assessment and bring the LCIs with them when dropping off the assessments at their scoring sites.
3. If teachers chose not to complete the inventory, forgot to bring it with them to the site, or chose to complete it upon arrival at the scoring site, inventories were available for them at the scoring site. At all times, teachers were given the choice not to complete the LCI.

In State 2, all district administrators were sent an e-mail from the chief of the bureau of assessment. District administrators were asked to forward an attached e-mail to teachers inviting them to complete an LCI for each student participating in the AA-AAS during the 2005-2006 school year. In this state, teachers were only allowed the option to complete the LCI online. Teachers were given a 3-week window to complete the inventory for their students, and then the inventory was taken offline.

In State 3, an e-mail invitation was sent to 247 teachers who attended alternate assessment regional training. From this group of attendees, teachers administering the alternate assessment this year were invited to complete the LCI for each of their students participating in the alternate assessment. The invitation provided a brief description and the purposes of the survey and asked teachers to click on the link to the online survey. Once the teachers clicked on the link, they were directed to the online survey and completed it for each of their students. The survey was available for 2 weeks. After the 1st week, a friendly reminder was sent to teachers. The online survey was extended by 1 week, and teachers received another friendly reminder.

Participants

All teachers who had students participating in the AA-AAS in three states were asked to complete the LCI for each student completing the assessment that year who was on their caseload. One state (State 1) was a southern state, largely rural. The second state was a northeastern state, largely urban and suburban. The third state was a western state, largely rural. To collect data on this population in an efficient and timely manner, researchers developed the instrument to be a quick and easy tool completed by the students' teachers, which could eventually be incorporated into the assessment process (such as when registering students to take the assessment or as part of the materials submitted with the assessment). Because we were interested in student, not teacher, descriptive data, we did not ask teachers to complete demographic data on themselves.

Instrumentation

The LCI was developed by researchers at the National Alternate Assessment Center (NAAC) in conjunction with experts in the fields of occupational therapy, physical therapy, speech and language pathology and communication disorders, deaf-blindness, reading, mathematics, and special education. The LCI went through expert validation, and changes to the categories were made given thoughtful feedback from the experts. The LCI was e-mailed to 10 experts across these fields, with a structured evaluation form. The form required experts to give feedback on the survey as a whole (i.e., clarity, utility, accuracy, and understandability), but for the questions that tapped individual expertise, experts were asked to provide specific recommendations on content and clarity. Each item on the survey included a purpose statement and rationale for the importance of including it on the survey. Experts were asked to indicate if changes were needed for each question and to precisely explain the changes necessary to improve the instrument.

The survey was then piloted with a small sample of teachers (approximately 25 from across elementary, middle, and high school grade levels). Teachers were asked to choose partner respondents (such as speech and language pathologists, school psychologists, or general education teachers), and both were to independently score an LCI for a single student so that interrater agreement could be calculated. Interrater agreement was 84%, and teachers made suggestions for changes to the categories. These suggestions were considered by researchers at NAAC, and a final version of the LCI was once more piloted with a small sample of approximately 15 teachers from across grade levels and their independent partner respondents. The average interrater agreement per variable was 95%, indicating that the instrument was valid to investigate the learning characteristics of students with the most significant cognitive disabilities.

The instrument included 10 questions, 9 on a continuum of skills in the areas of expressive communication, receptive language, vision, hearing, motor skills, engagement, health issues and attendance, reading, and mathematics. The other question was a dichotomous variable asking if students used augmentative communication systems. Teachers were asked to rate where each student in their classes participating in AA-AAS would rank on this continuum or dichotomy for each variable. (A copy of the survey is available from the lead author.)

Data Analysis

Expressive communication, receptive language, vision, hearing, motor skills, engagement, health issues and attendance, reading, and mathematics were continuous variables, and we chose to measure them as such for data analysis purposes. Each item within each variable was given a numerical value (low to high, with high representing more complex abilities). When coding the data in SPSS, multiple responses and missing data were coded as exclusionary data. Descriptive statistics (frequencies and percentages) were assessed for each of the 10 questions on the LCI. In addition, correlational analyses were conducted to investigate the relationships between expressive and receptive communication and reading and mathematics skills, along with other variables. In the Results section, we outline the response rate, descriptive statistics, and findings from the correlational analyses.

Results

During the 2005-2006 school year, approximately 1,394 students in State 1 from Grades 4, 8, and 12 completed AA-AAS. Teachers completed the LCI for 1,120 students during the spring of 2006. The response rate was 80%. In State 2, approximately 2,800 students from Grades 3 to 8 and 10 completed AA-AAS. Teachers completed the LCI for 201 students, also in the spring of 2006. The response rate was approximately 7%. It is possible that the response rate was reduced in State 2 for two reasons: (a) the time of year when the inventory was conducted (a very busy time) and (b) e-mailing teachers through district administrators (which required administrators to forward the e-mails to teachers, increasing attrition). During the 2006-2007 school year, teachers completed the LCI for 219 students in State 3 in the spring of 2007. Approximately 467 students from Grades 3 to 8 and 11 completed AA-AAS. The response rate was approximately 47%.

Descriptive Analyses

Table 2 includes the total number of respondents and frequencies for each variable in each state. To communicate expressively, most students in each state used verbal or written words, signs, Braille, or language-based augmentative systems to request, initiate, and respond to questions; describe things or events; and express refusal (71%, 63%, and 74%, respectively, in States 1, 2, and 3). A smaller group of the population in each state used understandable communication through such modes as gestures, pictures, objects or textures, pointing, and so on, to clearly express a variety of intentions (17%, 26%, and 17%, respectively). An even smaller group of students primarily used cries, facial expressions, changes in muscle tone, and so on, to communicate, but these students had no clear use of objects or textures, regularized gestures, pictures, signs, and so on, to communicate (8%, 11%, and 8%, respectively).

Receptively, students in each state fell into two primary groups: those students who independently followed one- or two-step directions presented through words (words could be spoken, signed, printed, or any combination) while not requiring additional cues (46%, 34%, and 56%, respectively, in States 1, 2, and 3) and those students who required additional cues (e.g., gestures, pictures, objects, demonstrations, models) to follow one- to two-step directions (41%, 54%, and 33%). A smaller group in each state (10%, 10%, and 7%) alerted to sensory input from other people (auditory, visual, touch, movement) but required actual physical assistance to follow simple directions. Finally, less than 3% of the population in each state displayed uncertain responses to sensory stimuli (e.g., sound or voice, sight or gesture, touch, movement, smell).

Overall, only a minority of students in each state used augmentative communication systems, in addition to or in place of oral speech (18%, 30%, and 15% in States 1, 2, and 3, respectively). Perhaps most significantly, only 57% of students in State 1, 36% of students in State 2, and 33% of students in State 3 who communicated primarily through cries, facial expressions, changes in muscle tone, and so on, used formalized augmentative communication systems. Furthermore, only 42% of the students in State 1, 44% of the students in State 2, and 43% of the students in State 3 who communicated through such modes as gestures, pictures, objects or textures, pointing, and so on, used formalized augmentative communication systems in place of oral speech.

The LCI also investigated individual students' reading and mathematics skills. For each of the five options under reading and math, teachers were asked to select the option that best described their students' present performance in those areas. In States 1 and 3, teachers noted that over 2% of the population read fluently with critical understanding in print or Braille. This option was not provided on the inventory in State 2. Almost 14% of the students in State 1, 12% in State 2, and 33% in State 3 were rated as being able to read fluently, with basic (literal) understanding from paragraphs or short passages with narrative or informational texts in print or Braille. The largest groups from all three states (50%, 47%, and 33% in States 1, 2, and 3, respectively) were rated as being able to read basic sight words, simple sentences, directions, bullets, and/or lists in print or Braille, but not fluently from text with understanding. Smaller percentages of students (17%, 14%, and 18%) were rated as not yet having sight word vocabularies but being aware of text or Braille, following directionality, making letter distinctions, or telling stories from pictures. Finally, teachers noted that 15% of students in State 1, 25% of students in State 2, and 13% of students in State 3 had no observable awareness of print or Braille.

Table 2
Number of Responses and Percentages for Each Variable for States 1, 2, and 3

	State 1		State 2		State 3	
Variable	*n*	%	*n*	%	*n*	%
Expressive language						
Uses symbolic language to communicate: Student uses verbal or written words, signs, Braille, or language-based augmentative systems to request, initiate, and respond to questions, describe things or events, and express refusal	799	71	127	63	163	74
Uses intentional communication, but not at a symbolic language level: Student uses understandable communication through such modes as gestures, pictures, objects/textures, pointing, etc., to clearly express a variety of intentions	193	17	52	26	37	17
Student communicates primarily through cries, facial expressions, change in muscle tone, etc., but no clear use of objects/textures, regularized gestures, pictures, signs, etc., to communicate	92	8	22	11	17	8
Multiple answers	6	1	0	0	0	0
No response	30	3	0	0	2	1
Total	1,120	100	201	100	219	100
Receptive language						
Independently follows one- or two-step directions presented through words (e.g. words may be spoken, signed, printed, or any combination) and does not need additional cues	523	46	68	34	122	56
Requires additional cues (e.g., gestures, pictures, objects, or demonstrations/models) to follow one- or two-step directions	461	41	109	54	73	33
Alerts to sensory input from another person (auditory, visual, touch, movement) but requires actual physical assistance to follow simple directions	109	10	21	10	16	7
Uncertain response to sensory stimuli (e.g., sound/voice, sight/gesture, touch, movement, smell)	18	2	3	2	6	3
Multiple answers	1	0	0	0	0	0
No response	8	1	0	0	2	1
Total	1,120	100	201	100	219	100
Communication system						
Does your student use an augmentative communication system in addition to or in place of oral speech?						
Yes	202	18	60	30	33	15
No	878	78	141	70	184	84
Multiple answers	0	0	0	0	0	0
No response	40	4	0	0	2	1
Total	1,120	100	201	100	219	100
Reading						
Reads fluently with critical understanding in print or Braille (e.g., to differentiate fact/opinion, point of view, emotional response, etc.)	27	2	NA	NA	5	2
Reads fluently with basic (literal) understanding from paragraphs/short passages with narrative/informational texts in print or Braille	153	14	24	12	73	33
Reads basic sight words, simple sentences, directions, bullets, and/or lists in print or Braille	562	50	95	47	71	33
Aware of text/Braille, follows directionality, makes letter distinctions, or tells a story from the pictures that is not linked to the text	192	17	28	14	40	18
No observable awareness of print or Braille	172	15	50	25	28	13
Multiple answers	6	1	0	0	0	0
No response	8	1	4	2	2	1
Total	1,120	100	201	100	219	100
Mathematics						
Applies computational procedures to solve real-life or routine word problems from a variety of contexts	29	2	8	4	9	4
Does computational procedures with or without a calculator	641	57	75	38	111	51
Counts with 1:1 correspondence to at least 10 and/or makes numbered sets of items	211	19	49	24	59	27
Counts by rote to 5	76	7	20	10	13	6
No observable awareness or use of numbers	144	13	45	22	25	11

(continued)

Table 2 (continued)

Variable	State 1		State 2		State 3	
	n	%	*n*	%	*n*	%
Multiple answers	8	1	0	0	0	0
No response	11	1	4	2	2	1
Total	1,120	100	201	100	219	100
Vision						
Vision within normal limits	686	61	136	68	110	50
Corrected vision within normal limits	331	29	35	17	87	39
Low vision; uses vision for some activities of daily living	74	7	22	11	10	5
No functional use of vision for activities of daily living, or unable to determine functional use of vision	23	2	8	4	10	5
Multiple answers	0	0	0	0	0	0
No response	6	1	0	0	2	1
Total	1,120	100	201	100	219	100
Hearing						
Hearing within normal limits	1,040	93	187	93	208	95
Corrected hearing loss within normal limits	29	2	1	1	4	2
Hearing loss aided but still with significant loss	12	1	6	3	0	0
Profound loss, even with aids	10	1	4	2	0	0
Unable to determine functional use of hearing	20	2	3	1	5	2
Multiple answers	0	0	0	0	0	0
No response	9	1	0	0	2	1
Total	1,120	100	201	100	219	100
Motor skills						
No significant motor dysfunction that requires adaptations	850	76	153	76	177	81
Requires adaptations to support motor functioning (e.g., walker, adapted utensils, and/or keyboard)	127	11	20	10	15	7
Uses wheelchair, positioning equipment, and/or assistive devices for most activities	55	5	3	2	11	5
Needs personal assistance for most/all motor activities	73	6	25	12	14	6
Multiple answers	4	1	0	0	0	0
No response	11	1	0	0	2	1
Total	1,120	100	201	100	219	100
Engagement						
Initiates and sustains social interactions	587	52	85	42	130	59
Responds with social interaction, but does not initiate or sustain social interactions	414	37	87	43	69	32
Alerts to others	84	8	22	11	16	7
Does not alert to others	21	2	7	4	2	1
Multiple answers	2	0	0	0	0	0
No response	12	1	0	0	2	1
Total	1,120	100	201	100	219	100
Health issues/attendance						
Attends at least 90% of school days	901	80	173	86	183	84
Attends approximately 75% of school days; absences primarily for health issues	156	14	27	13	26	12
Attends approximately 50% or less of school days; absences primarily for health issues	27	2	1	1	5	2
Receives homebound instruction because of health issues	6	1	0	0	0	0
Highly irregular attendance or receives homebound instruction because of issues other than health	21	2	0	0	3	1
Multiple answers	2	0	0	0	0	0
No response	7	1	0	0	2	1
Total	1,120	100	201	100	219	100

Note: NA = not available.

Under math skills, teachers were again asked to select the performance description that best indicated the skill levels of their students. At the highest level, 2% of students in State 1 and 4% of students in States 2 and 3 applied computational procedures to solve real-life or routine word problems from a variety of contexts. The largest category of students within each state (57%, 38%, and 51% in States 1, 2, and 3, respectively) was able to complete computational procedures with or without a calculator. Nearly 19% of students in State 1, 24% of students in State 2, and 27% of students in State 3 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. Smaller percentages still (7%, 10%, and 6%) 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 nearly 13% of students in State 1, 22% of students in State 2, and 11% of students in State 3 had no observable awareness or use of numbers.

Most students in all three states (90%, 85%, and 89%) had normal vision or corrected vision within normal limits. However, nearly 9% in State 1, almost 15% in State 2, and exactly 10% in State 3 of all students represented in our survey had low vision or no functional use of vision for activities of daily living. As with vision, most students (95%, 94%, and 97%) had hearing within normal limits or corrected hearing loss within normal limits. Small percentages of the populations in States 1 and 2 (2% and 5%, respectively) had significant and profound hearing loss, even with aids. No students in State 3 had this characteristic. For almost 2% of the population in all three states, teachers were unable to determine the functional use of hearing for their students.

When asked to rate students' motor abilities, teachers rated approximately 76% of students in States 1 and 2 and 81% of students in State 3 as having no significant motor dysfunction that required adaptations. However, the remaining 24% of students in States 1 and 2 and 18% of students in State 3 had a range of motor abilities, from requiring adaptations to support motor functioning to needing personal assistance for most or all motor activities. Overall, there was clearly a wide variety of abilities and needs for this student population related to motor functioning.

Engagement (awareness and interaction with others) is another variable investigated by the LCI. Approximately 89% of students in State 1, 85% of the students in State 2, and 91% of students in State 3 were able to initiate and sustain social interactions or respond to social interactions (without initiating or sustaining them). However, 8% of students in State 1, 11% of students in State 2, and 7% of students in State 3 only alerted to other people. Approximately 2% of students in State 1, 4% in State 2, and 1% of students in State 3 did not alert to other people.

Because the students who take AA-AAS are those with the most significant cognitive disabilities, who may also have special medical needs or considerations, the final variable on the LCI investigated attendance in school. Remarkably, 94% of students in State 1, 99% of students in State 2, and 96% of students in State 3 attended at least 75% of school days, with absences primarily for health issues. In States 1 and 3, 2% of the population attended approximately 50% or fewer of school days, with absences primarily for health issues; in State 2 that percentage was 1%.

Table 3
Relationship Between Expressive Communication, Receptive Language, Reading, and Mathematics

Variable	1	2	3	4
State 1				
1. Expressive communication	—	.576*	.574*	.648*
2. Receptive language		—	.559*	.634*
3. Reading			—	.783*
4. Mathematics				—
State 2				
1. Expressive communication	—	.659*	.674*	.686*
2. Receptive language		—	.577*	.568*
3. Reading			—	.836*
4. Mathematics				—
State 3				
1. Expressive communication	—	.721*	.649*	.718*
2. Receptive language		—	.678*	.694*
3. Reading			—	.847*
4. Mathematics				—

*$p > .01$.

Correlational Analyses

Correlational analyses were also conducted between expressive language, receptive communication, and reading and math. Results for all three states can be found in Table 3. A bivariate Pearson correlation was used to investigate the relationship between expressive language and reading and math and receptive communication and reading and math. In all three states, a statistically significant correlation was found between the level of a student's expressive language and the student's level of reading. As might be expected, students who were symbolic learners were also reading at higher levels than those who were not. In addition, a significant correlation was found between the level of a student's receptive communication and the level of reading in all three states. Consequently, students with higher levels of receptive communication were also reading at a higher level. Furthermore, significant correlations were found between the level of a student's expressive language and mathematics and receptive communication and mathematics in all three states. Again as might be expected, students with higher levels of expressive language and receptive communication were working at higher levels in mathematics.

Correlational analyses were also conducted to investigate the relationship between receptive language and engagement, motor, and health issues and attendance. These analyses resulted in statistically significant correlations for receptive language and engagement ($r = .55$, $p < .01$), motor skills ($r = .57$, $p < .01$), and health issues and attendance ($r = .17$, $p > .01$) in State 1. Similarly, in State 2, analyses resulted in significant correlations for receptive language and engagement ($r = .58$, $p < .01$), motor skills ($r = .48$, $p < .01$), and health issues and attendance ($r = .18$, $p > .01$). In State 3, analyses yielded statistically significant correlations for receptive language and engagement ($r = .68$, $p < .01$), motor skills ($r = .56$, $p < .01$), and health issues and attendance ($r = .41$, $p < .01$).

Discussion

NCLB requires that all educational assessments, including AA-AAS, that are used for determining school and state-level adequate yearly progress meet high standards of technical adequacy. As noted by Pellegrino et al. (2001), two critical elements in determining technical adequacy are (a) precisely defining the target set of students for whom an assessment has been designed and (b) determining if the learners for whom that assessment has been designed are in fact the students who are taking it. The purpose of this study was to describe the learner characteristics of students taking AA-AAS in three demographically and geographically dissimilar states. To describe the population of students in the AA-AAS for these three states, we created a brief scale, the LCI, across nine separate dimensions on which students with significant cognitive disabilities are known to have highly variable abilities (expression communication, receptive communication, social engagement, motor skills, hearing, vision, health, reading, and math; Heward, 2006; Orelove et al., 2004). As might be expected, teachers' ratings for individual students ranged across the gamut of performance descriptions within each area assessed by the LCI, but some important conclusions can still be drawn.

First, students in these three states who are being identified to take AA-AAS are for the most part students for whom the regular assessments, even with accommodations, would probably not be appropriate. For example, only 2% to 4% of the total students in the AA-AAS in these states are able to "read fluently with critical understanding" or "apply computational procedures to solve real-life or routine word problems." Both skills would be required for the successful completion of grade-level reading and math assessments under NCLB.

Second, the majority of students taking the AA-AAS represented in our survey from these three states did have functional reading and math skills. For example, over 66% of the students in our survey from State 1 could at least read basic sight words or simple sentences in print or Braille, and 59% of the students in the AA-AAS in State 1 could, at a minimum, do computational problems with or without a calculator.

Third, within each of these three states, there would appear to be a small but significant number of students (approximately 11% or less) in the AA-AAS whose language skills could best be described as presymbolic (Bates, 1976). That percentage appears consistent for both expressive and receptive communication. Moreover, these percentages are also consistent with the percentage of students in each state who teachers report do not respond to social interactions.

Fourth, even larger percentages of students in each of the three states had no observable awareness of print or Braille (15%, 25%, and 13% in States 1, 2, and 3, respectively) and no observable awareness or use of numbers (13%, 22%, and 11%, respectively).

Finally, as might be expected, there were strong correlations between levels of receptive and expressive communication skills and academic and math measures for students in the AA-AAS in each of the three states. The strongest correlations, also as might be expected, were between academic ratings in math and reading for the students in these states (.78, .84, and .85 in States 1, 2, and 3, respectively), indicating a very strong relationship between math and reading performance on the LCI for these students.

Our findings suggest that although the majority of students in our sample in their respective states' AA-AAS did have functional math and reading skills, there were smaller percentages of students whose lack of formalized, symbolic communication systems or lack of awareness of the basic building blocks of reading and math (i.e., print and numbers) may create tremendous challenges in building alternate assessments that

(a) capture meaningful skills that these students have achieved and (b) are linked to grade-level content standards.

Our results appear consistent with those of Almond and Bechard (2005), who also found a broad range of communication skills in the students in their study (i.e., 10% of the students in their sample did not use words to communicate, but almost 40% used 200 words or more in functional communication) and in their motor skills (students in their sample ranged from not being able to perform any components of the task because of severe motor deficits to being able to perform the task without any supports). Our findings, together with those of Almond and Bechard, highlight the extreme heterogeneity of the population of students in the AA-AAS, making the development of valid and reliable assessments for these students an even more formidable task.

Limitations

One of the most significant limitations in this study is the difficulty in describing communication levels of students in a way in which all communication experts would agree. Describing students' levels of expressive communication can become confusing, because various experts use varying terms for this purpose. Bates (1976), who was a pioneer in identifying the emergence and levels of symbolic and language-based communication, spoke of three major stages of development. Locution, the highest level, occurs when an individual uses formal language to express intent. Formal language includes those systems that are rule based, such as oral speech, Braille, print, various forms of sign language, and formalized augmentative communication boards or electronic systems (Level 1 of expressive communication on the LCI). These are clearly symbolic systems. The use of regularized gestures, pointing, or objects to express communicative intent (Level 2 on the LCI), although understandable, falls at the level of illocution and can be considered at an emergent symbolic level, but not formalized language. Finally, an individual who uses less differentiated cries, muscle tone changes, and so on, to communicate (Level 3 on the LCI) may require interpretation on the part of a listener, and although these individuals are definitely communicative, they would not be considered to be at a symbolic level of communication. Mirenda (2003), a noted authority in functional and augmentative communication development for students with significant disabilities, listed multiple options for "symbols" that can be used for functional communication. These might include signs, pictures, partial objects, gestures, and so on. When reviewing the vast literature in this area, it is difficult to determine which descriptors to use when describing a given student's communicative or expressive acts. Is one at a "symbolic level" of development when he or she uses any symbol as a representation, even a real object, or should he or she be using a standardized, language system to be considered symbolic? In designing the LCI, we separated the students who used formalized language (print, speech, sign, formalized augmentative communication systems) at Level 1 of expressive communication from those who used some symbols (such as pictures, gestures, points, and so on) at 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.

A second limitation is that the LCI is our own instrument, but no other measures existed that would succinctly capture the essential dimensions on which we needed to describe the population of students potentially eligible for the AA-AAS. To ensure that we did construct a valid measure of student characteristics, we designed the LCI in conjunction with experts in the fields of occupational therapy, physical therapy, speech and language pathology and communication disorders, deaf-blindness, reading, mathematics, and special education; piloted the survey with a small sample of teachers and partner respondents to achieve an acceptable level of interrater agreement; and achieved a final interrater agreement of 95% upon subsequent revisions on the basis of expert and teacher comments. However, the lack of a previously validated research tool for our study is a limitation.

In addition, a third limitation of this study is the use of teacher ratings to describe the characteristics of students participating in AA-AAS. Certainly, there are limitations to gathering data requiring teachers to rate students' abilities (i.e., underestimating abilities), but this is necessary in gathering data on the learning characteristics of students taking AA-AAS. In the future, researchers may want to consider gathering descriptive data on respondents or have parents and teachers complete the same inventory to check for consistency in reporting. Additionally, states used varied data collection techniques, which we recognize as a limitation. However, the consistency in directions for completing the LCI was maintained across each of the states and across the data collection techniques.

The fourth significant limitation is, of course, the very low response rate for State 2. With a response rate of only approximately 7%, it would be impossible to generalize the results from State 2 to the entire population of students in that state who are eligible for its AA-AAS. Despite this limitation, we did include the results from this state for two reasons: (a) we did have more than 200 individual responses from the state, and (b) although this was a very limited sample, in general, the student characteristic results from State 2 mirrored those of States 1 and 3, for which we had response rates of 80% and 47%, respectively. This was especially true in the overall percentage of students in each state who scored at either Level 1 (symbolic) or Level 2 (emerging symbolic) for both the expressive and receptive language items and for the overall percentage of students in each state who initiated or sustained or responded to social interactions. Although teachers in State 2 did report a higher incidence of students who used augmentative communication systems, who had no observable awareness of print or numbers, and who required assistance for all motor activities than did teachers from States 1 and 3, we simply cannot identify whether this is a real difference or an artifact of the small sample from that state. Further research is clearly needed to establish how states differ in their identified populations for their alternate assessments.

Contributing, in all probability, to the low response rate for State 2 in our study was the element of timing of the survey and the fact that the survey was electronically "passed down" from administrators to teachers. Future studies should ensure that teachers have direct access to the LCI or a similar instrument and that the survey is not timed to coincide with other major due dates or year-end activities for teachers.

Future Research Considerations

There are important considerations for future research investigating the learning characteristics of students with the most significant cognitive disabilities as well as possible uses of the LCI. To begin, we have no current data that outline how many students with the most significant cognitive disabilities are also English-language learners who participate in the AA-AAS. This is an important consideration to add to the LCI to identify the number of students who are both students with significant cognitive disabilities and English-language learners. In addition, this information will help states be sure that teachers are providing appropriate instruction on the basis of these particular students' learning needs.

Second, the AA-AAS for every state is used to determine adequate yearly progress for these students and in some states is also part of student and school accountability measures that have considerable impact (graduation status for individual students, rewards and sanctions for schools). It is important to know what student characteristics are most correlated with performance on the AA-AAS. For example, is it possible for states to design their AA-AAS in such a way that even students at the emerging and presymbolic levels of communication can demonstrate what they know and can do on content linked to grade-level content standards? Further research that links student characteristics on the LCI with actual AA-AAS scores can begin to answer these questions.

Third, research with the LCI, or similar measures that can reliably and validly identify the learner characteristics of this population, would be useful in increasing general public awareness about strengths and challenges for students taking alternate assessments and in delineating the extent to which states truly are assessing similar populations of students in their respective AA-AAS. For states that may be overidentifying students for their AA-AAS (e.g., exceeding the 1% cap on students who can achieve proficiency in the AA-AAS), instruments such as the LCI can be useful in determining if students with more advanced academic skills (e.g., reading with critical understanding) are being placed into the AA-AAS and could perhaps be more appropriately placed into other assessment options (alternate assessments on grade-level standards or alternate assessments under modified achievement standards) allowed under NCLB.

Finally, professional development has been identified as a key variable for teachers with students in the AA-AAS (Browder, Karvonen, Davis, Fallin, & Courtade-Little, 2005). Instruments such as the LCI could be used to tailor professional development on the AA-AAS to ensure that teachers receive in-service training that addresses the communication levels of their students, as an essential variable in accessing the grade-level curriculum.

Implications for Practitioners

There are two critical implications for practitioners from this study. We will discuss each in turn. First, the U.S. Department of Education (2004, 2005) clearly requires that states develop alternate achievement standards that are linked to grade-level content standards for students with significant cognitive disabilities. In its NCLB peer-review guidance for states, the Department of Education (2004) has made this linkage to grade-level context explicit:

> For alternate assessments in grades 3 through 8 based on alternate achievement standards, the assessment materials should show a clear link to the content standards for the grade in which the student is enrolled although the grade-level content may be reduced in complexity or modified to reflect pre-requisite skills. (p. 15)

The challenge for both state-level policy makers and practitioners is how this linkage is to be made for students who are functioning at a presymbolic level of communication. It is important to note that this term is not used to describe students who expressively have not been provided with the means (or symbols) to convey content that they may really know, but students who receptively are functioning at a presymbolic level as well. Academic content is, by definition, symbolic content; that content becomes increasingly complex and abstract at higher grade levels. For students at a presymbolic level, then, teachers must teach the development of symbolic communication through the grade-level content. As noted by Browder, Wallace, Snell, and Kleinert (2005), this means simultaneously teaching the content while teaching the symbols by which that content is represented. For example, for students who are learning to identify key characters in a story by selecting pictures of those characters, this means learning that pictures are symbols that can represent actual characters, while learning about the characters themselves. As a field focused on curriculum and instruction for students with significant cognitive disabilities, we simply have not yet developed a research base for how these two important, but very distinct, skill sets (one a developmental and communicative skill and the other an academic and core content skill) can be effectively taught in tandem.

The second implication is in part a recognition of the first. In consideration of the heterogeneity of learners who are eligible for alternate assessments on grade-level content standards, NCLB allows multiple alternate achievement standards (U.S. Department of Education, 2005). According to the Department of Education (2005), if a state

> chooses to define multiple alternate achievement standards, it must employ commonly accepted professional practices to define the standards; it must document the relationship among the alternate achievement standards as part of its coherent assessment plan. . . . One reason why a State might choose to develop more than one alternate achievement standard is to promote access to the general curriculum and to ensure that students are appropriately challenged to meet the highest standards possible. (p. 22)

This survey suggests some evidence that states might want to consider this option. Given that the 1% of students with significant cognitive disabilities for whom the AA-AAS is designed includes both symbolic learners who evidence skills in reading and math as well as presymbolic learners who display limited social engagement and no awareness of print and numbers, it would appear to be a reasonable and coherent assessment approach to consider separate alternate achievement standards for these two sets of students. Certainly, what might be defined as an appropriately challenging alternate achievement standard in reading for a student who reads basic sight words or sentences (or even reads fluently with basic understanding from paragraphs) would be defined at a different level of complexity or scope than for a student with no clear use of gestures, pictures, or signs to communicate and who had no observable awareness of print. Or conversely, what would be an appropriately challenging math standard for a student "who could do computational problems with or without a calculator" would appear to be different for a student who had no observable awareness of numbers. Still, of course, the caveat remains that even for students at a presymbolic level of communication, states are to consider alternate achievement standards linked to grade-level content standards, and if a state does adopt multiple achievement standards, each set of those alternate standards must reflect that linkage.

We should also note that if a state chooses to adopt multiple alternate achievement standards, the Department of Education (2005) has described the relationships that should exist between those multiple sets of standards: "If, however, a State chooses to define multiple alternate achievement standards, it must employ commonly accepted professional practices to define the standards; it must document the relationship among the alternate achievement standards as part of its coherent assessment plan" (p. 23). We would argue that on the basis of the results of this study, a decision to create multiple alternate achievement standards based on students' symbolic use of language does represent a coherent distinction in the students who participate in the alternate assessment and also provides a mechanism for relating how students might move from one set of alternate assessment standards to a more complex set of standards, as students attain formalized, symbolic modes of communicating and representing what they know.

Conclusion

This study examined the learner characteristics of students in the AA-AAS in three very geographically and demographically different states. On the basis of our results, it can be argued that students in the alternate assessment include at least two subgroups within this population, although it should be noted that there is no distinct line between the two and most likely a continuum rather than a precise demarcation of symbolic language levels exists. The first set of students (and the majority of the students in our sample) have either symbolic or emerging symbolic levels of communication, evidence social engagement, and possess at least some level functional reading and math skills. The second set of students in our sample (10% to 25% of our students, depending on the measure and the state) have not yet acquired formal, symbolic communication systems do not initiate, maintain, or respond to social interactions and have no awareness of print, Braille, or numbers. Between these two sets of students are those who most likely represent skills and abilities characteristic, in part, of each of these groups. States must consider the educational needs of all these students in designing their AA-AAS. Most important, states will need to thoughtfully consider, especially for students at a presymbolic level of communication, how to ensure linkage to grade-level content standards in ways that provide meaningful and useful educational targets for those students.

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