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Measuring the Enacted Curriculum for Students With Significant Cognitive Disabilities

A Preliminary Investigation

Meagan Karvonen, Shawnee Y. Wakeman, Claudia Flowers, and Diane M. Browder

Based on recent federal legislation, alternate assessments for students with disabilities may now be based on alternate achievement standards, modified achievement standards, or grade-level achievement standards. Although all students with disabilities must access the general curriculum, those with significant cognitive disabilities often do so through extensions of grade-level content standards. Because curriculum is individualized for students with disabilities, experts cannot immediately apply to this population the methods for examining the taught curriculum in general education. The purpose of this article is to describe the development and use of a method for examining the enacted curriculum for students who take alternate assessments. We present initial item development, survey blueprint, expert review, and pilot test findings. Experts can use this tool to investigate the alignment of curriculum with alternate assessments and state standards and to design professional development for educators learning to access the general curriculum.

Students with significant disabilities were first included in large-scale assessments after 1997 amendments to the Individuals with Disabilities Education Act (IDEA; IDEA Amendments of 1997) required alternate assessments be provided for students who could not participate in typical tests, even with accommodations. Final No Child Left Behind regulations permitted states to develop alternate achievement standards for reporting adequate yearly progress for students with significant cognitive disabilities, but the regulations stipulated that these alternate achievement standards must align with a state's academic content standards, promote access to the general curriculum, and reflect the highest achievement standards possible (200.1[d]; Title 1—Improving the Academic Achievement of the Disadvantaged; Final Rule, 2003). The federal law does not define "significant cognitive disabilities," and individuals who participate in alternate assessments come from several IDEA categories of disabilities. In this article the population of focus is students who may be classified through IDEA as having moderate to severe mental retardation, autism, or multiple disabilities, including mental retardation.

The *Alternate Achievement Standards for Students With the Most Significant Cognitive Disabilities: Non-Regulatory Guidance* states that the content of alternate assessments should be "clearly related to grade-level content, although it may be restricted in scope or complexity or take the form of introductory or pre-requisite skills" (U.S. Department of Education, 2005, p. 26). Educators can begin with academic content standards for the grade level in which the student is enrolled and then adapt or "extend" these content standards for the individual with disabilities.

Although some models of alignment have focused on the relationship between standards and large-scale assessments, Porter and Smithson (2001) characterized alignment among three elements: (a) the intended curriculum, typically represented in content standards or curriculum frameworks; (b) the assessed curriculum; and (c) the enacted curriculum, or what is actually taught in the classroom. It is the interaction of those three elements, along with secondary elements (e.g., resources, professional

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development), that contribute to the learned curriculum (student outcomes).

In general education settings, states and districts sometimes use the Surveys of Enacted Curriculum (SECs; Council of Chief State School Officers, 2003) to investigate alignment of the enacted curriculum with state standards and assessments. Procedures have been developed to use these surveys for purposes ranging from the interpretation of assessment results to school curriculum improvement and alignment. Versions of the SEC exist for mathematics, science, and English language arts (ELA) and reading based on the content, materials, and methods typical in general education settings. A longitudinal, randomized study on the use of SEC data in professional development for math and science teachers revealed improved alignment of instruction with state standards over a 2-year period (Council of Chief State School Officers, 2004). Additionally, researchers have found that general curriculum access as measured by teacher survey is a strong predictor of alternate assessment outcomes for students with significant cognitive disabilities (Roach & Elliott, 2006).

Understanding Curriculum and Expectations for Students With Significant Disabilities

As described previously, students with significant cognitive disabilities are now expected to learn academic skills and content. However, when these students are assessed, their performance is not judged against typical (grade-level) achievement standards. The *Alternate Achievement Standards for Students With the Most Significant Cognitive Disabilities: Non-Regulatory Guidance* notes that alternate achievement expectations may reflect an expectation for learning a narrower range of content (e.g., fewer objectives under a content standard) and learning content that is less complex while still challenging (U.S. Department of Education, 2005). The skills the student acquires may be associated with those that are typically acquired at earlier grades or that are prerequisites to attaining grade-level proficiency.

As this shift to academics represents a major curriculum change for this population (Browder et al., 2004), teachers still need considerable help with planning curriculum; identifying, developing, and adapting materials; and learning how to effectively teach academic skills to students with significant cognitive disabilities. Surveys have revealed that some teachers question the relevance of this grade-level content for students with significant intellectual disabilities (Agran, Alper, & Wehmeyer, 2002) or do not agree that alternate assessment promotes access to the general curriculum standards (Flowers, Ahlgrim-Delzell, Browder, & Spooner, 2005; Kleinert, Kennedy, & Kearns, 1999). Although some special educators have gained increased knowledge of general education through their states' professional development activities or through preservice training, many states continue to struggle with how to build teacher competence in this area (see Note 1). Further complicating this curriculum shift are (a) the lack of research-based strategies for teaching a wide range of ELA and math content to the population (Browder, Ahlgrim-Delzell, Pugalee, & Jimenez, 2006; Browder, Wakeman, Spooner, Ahlgrim-Delzell, & Algozzine, 2006); (b) a lack of understanding of academics in general education, especially among special educators who teach students with significant disabilities (Otis-Wilborn, Winn, Griffin, & Kilgore, 2005); and (c) the need to combine academic instruction for alternate achievement standards with individual curricular priorities represented in students' Individualized Education Programs. Given these challenges, how do teachers learn to identify the gaps in the curriculum and expand the range of academic content taught to their students to cover the full range represented in the state standards and on the assessment?

Because special education teachers need help with curriculum planning as they adjust to the increased academic focus required by federal legislation, a mechanism for measuring the enacted curriculum for students with significant cognitive disabilities is now needed for both alignment studies and teacher professional development. We developed the Curriculum Indicators Survey (CIS) to measure the enacted curriculum for students with significant cognitive disabilities who participate in alternate assessments based on alternate achievement standards. The CIS also assesses some information about instructional resources and professional development. The CIS incorporates elements of the SEC approach, but for several reasons the existing SECs are not appropriate as valid measures of the enacted curriculum for this population. The SEC uses academic language that may be unfamiliar to teachers of this student population, it includes items about homework and classroom instruction procedures that are irrelevant for students with significant disabilities, and it provides cognitive demand descriptors that are not sufficiently wide ranging to capture the response processes of students with the most significant cognitive disabilities.

The purpose of this article is to describe the process we used to develop and refine the CIS. We discuss four stages of survey development: (a) initial survey development and blueprint, (b) procedures for survey completion, (c) findings from expert reviews of the surveys and related materials, and (d) qualitative findings from pilot implementation of the CIS. Prior to these four sections, we provide a brief overview of the survey contents.

Overview of Survey Contents

We designed the CIS to measure the enacted curriculum in ELA and mathematics across pre-kindergarten to 12th grade

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(pre-K–12). Part I of the survey collects information about the teacher's background, professional development, classroom characteristics, instructional resources, use of particular types of classroom assessment, and instructional influences. This part of the survey is answered with all of the teacher's students in mind (i.e., the "target class"). If the teacher does not teach a self-contained class but is instead responsible for students in multiple settings (e.g., inclusion, homebound instruction), the target class consists of the teacher's case load.

Part II of the survey has two separate versions for ELA and math and is completed with a particular student ("target student") in mind. The contents of Part II surveys contain a list of topics or strands (e.g., geometry) and specific content within each topic (see Figure 1 and see Note 2). Teachers rate the intensity of coverage of each item within topics that they teach to the target student and also indicate the highest performance expectation (cognitive demand) for that student during the year. The survey can use this combination of information to generate matrices that illustrate the percentage of instructional time spent per strand, per level of cognitive demand (see Table 1). This matrix provides a snapshot of areas of instructional emphasis and gaps. When compared with a test blueprint organized in a similar matrix, it can identify areas of strong and weak alignment. A third column indicates the grade level from which teachers adapted materials, activities, and contexts for items that were taught or planned. The final page of each Part II survey asks about the intensity of use of a variety of instructional strategies (e.g., individualized instruction, independent practice) and the level of expectation for student participation in these activities. As the Part II surveys are designed to obtain the richest information about the enacted curriculum, the following section is limited to item development for those components of the CIS.

Initial Development of Academic Content for the CIS

We established several priorities to guide the process of generating items for ELA and math topics. First, we decided that the language in the items should be comprehensible to special educators who may lack the detailed vocabulary of the content area specialist. To assist teachers of students with significant disabilities who are still learning to access the general curriculum, some items consist of both their usual terminology as well as a parenthetical interpretation. For example, the item "proportional relationships in problem solving, modeling, and analysis" contains parenthetical examples of unit pricing and map interpretation. Our second priority was that the performance expectations ratings (cognitive demand) should be accessible to students with a wide range of levels of symbolic communication, including those with no symbol use and limited intentionality. Finally, because the goal was to develop content lists that are applicable across states, we decided that the final list of topics and items should have some social validity among a wide range of special educators, general educators, and measurement professionals with expertise in this area.

Sources of ELA and Math Content

As the idea of general curriculum access and academics for this population is still fairly new, there are few examples of agreement across multiple states on how to access academic content standards. One exception is the Alternate Assessment Collaborative (2004), a consortium of states and nonprofit organizations that developed consensus frameworks and expanded benchmarks (hereafter, *EAG benchmarks*) for Grades 3 through 8 and high school in reading, writing, math, and science. Additionally, the curricular frameworks developed by Massachusetts (Massachusetts Department of Education, 2001) are cited by the U.S. Department of Education (2005) as a model for states. The Massachusetts frameworks, which reflect the same domains as the national standards developed by the National Council of Teachers of Mathematics (www.nctm.org) and the National Council of Teachers of English (www.ncte.org), provide categories of content that can be used across states for consideration of curriculum access. Although we cannot guarantee that all CIS items are reflected in various states' curricular frameworks, summaries of survey responses within categories (e.g., National Council of Teachers of Mathematics strands) may still provide useful estimates of curricular emphasis across states.

We developed CIS items by gleaning items from both the Massachusetts frameworks and EAG benchmarks. Massachusetts's frameworks, which extend downward to early academic skills and feature skill progression across grades, were the primary source of items. In each topic (strand), we made a check to be sure we had incorporated the contents of the EAG benchmarks.

Both the EAG benchmarks and Massachusetts frameworks were written with cognitive demand embedded in the item (e.g., EAG = "demonstrate understanding of main idea"; Massachusetts = "summarize main ideas and supporting details"). We stripped out of the items verbs signifying cognitive demand so that only content (e.g., "main idea in text") was evident in the item. A second member of the team checked the first member's edits to be sure no content was lost and that the remaining items would appear clear to special educators. The final versions of the Part II content sections consisted of 250 items across 27 topics in ELA and 178 items in 5 strands in math. The response options for emphasis on each item were on a 5-point scale ranging from *no coverage* to *intensive, systematic coverage*, with a separate option to indicate that instruction is planned for later in the school year but has not yet started.

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Item	NUMBERS AND OPERATIONS	Intensity of Coverage						Highest Performance Expectation						Grade level
1101	The "language" of numbers (verbal & symbolic forms)	0	1	2	3	4	P	A	MR	P	C	APP	ASE	
1102	Concepts of whole and half	0	1	2	3	4	P	A	MR	P	C	APP	ASE	
1103	Exact answer to estimate comparison	0	1	2	3	4	P	A	MR	P	C	APP	ASE	
1104	Counting	0	1	2	3	4	P	A	MR	P	C	APP	ASE	
	PATTERNS, RELATIONS, & ALGEBRA	Intensity of Coverage						Highest Performance Expectation						Grade level
1201	Addition, subtraction, & number patterns	0	1	2	3	4	P	A	MR	P	C	APP	ASE	
1202	Shared attributes of objects	0	1	2	3	4	P	A	MR	P	C	APP	ASE	
1203	Sorting on the basis of shared attributes	0	1	2	3	4	P	A	MR	P	C	APP	ASE	
1204	Counting in patterns (skip counting)	0	1	2	3	4	P	A	MR	P	C	APP	ASE	
	MEASUREMENT	Intensity of Coverage						Highest Performance Expectation						Grade level
1401	Measurements using informal units of measurement	0	1	2	3	4	P	A	MR	P	C	APP	ASE	
1402	Measurements using standard units	0	1	2	3	4	P	A	MR	P	C	APP	ASE	
1403	Length	0	1	2	3	4	P	A	MR	P	C	APP	ASE	
1404	Weight	0	1	2	3	4	P	A	MR	P	C	APP	ASE	
1405	Volume	0	1	2	3	4	P	A	MR	P	C	APP	ASE	
1406	Time (clock, calendar)	0	1	2	3	4	P	A	MR	P	C	APP	ASE	
1407	Capacity	0	1	2	3	4	P	A	MR	P	C	APP	ASE	

Intensity of Coverage

0 = *No coverage* (Not an expectation for this topic this school year)
1 = *Slight coverage* (1–10 lessons over the course of the school year)
2 = *Moderate coverage* (11–20 lessons over the course of the school year)
3 = *Sustained coverage* (21 or more lessons over the course of the school year)
4 = *Intensive, systematic coverage* (daily/nearly daily instruction throughout the school year)
P = *No coverage yet, but planned for later this school year*

Highest Cognitive Demand/Performance Expectation

A: *Attention*
MR: *Memorize/recall*
P: *Performance*
C: *Comprehension*
APP: *Application*
ASE: *Analysis, Synthesis, Evaluation*

FIGURE 1. Excerpted items and codes from Curriculum Indicators Survey Part II (mathematics).

Scale for Rating Performance Expectations

Using the categories described by Tileston (2004) and based on Bloom's taxonomy, we created a scheme for coding cognitive demand represented in the items. Tileston's original categories included (a) memorize/recall, (b) performance, (c) comprehension, (d) application, (e) analysis, and (f) synthesis/evaluation. To be sensitive to the level of adaptation to general curriculum that may be needed for some students with the most significant cognitive disabilities who may lack symbolic communication or even intentionality, we extended the scale downward to include attention, which includes such behaviors as eye gaze, touch, vocalization, and recognition. To assist with accuracy and precision of coding, we created lists of verbs that were consistent with each category of cognitive demand (see Table 2). We collapsed the upper two categories to yield a 6-point scale ranging from *attention* to *analysis, synthesis, evaluation*. We made this change to reduce the potential difficulty in processing categorical response op-

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TABLE 1. Example of Enacted Curriculum in Mathematics: Percentage of Instructional Time Spent per Strand, at Each Level of Cognitive Demand

Strand	Attention	Memorize/ recall	Performance	Comprehension	Application	Analysis, synthesis, evaluation
Numbers and operations	26	5	16	2	2	0
Algebra	6	2	1	1	1	0
Geometry	4	2	0	0	2	0
Measurement	16	0	4	0	0	0
Probability	4	0	4	0	0	0

TABLE 2. Performance Expectations and Sample Behaviors

Performance expectation	Examples
Attention	touch, look, vocalize, respond, attend, recognize
Memorize/recall	list, describe (facts), identify, state, define, label, recognize, record
Performance	perform, demonstrate, follow, choose, count, locate, read
Comprehension	explain, conclude, group, restate, review, translate, describe (concepts), paraphrase
Application	compute, organize, collect, apply, classify, construct, solve, use, order, develop, generate, interact with text
Analysis/synthesis/evaluation	pattern, analyze, compare, contrast, compose, predict, extend, plan, judge, evaluate, interpret, investigate, examine, cause and effect

tions, which may be greater than the difficulty for items measured on a continuous scale (Dillman, 2000). Given (a) the large number of survey items and (b) the low density of responses expected at the upper end of the scale due to the nature of the population, we intended the collapsing of the upper categories to reduce response burden without eliminating useful information.

Instructional Activity and Student Participation Items

We adapted the lists of instructional activities in Part II from the SEC to include other instructional methods that represent best practices for the population. Part II lists a total of 18 activities in ELA and 17 in math. Teachers rate the frequency of use of each method within the most recent week on a 5-point scale ranging from *none* to *considerable (8 or more hr)*. In addition to frequency of use of each method, teachers rate the extent of student participation expected during that activity on a 4-point scale ranging from *no participation* to *independent, active participation*. We developed this scale based on the characteristics of the target students. The challenge for this population is that there must be some trade-offs between the amount of material targeted and the level of student achievement. As mastery and/or independent performance is a focal point in the scoring criteria in several states, it is necessary to determine the level of performance expected in teacher instruction. If teachers indicate that they engage in many instructional activities with the student and present content at high levels of cognitive demand but expect nothing more than passive participation, this provides rich information about the expectations for the student's learning of the enacted curriculum.

Survey Completion Procedures

We designed the CIS to be completed in a group setting in which survey administration is prefaced by a brief presentation on alignment and the enacted curriculum. Following that presentation, teachers complete a brief exercise

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in which they classify their students according to four levels of symbolic communication: (a) abstract symbolic communication, (b) concrete *symbolic communication*, (c) presymbolic communication, and (d) nonsymbolic communication with limited intentionality (awareness). *Symbolic communication* refers specifically to the types of symbol systems the student currently utilizes from abstract symbols (e.g., selects items from picture or word menu) to concrete symbols (e.g., uses a photograph of an apple to request an apple) to presymbolic (e.g., touches the apple to ask for it) or awareness (may or may not respond to the presence of food). A recent cluster analysis of teacher survey responses supported this classification system (Browder, Wakeman, & Flowers, 2007). Because students who take alternate assessments based on alternate achievement levels encompass a wide range of abilities, this theoretical model guides a purposeful sampling strategy for Part II surveys. While teachers complete Part I of the survey, researchers review the student information forms and select a single target student as the focus for Part II surveys. We acknowledge that the request to respond about a particular student drastically narrows the sample size upon which we may be able to make generalizations about the enacted curriculum. However, this focus on a single student improves the precision of measurement of the enacted curriculum given the individualized nature of curricular priorities, instructional methods, and expectations that may exist within one teacher's classroom (and that indeed exist for the population of students with significant disabilities). Although the sample of target students may be smaller, it may still be representative of the broader population if teachers are assigned to certain target students through a purposeful sampling method based on students' levels of symbolic communication.

When teachers receive the Part II surveys they are also provided with a page of code summaries that contain lists of verbs typical of each performance descriptor. As a group, the researchers and teachers complete several example items using statements resembling Individualized Education Program objectives that might reflect different levels of cognitive demand within certain CIS items. For instance, under the item "coins and money," teachers would rate "identify coins" at the memorize/recall level, whereas they would label "use the next dollar strategy to make a purchase" as application. Five examples in ELA and six examples in math are discussed, and teachers have an opportunity to talk through some of the distinctions between activities associated with certain levels of cognitive demand. Finally, given the likely narrowing of the curriculum for the students, researchers emphasize that teachers should not expect to rate most or all of the items on the Part II surveys for a particular student, and that they may in fact find many topics that they do not teach. This experience is normalized to avoid the potential negative affective responses that might occur if teachers think they are not teaching "enough" to the target student. After the training examples, teachers complete both Part II surveys independently. Researchers remain in the room and answer questions if teachers ask for clarification.

Findings From Expert Reviews

The initial survey draft was reviewed by professionals with content expertise in ELA and math, curriculum for students with significant disabilities, and the SEC model. ELA and math content experts each had doctoral degrees and more than 10 years of experience as university-based teacher educators in their content areas. The SEC expert also possessed a doctoral degree and was one of the original developers of the SEC model. The expert in curriculum for students with significant disabilities had a master's degree in special education, postgraduate coursework in related areas, and significant work experience in providing training and technical assistance on general curriculum access and assessment for students with significant disabilities.

Each expert received a set of specific questions to address, along with background materials and copies of the instruments. The content area experts and special education experts made several suggestions for revisions to instructions, formatting, and item wording. We eliminated five ELA items and added several math items based on this feedback. Both content experts agreed that the scale for cognitive demand was appropriate and clear and that items and topics were consistent with national guidelines in these disciplines.

The SEC expert generally agreed with the survey development procedures (past and planned) and provided helpful suggestions about feedback to solicit from teachers and the design of a validity study (J. Smithson, personal communication, February 20, 2006). The expert also made several specific suggestions about the clarity of instructions to teachers and about response options, particularly in areas where changes were made from the SEC to the CIS. Finally, the expert noted important limitations in the ability to analyze alignment with standards based on decisions made to simplify the survey by removing embedded levels of cognitive demand within each level of intensity of coverage.

Pilot Test Method

Participants and Setting

We pilot tested the first complete draft of the CIS with 12 teachers of students with significant disabilities using the

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administration procedures described previously. Of the 12 teachers who participated in the pilot, 25% had between 4 and 10 years of teaching experience, whereas 33% had between 11 and 20 years of experience and another 33% had between 21 and 30 years of experience. One respondent was a student teacher. Two respondents (17%) had bachelor's degrees, whereas the remaining 9 (75%) had master's degrees. Ten (83%) had special education certifications, and 6 (50%) also had certifications in grade-level subject areas. Four respondents were National Board certified. The students with whom they worked were in pre-K–12 self-contained special education classrooms; were classified as having severe/profound disabilities, autism, and moderate developmental disabilities; and participated in their state's alternate assessment. All students in the teachers' classrooms who were in the age range for the accountability system (3–8 and 10) participated in alternate assessments judged against alternate achievement standards. We conducted the CIS pilot in a meeting room in a school setting.

Data Collection and Analysis

We used three sources of data to pilot the CIS: teachers' completed CISs, observation notes on teacher conversations during the CIS administration, and a follow-up e-mail survey (see Table 3). We used CIS responses to make refinements to areas such as response options, new and revised items, formatting, and estimates of time required to complete the survey. We also used observation notes to identify potential areas of confusion and to understand teachers' interpretations of the items in light of their own instruction. Eight teachers responded to the follow-up e-mail questions about the accuracy and thoroughness of the coverage of the curriculum for that student, the appropriateness of the survey for all of their students with significant cognitive disabilities, and the clarity of response options in each section of the survey.

Pilot Results: Teacher Perceptions of the CIS

All 12 teachers were able to complete the CIS after receiving instruction on its purpose and administration. The total time for the orientation and completion of the instrument was 90 min. Six of the eight teachers responding to the follow-up e-mail survey generally thought that the CIS accurately and thoroughly covered the math and ELA curriculum taught to the target student this year. Several noted that although it did capture the content for the target student, the survey also included much more advanced content that went beyond what the student was learning this year (e.g., "significant characters in Greek, Roman, and Norse mythology" on the ELA survey). One of the two teachers who thought the survey did not accurately and thoroughly address the content of the target student's curriculum was a pre-K teacher, and the other thought the survey was a mix of items that were either too high functioning or not specific enough when they did reflect the student's level. When she could positively endorse an item, this teacher seemed to be frustrated by not being able to describe the complexity of how content was taught.

Regarding the relevance of the items for all of the teachers' students, responses were similar to those about the target student. One teacher who had students labeled with mild, moderate, and severe/profound mental retardation said that all of her students were in some way working on academic skills reflected in the survey. Two other teachers agreed about the similarity of the content being taught but noted the different adaptations depending upon disability and skill level. One teacher noted that she did not believe some of the literature topics on the ELA

TABLE 3. Follow-Up Teacher Survey Items

For Questions 1 and 2, think about the Part II survey you filled out with one student in mind (either in ELA or math). Remember that our goal was to capture the ELA or math curriculum you are teaching to that target student this year, not other academics or functional goals.

1. Do you think Part II of the survey **accurately and thoroughly** captured the ELA or math curriculum for the student you had in mind when you filled out the survey? If not, what seemed inaccurate or missing?
2. Are there students in your class for whom the contents of the survey would not reflect the curriculum they are learning in ELA or math this year? If so, in what way?
3. Think about both parts of the survey, and about the curriculum you teach this year. What are we **not** learning about the "enacted" curriculum by using this survey? What else is important to understand?
4. What parts of the survey were especially confusing or difficult to fill out? What didn't seem to work? What should we revise?

Note. ELA = English language arts.

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survey were relevant. Another teacher did not believe the math items were functional enough and did not include some of her students' current skills. At the pre-K level, the teacher viewed the survey items as relevant for some of the students but not for others.

Pilot test teachers expressed some concerns about the content of the Part II surveys, including the source of the items (which looked unfamiliar because they were not the state's standards) and whether teachers who were still new to states' academic content standards would be familiar with the language. Teachers also wondered whether certain skills "counted" under particular CIS items. For example, an open house performance was associated with the item "presentation based on a dramatic or literary production," and one teacher asked whether the items in the writing topic could be rated if the target student did adaptive writing (e.g., using adapted keyboards or writing utensils such as a name stamp to facilitate student participation in the writing process).

One question in the e-mail survey asked teachers to indicate what their responses to the CIS did not capture about the curricula they teach and what else was important for us to understand about their students' curricula. The predominant theme underlying responses to this question was, unsurprisingly, the individualization that occurs. As one teacher stated, "Teaching our students is not so 'cut and dried.'" Given the diverse abilities, student response modes, and use of assistive technologies, the same skill may require extensive modification in its presentation to different students. Multiple teachers also mentioned the importance of materials in adapting the curriculum. Without commercially available materials that are aligned to the curriculum and appropriate for their students, teachers put considerable effort into adapting materials for instruction. One teacher who used a specific commercial curriculum in her classroom noted that although the curriculum could be described using the items in the CIS, her CIS responses did not reflect information about the integration of the academics into other parts of the curriculum (e.g., vocational).

Pilot Test Discussion

Given that the CIS is a new instrument, and the first of its kind developed for teachers of students with significant cognitive disabilities, the purpose of this pilot study was to validate its content with experts and teachers. Although caution is warranted in interpreting the results due to the small sample of pilot participants, we will use the information obtained to continue to refine the instrument for use in future evaluations of instructional alignment.

The version of the CIS that was pilot tested with 12 teachers covered a broad range of ELA and math content that, with few exceptions, captured the academic curriculum taught to students with moderate and severe disabilities. These students ranged in age from preschool to high school age and also represented all four categories used to describe students' level of symbolic communication. Although some teachers indicated that their students learned the "same" curriculum that was adapted differently, the sets of questions about instructional activities and expected level of participation, as well as ratings of highest performance expectations, should help explain the individualization that occurs when content is adapted for each student. Although additional use of the CIS will be needed to determine its true value to states, this preliminary study suggests that it holds promise as a tool to measure the enacted curriculum for students who take alternate assessments based on alternate achievement standards.

States that may wish to use the CIS for alignment studies or professional development purposes will need to consider the trade-offs between the high resource demands required to obtain detailed information on the current version of the CIS and the lower resource demands associated with other measures of the enacted curriculum. One possible next step in the development of the CIS involves the creation of a short form. Although a short form would provide a broader perspective on the curriculum taught by a large number of teachers, results would lack the precision necessary to pinpoint specific gaps and engage teachers in meaningful reflection about instruction. One possible compromise would be use of a matrix sampling approach, in which some teachers complete the long form but most complete the short form. This approach would provide states with instructional data that could still yield alignment indices at the topic or strand level without creating such a response burden that teachers would fail to respond to the survey.

Potential Limitations

There are several potential limitations to the CIS that we should acknowledge. First, relying on teacher self-report on instructional practices raises questions about the validity of the data obtained (Mayer, 1999). Multiple data sources are needed to confirm teachers' survey responses and also to expand the information available about adaptations. On a small scale, classroom observations, analysis of instructional materials and other documents, and interviews would serve to triangulate teachers' survey responses. If used in practice rather than in a validation study, these data may help teachers identify the way the content of instruction identified in the CIS is intertwined with materials, presentation modes, and response expectations. Observational data may also uncover discrepancies between what teachers intend to teach and what curriculum they actually do teach.

Another limitation of the CIS is the source of topics and items in Part II. Although we made efforts to draw

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from nationally recognized frameworks, the survey contents do not perfectly represent any one state's curriculum. Currently, alignment is determined by mapping CIS topics onto strands in a state's standards and reporting discrepancies at a coarse "grain size." If the survey is used to make judgments about opportunity to learn, conclusions are attenuated by the lack of precise matching to the state standards. However, because the CIS aligns with national strands in math (National Council of Teachers of Mathematics, n.d.) and ELA (National Council of Teachers of English, n.d.), states with standards comparable to national recommendations may find that it is a close enough match to be usable for consideration of instructional alignment. The alternative solution would be for a state to create item banks specific to its own state standards.

Finally, this phase of survey development did not include an analysis of the reliability of teachers' responses. Teachers completed the survey with one of their own students in mind, and none of the teachers in the pilot study shared responsibility for the same students. Thus, there was no opportunity to examine interrater agreement about responses based on a single student. Tentative evidence of agreement on performance expectation categories was evident during teacher training, when teachers independently identified the level of expectation they saw in sample items and compared answers. Subsequent stages of instrument development will include collection of reliability evidence.

Implications for Practice

Teacher perceptions of the survey provide some hints about the possible use of the CIS as a self-assessment tool for professional development on improved alignment. Overall, teachers were positive about the survey during the pilot administration; only one teacher responded negatively. One teacher indicated that completing the survey had given her additional ideas about skills she could try teaching to her students. These overall favorable responses may have been due to pairing the administration of the CIS with a brief review of the purpose and practice of general curriculum access for this population.

The extent to which the administration of the CIS is embedded in meaningful professional development may affect how teachers respond to its use. Because each Part II CIS may take an hour to complete, teachers need to realize some benefits to themselves to offset the costs associated with their time commitment. Using the CIS as a self-assessment tool for professional development based on a curriculum development and problem-solving model (cf. Sparks & Loucks-Horsley, 1990) may help teachers redesign instruction to be more deeply horizontally and vertically aligned and more adaptable for their student populations.

On a more basic level, the CIS may simply help teachers realize the breadth and scope of the general curriculum. One pilot study teacher volunteered that the survey gave her new ideas about content to add to the student's curriculum. Seeing this breadth and depth also may stimulate teacher discussion about the complex challenge of helping students meet state standards while providing an individualized focus for instruction. Another pilot study participant, an experienced teacher with a graduate degree and multiple certifications, spoke to the tension between accessing the general curriculum to prepare students for alternate assessments and the historical need for Individualized Education Programs and priorities:

> *I work hard to make sure that I align the portfolio goals with the curriculum. I struggle with teaching a curriculum to students with very specific [Individualized Education Programs]. . . . How do we continue writing student-centered [Individualized Education Programs] based upon their individual needs and teach a specific curriculum at certain grade levels? Sometimes my students need to learn or practice a basic skill in the area of ELA or math that is covered in a younger age group curriculum. . . . I worry sometimes that by pushing grade level benchmarks, one of my students will not get the basic skill needed. I know that I can adapt everything to make it age appropriate, but it is sometimes difficult.*

One potential benefit of the CIS is its use as a tool to help teachers identify gaps between instruction and other elements of the educational system. It may also help locate differences between what teachers intend to teach and what they actually teach. It will be of utmost importance to make sure that teachers are trained to understand the content within the standards and sound practices for teaching that content.

In summary, the CIS is a tool that has potential to evaluate the extent to which teachers are addressing the general curriculum. This instructional alignment may be of interest to state alternate assessment coordinators, professional development leaders, researchers who focus on alternate assessment or general curriculum access, and teachers themselves. Because additional research is needed to build the validity of the CIS, those who utilize its current form are encouraged also to collect information on how it is viewed by content experts and teacher respondents.

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NOTES

1. From state discussions at the fall seminars on Inclusive Assessment: Evaluating and Improving Technical Quality of Alternate Assessments (Denver, Colorado, October 9–10, 2006; and Washington, DC, October 24–25, 2006).
2. Additional information about the full CIS is available from Meagan Karvonen.

REFERENCES

Agran, M., Alper, S., & Wehmeyer, M. (2002). Access to the general curriculum for students with significant disabilities: What it means to teachers. *Education and Training in Mental Retardation and Developmental Disabilities*, *37*, 123–133.

Alternate Assessment Collaborative. (2004). *Guide to expanded benchmarks*. Retrieved March 9, 2006, from http://www.cde.state.co.us/cdesped

Browder, D., Flowers, C., Ahlgrim-Delzell, L., Karvonen, M., Spooner, F., & Algozzine, R. (2004). The alignment of alternate assessment content with academic and functional curricula. *The Journal of Special Education*, *37*, 211–233.

Browder, D., Wakeman, S. Y. & Flowers, C. (2007). *Level of symbolic communication classification for students with significant cognitive disabilities*. Available at: http://education.uncc.edu/access/GCApowerpp.htm

Browder, D., Wakeman, S., Spooner, F., Ahlgrim-Delzell, L., & Algozzine, B. (2006). Research on reading instruction for individuals with significant cognitive disabilities. *Exceptional Children*, *72*, 392–408.

Browder, D. M., Ahlgrim-Delzell, L., Pugalee, D. K., & Jimenez, B. (2006). Enhancing numeracy. In D. M. Browder & F. Spooner (Eds.), *Teaching reading, math, and science to students with significant cognitive disabilities* (pp. 171–196). Baltimore: Brookes.

Council of Chief State School Officers. (2003, June 9). *Surveys of enacted curriculum: Tools for aligning instruction, standards, and assessments*. Retrieved January 20, 2006, from http://www.ccsso.org/projects/Surveys_of_Enacted_Curriculum/

Council of Chief State School Officers. (2004). *Data on enacted curriculum study: Experimental design study of effectiveness of DEC professional development model in urban middle schools*. Retrieved March 10, 2006, from http://www.ccsso.org/content/pdfs/DECStudy.pdf

Dillman, D. A. (2000). *Mail and Internet surveys: The tailored design method* (2nd ed.). New York: Wiley.

Flowers, C., Ahlgrim-Delzell, L., Browder, D., & Spooner, F. (2005). Teachers' perceptions of alternate assessment. *Research and Practice for Persons With Severe Disabilities*, *30*, 81–92.

Individuals with Disabilities Education Act of 1990, 20 U.S.C. § 1400 *et seq*. (1990) (amended 1997)

Kleinert, H. L., Kennedy, S., & Kearns, J. F. (1999). Impact of alternate assessments: A statewide teacher survey. *Journal of Special Education*, *33*, 93–102.

Massachusetts Department of Education. (2001). *Resource guide to the Massachusetts curriculum frameworks for students with significant disabilities*. Retrieved March 9, 2006, from http://www.doe.mass.edu/mcas/alt/

Mayer, D. P. (1999). Measuring instructional practice: Can policymakers trust survey data? *Educational Evaluation and Policy Analysis*, *21*, 29–45.

National Council of Teachers of English. (n.d.). *Standards for the English language arts*. Retrieved May 25, 2006, from http://www.ncte.org/about/over/standards/110846.htm

National Council of Teachers of Mathematics. (n.d.). *Principles and standards for school mathematics*. Retrieved May 25, 2006, from http://standards.nctm.org/index.htm

Otis-Wilborn, A., Winn, J., Griffin, C., & Kilgore, K. (2005). Beginning special educators' forays into general education. *Teacher Education and Special Education*, *28*, 143–152.

Porter, A. C., & Smithson, J. L. (2001, December). *Defining, developing, and using curriculum indicators* (CPRE Research Report Series RR-048). Retrieved January 20, 2006, from http://www.cpre.org/Publications/rr48.pdf

Roach, A. T., & Elliott, S. N. (2006). The influence of access to general education curriculum on alternate assessment performance of students with significant cognitive disabilities. *Educational Evaluation and Policy Analysis*, *28*, 181–194.

Sparks, D., & Loucks-Horsley, S. (1990). *Five models of staff development*. Oxford, OH: National Staff Development Council.

Tileston, D. W. (2004). *What every teacher should know about special learners*. Thousand Oaks, CA: Corwin Press.

Title 1—Improving the Academic Achievement of the Disadvantaged; Final Rule, 68 Fed. Reg. 236 (Dec. 9, 2003).

U.S. Department of Education. (2005). *Alternate achievement standards for students with the most significant cognitive disabilities: Nonregulatory guidance*. Retrieved August 12, 2005, from http://www.ed.gov/policy/elsec/guid/altguidance.doc

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STATE DEPARTMENT OF EDUCATION'S CURRICULUM INDICATORS SURVEY (CIS) RESULTS

UNIVERSITY OF NORTH CAROLINA AT CHARLOTTE
NATIONAL ALTERNATE ASSESSMENT CENTER

AUGUST 27, 2007

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Curriculum Indicators Survey (CIS) Results

The Curriculum Indicators Survey (CIS) was administered as part of the alignment study on the Alternate State School Assessment (alternate assessment) conducted by the University of North Carolina at Charlotte under the auspices of the National Alternate Assessment Center in spring 2007. This report summarizes the methodology and findings from the CIS administration. In addition, information is provided about the alignment of the enacted curriculum, as reported by teachers, with the emphases in the alternate assessment.

Methodology

The CIS is a five-part survey designed to measure, through teacher self-report, the enacted academic curriculum in English language arts (ELA), math, and science, for students with significant cognitive disabilities who are eligible to take a state's alternate assessment based on alternate achievement standards. The CIS is based on the concepts in the Surveys of Enacted Curriculum but is adapted for the unique needs of this population of teachers and students.

- Part 1 asks for background information on the teacher (e.g., educational experience, characteristics of case load, and instructional influences in each academic subject).
- In Part 2, teachers provide information about the types of students on their case load, based on students' levels of symbolic communication. They are then asked to select a single student on their case load who will serve as the "target student" for the remaining three parts of the survey.
- Parts 3-5 measure the English language arts, math, and science curriculum being taught to the target student during the current academic year. For each academic skill taught, teachers rate three pieces of information: (1) the intensity of coverage of the topic, (2) the highest performance expectation (depth of knowledge, or DOK) of the student on the topic, and (3) the grade level or band from which activities, materials, and contexts were adapted for instruction on that skill. There are also a few questions in Parts 3-5 about the types of instructional methods used to teach the academic content.

In this alignment study, both the long and short versions of the CIS were administered. As an incentive, respondents who completed all five sections were entered into a drawing to receive one of ten $50 gift cards.

Short Version

Teachers were invited to complete the short version online in May 2007. Eligible teachers were identified by State Department of Education, Division of Assessment and Accountability. Teachers were recruited via email sent directly by the State DOE. The State DOE sent email invitations to 4,355 email addresses. A follow-up email was sent to six teachers who had completed parts of the survey, but not the entire survey, five days before the deadline.

Through email and phone correspondence with potential short version participants, it became clear that some teachers originally on the recruitment list were not eligible, while some emails were sent to principals who then distributed the notice to teachers whose names were not on the original list. A precise response rate cannot be determined because of the recruitment methods used. Because not all teachers completed all sections, sample sizes for each section are reported with the corresponding results.

CIS topics were reviewed by content experts to determine the match between survey topics and State's content standards (Voluntary State Curriculum and High School Core Learning Goal topics). These identified matches were used to analyze the alignment of the enacted curriculum as reported by teachers with the alternate assessment.

Long Version

The long versions for Parts 3-5 were completed by alternate assessment facilitators during a professional development meeting held in early June, 2007. Whereas teachers completed the short version with a selected target student in mind, facilitators completed the surveys based on the academic instruction provided by the "typical" teacher they worked with in 2006-07. They were then asked to review the content not taught by the typical teacher and indicate whether the "best" teacher they worked with in 2006-07 had taught that content.

Organization of the Findings

CIS short version results are organized into two sections: (a) respondents' backgrounds and (b) the enacted (taught) curriculum. Within the second section, results are reported for each subject (English language arts, math, and science). Alignment of instructional emphases with emphases in the Alternate assessment assessments are made for ELA and math only, since no alternate assessment in science was administered in 2007. An appendix contains supplemental tables.

Long version results are reported separately, following the short version results. These findings provide a fine-grained analysis of the instructional priorities for students who took alternate assessments in 2007. However, as the responses allow for inferences at the teacher level rather than student level, results are purely descriptive and intended for professional development planning. Analysis was not conducted on alignment of the CIS long version results with alternate assessment content.

CIS Results: Short Version

Section 1: Respondents' Backgrounds

A total of 55 teachers, including 50 (91%) females and 5 (9%) males completed Part 1 of the CIS. The majority (69%) held Masters degrees, while 27% had Bachelors degrees and two respondents (4%) had a six-year degree. Distributions of years of teaching experience are summarized in the table below.

Percent of Respondents Reporting Years of Teaching Experience

Years of experience	Total Teaching	Teaching students with sig. cog. disabilities	Teaching ELA	Teaching Math	Teaching Science
0-10	40.0	45.5	50.9	54.5	67.3
11-20	30.9	30.9	27.3	25.5	30.9
21 or more	29.1	23.6	11.8	20.0	10.9

While fewer than one-fifth (18.2%) of teachers had three or less years of total teaching experience and years of teaching students with significant cognitive disabilities, that figure was higher for English language arts and math (27.3% each), and for science (41.8%). Relatively few respondents held licensure in the academic subjects (13% in ELA, 3.8% in math, 7.5% in science). All but one respondent (98.2%) held certification in special education, and 32.7% were certified in elementary education. Fewer respondents had middle or secondary licensure or National Board certification (9.1% each).

Teachers were also asked to report the amount of time in the past year that they had spent in professional development on content standards and instructional strategies in each of the three academic subjects. Response distributions are shown below. The most widely reported professional development experiences were in ELA instructional strategies, followed by ELA content standards, math content standards and instructional strategies. Approximately one-fourth of respondents reported receiving any professional development in science within the previous year.

Time Spent in Professional Development in Past 12 Months

	none	1-5 hours	6-10 hours	11-15 hours	> 15 hours
Instructional strategies in teaching ELA	34.5	25.5	12.7	12.7	14.5
ELA content standards	41.8	29.1	14.5	5.5	9.1
Instructional strategies in teaching math	56.4	27.3	7.3	3.6	5.5
Math content standards	60.0	27.3	5.5	1.8	5.5
Instructional strategies in teaching science	80.0	7.3	7.3	5.5	0
Science content standards	76.4	16.4	5.5	1.8	0

Section 2: Academics

Teachers completed surveys on the enacted curriculum for their students in English language arts (ELA), math, and science. Fifty-six teachers completed Part 2 of the survey, in which the target student was identified for Parts 3-5. Of the target students selected, 39% were enrolled in elementary grades, 34% in middle grades, and 27% in high school. (One student reportedly had no assigned grade.)

In order to understand the characteristics of the learners selected as target students, respondents were asked to identify which of the three levels of communication best reflected what the student could currently do.

Level 1 (awareness/presymbolic): Has not yet acquired the skills to discriminate between pictures or other symbols (and does not use symbols to communicate). May or may not use objects to communicate. May or may not use idiosyncratic gestures, sounds/vocalizations, and movements/touch to communicate with others. A direct and immediate relationship between a routine activity and the student's response may or may not be apparent. The student may have the capacity to sort very different objects, may be trial and error. Mouthing and manipulation of objects leads to knowledge of how objects are used. May combine objects (e.g., place one block on another).

Level 2 (early symbolic): May use some symbols to communicate (e.g., pictures, logos, objects). Beginning to acquire symbols as part of a communication system. May have limited emerging functional academic skills. Representations probably need to be related to the student's immediate environment and needs.

Level 3 (symbolic): Communicates with symbols (e.g., pictures) or words (e.g., spoken words, assistive technology, ASL, home signs). May have emerging or basic functional academic skills. Emerging writing or graphic representation for the purpose of conveying meaning through writing, drawing, or computer keying.

The majority of teachers identified target students who had symbolic communication. While three target students were reported to be enrolled in grades pK-2, these responses were not excluded from the descriptive portions of this report due to the small sample size and the possibility of a clerical error (i.e., a student labeled pK-2 but of the chronological age to be enrolled in alternate assessment-eligible grades).

Communication Levels of Identified Target Students, by Enrolled Grade Band

Assigned grade band	Level 1	Level 2	Level 3	Total
pK-2	1	1	1	3
3-4	1	3	8	12
5-6	2		9	11
7-8	1	4	10	15
9-10	4	1	9	14
Total	9	9	37	55

While disability labels are not precise classifications in terms of students' levels of functioning, teachers were asked to provide this information about their target students for descriptive purposes. The most frequently reported categories were mental retardation, multiple disabilities, autism, and speech/language impairment. None of the respondents selected target students with deaf-blindness, traumatic brain injury, or serious emotional disturbance.

Disability Labels of Target Students (N = 56)

IDEA Disability Label	% of Target Students
Mental Retardation	67.9
Multiple Disabilities	30.4
Autism	28.6
Speech / Language Impairment	23.2
Other Health Impairment	12.5
Orthopedic Impairment	10.7
Visual Impairment	7.1
Specific Learning Disability	1.8
Hearing Impairment	1.8

Thus, in general, the target students on whom the remaining descriptions of enacted curriculum are based are fairly evenly split among elementary, middle, and secondary grades. They primarily have early symbolic or symbolic communication systems, while nearly one-third have multiple disabilities. The State Department of Education should consider the remaining results in light of this profile of the target students, in terms of overall representativeness of students who take alternate assessment.

ENGLISH LANGUAGE ARTS

A total of 50 teachers completed the English language arts (ELA) section of the CIS, which includes both reading and writing. This section of the report summarizes teacher responses to the ELA section as well as ELA-related items from Part I of the survey (general background).

ELA Content

The table below provides an overview of the distributions of depth of knowledge (DOK) expected of target students for items within each of the four ELA topics. Frequencies represent the number of items, across target students, for whom the content was taught in 2006-07. Distributions of DOK expectations for each item within each topic are reported in Table E.1 in the appendix.

Distribution of ELA Content Taught, by Depth of Knowledge

		Attention		Memorize/ Recall		Perform		Comprehend		Apply		Analyze/ Synthesize/ Evaluate	
Topic	N	n	%	n	%	n	%	n	%	n	%	n	%
Language	237	52	21.9	51	21.5	64	27.0	27	11.4	37	15.6	6	2.5
Reading and Literature	433	128	29.6	122	28.2	93	21.5	43	9.9	39	9.0	8	1.8
Composition	193	32	16.6	50	25.9	70	36.3	20	10.4	19	9.8	2	1.0
Media	48	22	45.8	15	31.3	4	8.3	2	4.2	5	10.4	0	0.0

The most frequently taught ELA topic was Reading and Literature. Forty-three percent of the responses within this topic came from items related to beginning reading, understanding texts, fiction, and nonfiction (see Table E.1). Language and Composition were the other two most frequently reported ELA topics included in the enacted curriculum for target students in 2006-07. The highest performance expectations for the target students in the current academic year tended to be on attending to the content, memorizing or recalling the content, or performing rote tasks related to the content. Very few of the target students were expected to analyze, synthesize, or evaluate material.

Grade Level Materials, Activities, and Contexts

After identifying each type of ELA content and DOK at which the target students were taught, teachers were also asked to identify the grade band or grade from which activities, materials, and contexts were adapted to teach the corresponding ELA content. The table below summarizes the distribution of responses to items within each ELA topic. (Respondents could identify more than one grade band if applicable to the target student.)

The majority of ELA materials were adapted from elementary grades, either pK-2 or 3-5.

Percent of CIS items taught to target student with materials, activities, contexts in each grade brand

		pK-2		3-5		6-8		9-12		No grade band		Specific grade	
	N	n	%	n	%	n	%	n	%	n	%	n	%
Language	280	92	32.9	66	23.6	40	14.3	16	5.7	52	18.6	14	5.0
Reading and Literature	488	143	29.3	144	29.5	113	23.2	43	8.8	37	7.6	8	1.6
Composition	222	70	31.5	62	27.9	48	21.6	17	7.7	25	11.3	0	0.0
Media	59	19	32.2	13	22.0	11	18.6	4	6.8	11	18.6	1	1.7

Other ELA Instruction Information

Tables E.2 – E.5 in the appendix provide additional results related to ELA instruction. Highlights of these findings are as follows:

- Instructional activities: The most frequently reported instructional methods used recently with the target students in ELA were scaffolded instruction with supports, individualized instruction, the use of manipulatives, and small group instruction. The highest rate of expected independent, active performance within a lesson was seen in using computers or assistive technology. Otherwise, fewer than one-fifth of respondents expected the target student to perform independently in other ELA instructional activities. Instead, they included some level of support or limited participation within the activity.
- Resources: Teachers reported using a wide range of materials to teach students who take the Alternate assessment, including materials adapted from general education, teacher-made materials, and age-appropriate materials designed for students with significant disabilities. Nearly three-fourths (73%) also reported using assistive technologies. Most respondents also reported using functional materials (78%) and other school settings (67%), although only 38% said their students received ELA instruction in inclusive settings. The majority of teachers reported enlisting support from other special education teachers (51%) and therapeutic support staff (73%) to assist with ELA instruction.
- Instructional influences: The strongest influences on teachers' choices about ELA instruction are student needs as documented in IEPs (96% moderate to strong influence), classroom assessment results (91% moderate to strong influence), and alternate assessment requirements (89% moderate to strong influence). Lesser influences included national ELA standards (61% minimal to no influence), and prior alternate assessment results (38% minimal to no influence).
- Classroom assessment: For the purpose of assessing their students in ELA, teachers reported using observational data most frequently (80% once per week or more frequently), followed by performance on-demand (76% once per week or more often), and objective tests (65% weekly or more often) for assessment purposes.

Instructional Alignment
To investigate the alignment of the enacted ELA curriculum with the emphases in the alternate assessment, CIS responses and alignment expert codes were both linked back to Voluntary State Curriculum (VSC) and High School Core Learning Goal (CLG) topics. The distributions of CIS items endorsed within each topic and each DOK level were converted to proportions based on the total number of items endorsed within the topics. While some CIS items may have included content related to multiple VSCs, only the *best* match was selected.

Proportional coverage on the alternate assessment topics was determined by examining content experts' ratings of those items during the spring 2007 alignment study. After VSC/CLG topic matches for each CIS item were identified, comparisons of topic x DOK proportions in the CIS responses and alternate assessment ratings were made.

Grades 3-8
The correspondence between CIS topics and State's VSC topics in ELA are shown below. All but three CIS items matched one of the State VSC topics, and two VSC topics (Fluency and Listening) had no CIS links.

CIS Topic	VSC Topic
Discussion	7.1
Questioning, Listening, Contributing	7.1
Oral Presentation	7.1
Vocabulary & Concept Development	1.3
Structure and Origins of Modern English	5.1
Formal and Informal English	7.1
Beginning Reading	1.1
Understanding Text	1.4
Making Connections	3.1
Genre	3.1
Theme	3.1
Fiction	3.1
Nonfiction	2.1
Poetry	3.1
Style and Language	3.1
Myth, Traditional Narrative, and Classical Literature	3.1
Dramatic Literature	3.1
Dramatic Reading and Performance	7.1
Writing	4.1
Consideration of Audience and Purpose	4.1
Revising	4.1
Standard English Conventions	5.1
Organizing Ideas in Writing	4.1
Research	4.1
Evaluating Writing and Presentations	None
Analysis of Media	None
Media Production	None

The following table reflects proportional coverage of CIS ELA items identified as being aligned with VSC Topics.

CIS Emphases, Grades 3-8 (N = 576 item endorsements, 38 respondents)

	Attention	Memorize/ Recall	Perform	Comprehend	Apply	Analyze/ Synthesize/ Evaluate
1.1 Phonics	0.005	0.005	0.021	0.002	0.016	0.003
1.2 Fluency	*	*	*	*	*	*
1.3 Vocabulary	0.007	0.016	0.009	0.010	0.01	0.002
1.4 Comprehension	0.01	0.012	0.012	0.009	0.012	0
2.1 Comprehension of Informational Text	0.01	0.014	0.014	0.007	0.009	0
3.1 Comprehension of Literary Text	0.095	0.115	0.063	0.036	0.007	0.002
4.1 Writing	0.033	0.056	0.052	0.016	0.014	0
5.1 Controlling language	0.01	0.019	0.031	0.007	0.016	0.002
6.1 Listening	*	*	*	*	*	*
7.1 Speaking	0.049	0.043	0.063	0.014	0.04	0.003

** N/A – no match to content standards*

The table below shows the proportional content x DOK coverage of alternate assessment Reading assessments in the alignment study sample. None of the portfolios had ELA items identified at the attention level of DOK, or in the topics of writing, controlling language, listening, or speaking.

Alternate assessment Emphases (N = 1,551)

	Attention	Memorize/ Recall	Perform	Comprehend	Apply	Analyze/ Synthesize/ Evaluate
1.1 Phonics		0.005	0.006	0.001	0.001	
1.2 Fluency		0.132	0.006	0.063	0.002	0.003
1.3 Vocabulary		0.148	0.010	0.047	0.005	0.032
1.4 Comprehension		0.035	0.003	0.009	0.002	0.010
2.1 Comprehension of Informational Text		0.187	0.001	0.027	0.015	0.001
3.1 Comprehension of Literary Text		0.221	0.001	0.027	0.001	0.001
4.1 Writing						
5.1 Controlling language						
6.1 Listening						
7.1 Speaking						

On the whole, teacher-reported curriculum emphases covered a broader range of content and DOK than what was emphasized in the alternate assessment. There were 3 of 45 cells with no coverage on the CIS ELA items, and 31 of 60 with no coverage on the alternate assessment.

The CIS and alternate assessment matrices were then compared cell by cell to identify areas of consistency and discrepancy between the enacted curriculum reported by teachers in 2006-07 and the emphases in the alternate assessment Reading content in the sampled portfolios. The table below summarizes this comparison. Small discrepancies exist within the Phonics and Comprehension topics. CIS responses showed lesser emphases at the memorize/recall level, especially in Vocabulary, Comprehension of Informational Text, and Comprehension of Literary Text, as indicated by negative numbers. The alternate assessment places less emphasis on Comprehension of Literary Text at the attention and performance levels of knowledge compared with teachers' instructional reports.

Boxes around cells are used to highlight places where the proportional discrepancies were greater than 0.05 (essentially, more than five percentage points). Topics below the dark line are those not intended to be measured by the alternate assessment in Reading.

Discrepancy between CIS and Alternate Assessment Emphases (CIS – AA)

	Attention	Memorize/ Recall	Perform	Comprehend	Apply	Analyze/ Synthesize/ Evaluate
1.1 Phonics	0.005	0.000	0.015	0.000	0.015	0.003
1.2 Fluency	0.000	-0.132	-0.006	-0.063	-0.002	-0.003
1.3 Vocabulary	0.007	-0.132	-0.001	-0.037	0.006	-0.030
1.4 Comprehension	0.010	-0.023	0.009	0.000	0.010	-0.010
2.1 Comprehension of Informational Text	0.010	-0.173	0.013	-0.020	-0.007	-0.001
3.1 Comprehension of Literary Text	0.095	-0.107	0.062	0.009	0.006	0.000
4.1 Writing	0.033	0.056	0.052	0.016	0.014	0.000
5.1 Controlling language	0.010	0.019	0.031	0.007	0.016	0.002
6.1 Listening						
7.1 Speaking	0.049	0.043	0.063	0.014	0.040	0.003

Blank cells indicate no coverage in either CIS or Alternate Assessment.

High School

The correspondence between CIS topics and State's CLG topics in ELA are shown below. All but five CIS items matched one of the State CLG topics.

CIS Topic	CLG Topic
Discussion	3
Questioning, Listening, Contributing	3
Oral Presentation	3
Vocabulary & Concept Development	1
Structure and Origins of Modern English	None
Formal and Informal English	3
Beginning Reading	None
Understanding Text	1
Making Connections	1
Genre	1
Theme	1

CIS Topic	CLG Topic
Fiction	1
Nonfiction	1
Poetry	1
Style and Language	1
Myth, Traditional Narrative, and Classical Literature	1
Dramatic Literature	3
Dramatic Reading and Performance	3
Writing	2
Consideration of Audience and Purpose	2
Revising	2
Standard English Conventions	3
Organizing Ideas in Writing	2
Research	None
Evaluating Writing and Presentations	4
Analysis of Media	None
Media Production	None

The following table reflects proportional coverage of CIS ELA items identified as being aligned with CLG Topics.

CIS Emphases, High School (N = 197 item endorsements; 14 respondents)

	Attention	Memorize/ Recall	Perform	Comprehend	Apply	Analyze/ Synthesize/ Evaluate
1. Reading, review, and responding to texts	0.162	0.112	0.086	0.056	0.061	0.015
2. Composing in a variety of modes	0.030	0.020	0.066	0.041	0.005	0.005
3. Controlling language	0.086	0.046	0.107	0.036	0.010	0.025
4. Evaluating content, organization, and language use of texts	0.010	0.005	0.015			

The table below shows the proportional content by DOK coverage of Reading alternate assessments in the alignment study sample. None of the portfolios had evidence identified at the attention level of DOK, or in the topics of Controlling Language or Evaluating Content, Organization, and Language Use of Texts. On the whole, teacher-reported curriculum emphases covered a broader range of content and DOK than what was emphasized in the alternate assessment.

Alternate assessment Emphases (N = 266)

	Attention	Memorize/ Recall	Perform	Compre-hend	Apply	Analyze/ Synthesize / Evaluate
1. Reading, review, and responding to texts		0.692	0.045	0.128	0.071	0.041
2. Composing in a variety of modes		0.015	0.004			0.004
3. Controlling language						
4. Evaluating content, organization, and language use of texts						

The CIS and alternate assessment matrices were then compared cell by cell to identify areas of consistency and discrepancy between the enacted curriculum reported by teachers in 2006-07 and the emphases in the alternate assessment Reading content in the sampled portfolios. The table below summarizes this comparison. Small discrepancies exist within the Composing topic. CIS responses showed lesser emphases in the Reading, Reviewing, and Responding to Texts topic at the memorize/recall and comprehension levels, but greater emphasis on that topic at the attention level, as indicated by negative numbers.

Boxes around cells are used to highlight places where the proportional discrepancies were greater than 0.05. Topics below the dark line are those not intended to be measured at the high school level by the alternate assessment in Reading.

Discrepancy between CIS and Alternate Assessment Reading Emphases (CIS – AA)

	Attention	Mem/Rec	Perform	Compre-hend	Apply	Analyze/ Synthesize/ Evaluate
1. Reading, review, and responding to texts	0.162	-0.580	0.041	-0.072	-0.011	-0.026
2. Composing in a variety of modes	0.030	0.005	0.062	0.041	0.005	0.001
3. Controlling language	0.086	0.046	0.107	0.036	0.010	0.025
4. Evaluating content, organization, and language use of texts	0.010	0.005	0.015			

Blank cells indicate no coverage in either CIS or Alternate Assessment.

MATHEMATICS

A total of 47 teachers completed the math section of the CIS. This section summarizes teacher responses to the math section as well as math-related items from Part I of the survey (general background).

Math Content

The table below provides an overview of the distributions of depth of knowledge (DOK) expected of target students for items within each of the five math topics. Frequencies represent the number of items, across target students, for whom the content was taught in 2006-07. Distributions of DOK expectations for each item within each topic are reported in Table M.1 in the appendix.

Distribution of Math Content Taught, by Depth of Knowledge

		Attention		Memorize/ Recall		Perform		Comprehend		Apply		Analyze/ Synthesize/ Evaluate	
Topic	N	n	%	n	%	n	%	n	%	n	%	n	%
Number Sense and Operations	116	20	17.2	14	12.1	34	29.3	15	12.9	28	24.1	5	4.3
Patterns, Relations, and Algebra	121	35	28.9	19	15.7	33	27.3	11	9.1	20	16.5	3	2.5
Geometry	128	33	25.8	24	18.8	38	29.7	15	11.7	13	10.2	5	3.9
Measurement	111	35	31.5	16	14.4	27	24.3	11	9.9	19	17.1	3	2.7
Data Analysis, Statistics, and Probability	67	25	37.3	13	19.4	15	22.4	7	10.4	2	3.0	5	7.5

The most frequently taught math topic was Geometry. Roughly one-third of the responses within this category came from the item related to characteristics of geometric shapes (see Table M.1). Patterns, Relations, and Algebra; and Number Sense and Operations were the other two most frequently reported math topics included in the enacted curriculum for target students in 2006-07. The highest performance expectations for the target students in the current academic year tended to be on attending to the content, memorizing or recalling the content, or performing rote tasks related to the content. Roughly one-third of expectations were at higher levels of cognitive demand (comprehension and application) in Number Sense and Operations, and one-fourth were at higher levels in Patterns, Relations, and Algebra; Geometry; and Measurement. Very few students were expected to analyze, synthesize, or evaluate material.

Grade Level Materials, Activities, and Contexts

After identifying each type of math content and DOK at which the target students were taught, teachers were also asked to identify the grade band or grade from which activities, materials, and contexts were adapted to teach the corresponding math content. The table below summarizes the distribution of responses to items within each math topic. (Respondents could identify more than one grade band if applicable to the target student.)

The majority of math materials were adapted from elementary grades, either preK-2 or 3-5. Between 10% and 15% of items were taught with materials and activities that were not unique to a specific grade band.

Percent of CIS items taught to target student with materials, activities, contexts in each grade brand

		pK-2		3-5		6-8		9-12		No grade band		Specific grade	
	N	n	%	n	%	n	%	n	%	n	%	n	%
Number Sense and Operations	135	64	47.4	41	30.4	13	9.6	4	3.0	13	9.6	0	0.0
Patterns, Relations, and Algebra	146	63	43.2	47	32.2	12	8.2	9	6.2	14	9.6	1	0.7
Geometry	154	71	46.1	44	28.6	17	11.0	6	3.9	16	10.4	0	0.0
Measurement	131	58	44.3	36	27.5	15	11.5	4	3.1	16	12.2	2	1.5
Data Analysis, Statistics, and Probability	80	33	41.3	23	28.8	7	8.8	5	6.3	12	15.0	0	0.0

Other Math Instruction Information

Tables M.2 – M.5 in the appendix provide additional results related to math instruction. Highlights of these findings are as follows:

- Instructional activities: The most frequently reported instructional methods used recently with the target students in math were small or large group instruction and the use of manipulatives to solve problems, followed by individualized instruction. The highest rates of expected independent, active performance within a lesson were seen in using computers or calculators, independent work, and rote counting. Otherwise, the expectation for the target student tended to include some level of support or limited participation rather than independent performance of skills within the activity.
- Resources: Teachers most often reported using teacher-made materials or commercially prepared materials adapted from general education in order to teach math lessons. The vast majority used functional, real-life materials, although fewer than half taught math concepts in inclusive classrooms. Fewer than half of teachers reported enlisting support from other special education teachers and therapeutic support staff to assist with math instruction, or adopting activities and materials used by general educators in their school. Roughly one-fourth reported enlisting support from non-disabled peers.
- Instructional influences: The strongest influences on teachers' choices about math instruction are student needs as documented in IEPs (96% moderate or strong influence), classroom assessment results (87% moderate to strong influence), and alternate assessment requirements (86% moderate to strong influence). Less endorsed items included national math standards (38% moderate to strong influence), and math content, materials, and activities used by general education teachers in the school (44% moderate or strong influence).
- Classroom assessment: For the purpose of assessing their students who take the alternate assessment in Mathematics, teachers reported using observational data most frequently (84% once per week or more frequently), followed by performance on-demand (73% once per week or more often). Approximately half (53%) reported frequent use of objective tests for assessment purposes.

Instructional Alignment

To investigate the alignment of the enacted ELA curriculum with the emphases in the alternate assessment, CIS responses and alignment expert codes were both linked back to VSC /CLG topics. The distributions of CIS items endorsed within each topic and each DOK level were converted to proportions based on the total number of items endorsed within the topics. While some CIS items may have included content related to multiple VSCs, only the *best* match was selected.

Proportional coverage on the alternate assessment topics was determined by examining content experts' ratings of those items during the spring 2007 alignment study. After VSC/CLG topic matches for each CIS item were identified, comparisons of topic by DOK proportions in the CIS responses and alternate assessment ratings were made.

Grades 3-8

The correspondence between CIS topics and State's Math VSC topics are shown below. All CIS items matched one of the State VSC topics, and one VSC topic (Process of Mathematics) had no direct CIS links.

CIS Topic	VSC Topic
Number Sense	6
Operations	6
Computation and Estimation	6
Patterns, relations, and functions	1
Algebra	1
Relations and mathematical models	1
Variables and change	1
Characteristics of geometric shapes	2
Spatial relationships and coordinate geometry	2
Transformation and symmetry	2
Visualization/special reasoning/ Geometric modeling	2
Measurement tools	3
Concepts and attributes of measurement	3
Formulas of measurement	3
Data and statistics	4
Probability	5

The following table reflects proportional coverage of CIS Math items identified as being aligned with VSC Topics.

CIS Math Emphases, Grades 3-8 (N = 368 item endorsements, 38 respondents)

	Attention	Memorize/ Recall	Perform	Compre- hend	Apply	Analyze/ Synthesize/ Evaluate
1. Algebra, patterns, and functions	0.057	0.041	0.06	0.0245	0.043	0.003
2. Geometry	0.041	0.049	0.071	0.0326	0.035	0.014
3. Measurement	0.049	0.033	0.052	0.0272	0.038	0.003
4. Statistics	0.022	0.008	0.024	0.0054	0.003	0.005
5. Probability	0.022	0.016	0.005	0.0054	0.003	
6. Number relationships and computation/arithmetic	0.022	0.027	0.063	0.038	0.052	0.008
7. Process of mathematics						

The table below shows the proportional content by DOK coverage of Math alternate assessments in the grades 3-8 alignment study sample.

Math Alternate Assessment Emphases, Grades 3-8 (N = 1,421)

	Attention	Memorize/ Recall	Perform	Comprehend	Apply	Analyze/ Synthesize/ Evaluate
1. Algebra, patterns, and functions		0.008	0.359	0.003	0.203	0.427
2. Geometry		0.081	0.565	0.063	0.063	0.164
3. Measurement		0.010	0.318	0.005	0.057	0.508
4. Statistics		0.005	0.299	0.000	0.018	0.544
5. Probability						
6. Number relationships and computation/arithmetic		0.143	0.346	0.008	0.378	0.122
7. Process of mathematics						

On the whole, teacher-reported curriculum emphases in grades 3-8 covered a broader range of content and DOK than what was emphasized in the alternate assessment. While Probability had some emphasis on the CIS, it was not represented in the alternate assessment sample. Processes of mathematics were represented in neither the CIS nor the alternate assessment portfolios.

The CIS and alternate assessment matrices were then compared cell by cell to identify areas of consistency and discrepancy between the enacted curriculum reported by teachers in 2006-07 and the emphases in the alternate assessment math samples from grades 3-8. The table below summarizes this comparison. CIS responses showed greater emphases at the attention and comprehension levels, as indicated by positive numbers in those DOK columns. The alternate assessment items had greater emphasis at the performance, application, and analysis/synthesis/evaluation levels than what teachers report teaching to the target students this year.

Boxes around cells are used to highlight places where the proportional discrepancies were greater than 0.05 (essentially, more than five percentage points).

Discrepancy between CIS and Grades 3-8 Alternate Assessment Math Emphases (CIS – AA)

	Attention	Memorize/ Recall	Perform	Comprehend	Apply	Analyze/ Synthesize/ Evaluate
1. Algebra, patterns, and functions	0.057	0.033	-0.300	0.022	-0.160	-0.424
2. Geometry	0.041	-0.032	-0.494	-0.030	-0.027	-0.150
3. Measurement	0.049	0.022	-0.266	0.022	-0.019	-0.505
4. Statistics	0.022	0.003	-0.275	0.005	-0.016	-0.539
5. Probability	0.022	0.016	0.005	0.005	0.003	
6. Number relationships and computation/arithmetic	0.022	-0.116	-0.284	0.030	-0.326	-0.114
7. Process of mathematics						

Blank cells indicate no coverage in either CIS or Alternate Assessment.

<u>*High School*</u>

The correspondence between CIS topics and State's Math CLG topics are shown below. All but three CIS items matched one of the State CLG topics, and all CLG topics had direct CIS links.

CIS Topic	CLG Topic
Number Sense	None
Operations	None
Computation and Estimation	None
Patterns, relations, and functions	1
Algebra	1
Relations and mathematical models	1
Variables and change	1
Characteristics of geometric shapes	2
Spatial relationships and coordinate geometry	2
Transformation and symmetry	2
Visualization/special reasoning/ Geometric modeling	2
Measurement tools	2
Concepts and attributes of measurement	2
Formulas of measurement	2
Data and statistics	3
Probability	3

The following table reflects proportional coverage of CIS Math items identified as being aligned with CLG Topics.

CIS Math Emphases, High School (N = 110 item endorsements, 14 respondents)

	Attention	Memorize/ Recall	Perform	Compre- hend	Apply	Analyze/ Synthesize/ Evaluate
1. Functions and Algebra	0.118	0.027	0.082	0.0091	0.036	0.018
2. Geometry, Measurement, and Reasoning	0.282	0.073	0.1	0.0182	0.045	0.018
3. Data analysis and probability	0.082	0.036	0.009	0.0182		0.027

The table below shows the proportional content x DOK coverage of Math alternate assessments in the alignment study sample.

Math Alternate Assessment Emphases, High School (N = 315)

	Attention	Memorize/ Recall	Perform	Compre- hend	Apply	Analyze/ Synthesize / Evaluate
1. Functions and Algebra		0.025	0.244	0.025	0.067	0.327
2. Geometry, Measurement, and Reasoning		0.041	0.108		0.063	0.098
3. Data analysis and probability						

On the whole, teacher-reported curriculum emphases covered a broader range of content and DOK than what was emphasized in the alternate assessment. CIS content covered all three topics and all levels of DOK, with the exception of Data Analysis and Probability and the application level. The alternate assessment sample included no evidence of Data Analysis and Probability, or any content assessed at the attention level.

The CIS and alternate assessment matrices were then compared cell by cell to identify areas of consistency and discrepancy between the enacted curriculum reported by teachers in 2006-07 and the emphases in the high school alternate assessment math samples. The table below summarizes this comparison. CIS responses showed greater emphases at the attention and memorize/recall levels, as indicated by positive numbers in those DOK columns. The alternate assessment evidence had greater emphasis on Functions and Algebra, and in content at the higher levels of DOK than what teachers report teaching to the target students this year.

Boxes around cells are used to highlight places where the proportional discrepancies were greater than 0.05.

Discrepancy between CIS and Alternate Assessment Emphases, High School (CIS – AA)

	Attention	Memorize/ Recall	Perform	Comprehend	Apply	Analyze/ Synthesize/ Evaluate
1. Functions and Algebra	0.118	0.002	-0.163	-0.016	-0.030	-0.309
2. Geometry, Measurement, and Reasoning	0.282	0.031	-0.008	0.018	-0.018	-0.080
3. Data analysis and probability	0.082	0.036	0.009	0.018		0.027

Blank cells indicate no coverage in either CIS or Alternate Assessment.

SCIENCE

A total of 47 teachers completed the science section of the CIS. This section summarizes teacher responses to the science section as well as science-related items from Part I of the survey (general background).

Science Content

The table below provides an overview of the distributions of depth of knowledge (DOK) expected of target students for items within each of the six science topics. Frequencies represent the number of items, across target students, for whom the content was taught in 2006-07. Distributions of DOK expectations for each item within each topic are reported in Table S.1 in the appendix.

Distribution of Science Content Taught, by Depth of Knowledge

		Attention		Memorize/ Recall		Perform		Comprehend		Apply		Analyze/ Syntheize/ Evaluate	
Topic	N	n	%	n	%	n	%	n	%	n	%	n	%
Earth and Space Science	88	30	34.1	15	17.0	16	18.2	17	19.3	7	8.0	3	3.4
Life Science (Biology)	219	98	44.7	44	20.1	31	14.2	28	12.8	13	5.9	5	2.3
Physical Science (Chemistry & Physics)	110	38	34.5	25	22.7	24	21.8	15	13.6	4	3.6	4	3.6
Technology/Engineering	23	6	26.1	4	17.4	6	26.1	2	8.7	4	17.4	1	4.3
History/Nature of Science	47	19	40.4	12	25.5	12	25.5	2	4.3	0	0.0	2	4.3
Science as inquiry	32	13	40.6	6	18.8	8	25.0	2	6.3	1	3.1	2	6.3

The most frequently taught science subject was life science. The most frequent responses within this category were for the items related to personal and community health (18%), characteristics of organisms, (18%), and environments, populations, and ecosystems (15%; see Table S.1). Physical Science and Earth and Space Science were the other two most frequently reported science topics included in the enacted curriculum for target students in 2006-07. In most topics, the highest performance expectation for more than half the target students in the current academic year was either attending to the content, or memorizing and recalling the content. There was a higher proportion expected to apply knowledge in Technology/Engineering compared with other topics. Very few students were required to analyze, synthesize, or evaluate material.

Grade Level Materials, Activities, and Contexts

After identifying each type of science content and DOK at which the target students were taught, teachers were also asked to identify the grade band or grade from which activities, materials, and contexts were adapted to teach the corresponding science content. The table below summarizes the distribution of responses to items within each science topic. (Respondents could identify more than one grade band if applicable to the target student.)

More than half of science materials, activities, and contexts were adapted from elementary grade bands, with the exception of Technology/Engineering (48% from elementary grade bands). The Technology/Engineering topic also had the highest proportion of materials, activities, and contexts taught that were not linked to a specific grade band (24%).

Percent of CIS items taught to target student with materials, activities, contexts in each grade brand

		pK-2		3-5		6-8		9-12		No grade band		Specific grade	
	N	n	%	n	%	n	%	n	%	n	%	n	%
Earth and Space Science	114	39	34.2	32	28.1	23	20.2	8	7.0	8	7.0	4	3.5
Life Science (Biology)	290	98	33.8	69	23.8	63	21.7	26	9.0	24	8.3	10	3.4
Physical Science (Chemistry & Physics)	145	50	34.5	37	25.5	30	20.7	11	7.6	7	4.8	10	6.9
Technology/Engineering	29	9	31.0	5	17.2	4	13.8	3	10.3	7	24.1	1	3.4
History/Nature of Science	57	19	33.3	16	28.1	14	24.6	4	7.0	0	0.0	4	7.0
Science as inquiry	40	17	42.5	10	25.0	7	17.5	3	7.5	1	2.5	2	5.0

Other Science Instruction Information

Tables S.2 – S.5 in the appendix provide additional results related to science instruction. Highlights of these findings are as follow:

- Instructional activities: The most frequently reported instructional methods used recently with the target students in science were small group instruction, scaffolded instruction with supports, and the use of hands-on materials and manipulatives. Science instruction may not have a large emphasis in target students' overall educational program, as evidenced by the high rates at which science methods were reported to have been used one hour or less in the past week, or not at all. When certain science instruction methods were used, the expectation for the target student tended to include some level of support or limited participation, rather than independent, active performance within the lesson.
- Resources: Teachers most often reported using teacher-made materials or commercially prepared materials adapted from general education in order to teach science lessons. Many used functional, real-life materials (69%), although fewer taught science concepts in real-life settings. Fewer than half of teachers reported enlisting support from general educators, support staff, or nondisabled peers to assist with science instruction.
- Instructional influences: The strongest influences on teachers' choices about science instruction are student needs as documented in IEPs (96% moderate to strong influence), classroom assessment results (91% moderate to strong influence), and alternate assessment requirements (89% moderate to strong influence). The items most often rated as having minimal to no influence on respondents' science instructional choices were national science standards and science content used by general education teachers at the school.
- Classroom assessment: For the purpose of assessing their students in science, teachers reported using observational data most frequently (69% once per week or more frequently), followed by performance on-demand (56% once per week or more often) and objective tests (49%).

CIS SHORT VERSION: CONCLUSIONS

Teachers who completed the short version of the CIS are teaching a broad range of content in English language arts, math, and science. In ELA, the range of content includes topics covered by the alternate assessment in Reading as well as other components of ELA, although the greatest emphasis was in Reading. In science and math, the range of content taught was also broader than what was emphasized in the alternate assessment. In general, there was also a range of DOK reported for this sample of target students. In some cases, the span of DOK was wider than what was reflected in the alternate assessments.

The State Department of Education may want to further consider discrepancies between the symbolic communication skills of students in the sample and evidence of high expectations in instruction. For example, while the majority of target students in the sample (84%) had early symbolic or symbolic communication, teachers frequently reported teaching content at the "attention" level – requiring only eye gaze, vocalization, or some other form of minimal, intentional response. Similarly, there were low rates of expected independent, active participation of these students in most instructional activities.

According to federal guidelines, alternate assessments judged against alternate academic achievement standards are supposed to be aligned to grade level expectations, however, the activities, materials, and contexts teachers report using during instruction tend to be adapted from grades pK-2 or 3-5. The frequency with which materials were adapted from high school was not consistent with the composition of the target student group identified for this study (27% high school). In order to provide instruction that is more consistent with the content of alternate assessments aligned to grade level expectations, teachers may require more professional development on how to adapt materials and activities from grade levels that match the chronological age of their students.

Alignment results should be interpreted with caution, based on the low response rates and characteristics of the target students identified for the survey (e.g., more elementary and middle grades than high school; primarily students with some symbolic communication). Areas of discrepancy between instructional and alternate assessment emphases are identified for State DOE's formative use, and are not intended to be conclusive, summative statements about the quality of alignment of instruction with the assessment.

Finally, teachers' responses to survey questions about instructional influences suggest that there may be room for growth in their ways of building access to the general curriculum. While most report that state standards have a strong influence on what they teach, respondents are not yet as concerned as they could be about what their general education counterparts are teaching in the content areas, or what the general education academic priorities are within their school or district. Increasing student access to the general education curriculum and better aligning instruction in order to increase academic achievement may require more professional development and strengthened relationships with general educators in the same schools.

Short version: Appendix

English Language Arts

E1 Distribution of ELA Content Taught, by Depth of Knowledge
E2 ELA Instructional Methods and Level of Student Participation
E3 Percent of Teachers Using Various Resources to Teach ELA
E4 Teacher-Reported Influences on ELA Instruction
E5 Frequency of Use of Classroom Assessments – ELA

Math

M1 Distribution of Math Content Taught, by Depth of Knowledge
M2 Math Instructional Methods and Level of Student Participation
M3 Percent of Teachers Using Various Resources to Teach Math
M4 Teacher-Reported Influences on Math Instruction
M5 Frequency of Use of Classroom Assessments – Math

Science

S1 Distribution of Science Content Taught, by Depth of Knowledge
S2 Science Instructional Methods and Level of Student Participation
S3 Percent of Teachers Using Various Resources to Teach Science
S4 Teacher-Reported Influences on Science Instruction
S5 Frequency of Use of Classroom Assessments – Science

In each subject, first two tables are based on academic section of CIS (Part 3, 4, or 5; referenced to the target student), while last three are based on Part 1 (General classroom information; not about a specific target student).

Table E.1. Distribution of ELA Content Taught, by Depth of Knowledge (N = 50)

Item	LANGUAGE	N	Attention n	Attention %	Mem/Recall n	Mem/Recall %	Perform n	Perform %	Comprehend n	Comprehend %	Apply n	Apply %	An/Syn/Eval n	An/Syn/Eval %
A1	Discussion (discussion rules, group interactions)	45	10	22.2	9	20.0	13	28.9	2	4.4	9	20.0	2	4.4
A2	Questioning, Listening, and Contributing (class discussion contributions, gathering information)	47	9	19.1	7	14.9	12	25.5	10	21.3	7	14.9	2	4.3
A3	Oral Presentation (presentation elements and techniques, presentation preparation)	39	13	33.3	4	10.3	15	38.5	3	7.7	4	10.3		0.0
A4	Vocabulary and Concept Development (antonyms, synonyms, compound words, prefixes, suffixes, dictionary use, use in context)	47	9	19.1	12	25.5	7	14.9	9	19.1	9	19.1	1	2.1
A5	Structure and Origins of Modern English (grammar, mechanics, parts of speech)	32	6	18.8	9	28.1	11	34.4	2	6.3	4	12.5		0.0
A6	Formal and Informal English (standard vs. conversational language)	27	5	18.5	10	37.0	6	22.2	1	3.7	4	14.8	1	3.7
	Total	237	52	21.9	51	21.5	64	27.0	27	11.4	37	15.6	6	2.5
	READING AND LITERATURE													
B1	Beginning Reading (letters, handling of a book, phonemic awareness, letter/sound combinations, decode words)	45	7	15.6	6	13.3	17	37.8	2	4.4	11	24.4	2	4.4
B2	Understanding a Text (predictions, retell stories, cause/effect, story elements, imagery, symbolism)	47	10	21.3	10	21.3	10	21.3	6	12.8	9	19.1	2	4.3
B3	Making Connections (compare authors, illustrators, settings)	40	8	20.0	13	32.5	11	27.5	3	7.5	5	12.5		0.0
B4	Genre (forms of literature- poetry, prose, fiction, nonfiction, drama)	39	13	33.3	15	38.5	5	12.8	4	10.3	2	5.1		0.0
B5	Theme (lessons of folktales, fables, myths, theme identification)	31	11	35.5	8	25.8	6	19.4	5	16.1	1	3.2		0.0
B6	Fiction (plot, character, setting identification of stories)	47	12	25.5	16	34.0	7	14.9	8	17.0	3	6.4	1	2.1
B7	Nonfiction (meaning, prediction, and fact identification of informational material)	46	12	26.1	10	21.7	8	17.4	7	15.2	8	17.4	1	2.2
B8	Poetry (rhythm and rhyme, repetition, imagery, figurative language)	33	15	45.5	11	33.3	6	18.2	1	3.0		0.0		0.0

Item	READING AND LITERATURE (cont.)	N	Attention n	Attention %	Mem/Recall n	Mem/Recall %	Perform n	Perform %	Comprehend n	Comprehend %	Apply n	Apply %	An/Syn/Eval n	An/Syn/Eval %
B9	Style and Language (words that appeal to the senses, imagery, figurative language, flow)	29	7	24.1	10	34.5	7	24.1	5	17.2		0.0		0.0
B10	Myth, Traditional Narrative, and Classical Literature (characters in mythology, adventures/exploits of characters)	26	11	42.3	10	38.5	3	11.5	2	7.7		0.0		0.0
B11	Dramatic Literature (elements of dialogue, elements of drama, role play)	25	12	48.0	6	24.0	6	24.0		0.0		0.0	1	4.0
B12	Dramatic Reading and Performance (rehearsal and performance of stories, plays, poems, voice inflection)	25	10	40.0	7	28.0	7	28.0		0.0		0.0	1	4.0
	Total	433	128	29.6	122	28.2	93	21.5	43	9.9	39	9.0	8	1.8
	COMPOSITION													
C1	Writing (use of pictures, letters, words to write stories, poems, letters, reports)	38	5	13.2	3	7.9	17	44.7	6	15.8	7	18.4		0.0
C2	Consideration of Audience and Purpose (language to match audience and purpose-entertain, persuade, inform)	25	6	24.0	9	36.0	4	16.0	4	16.0	2	8.0		0.0
C3	Revising (clarification/rethinking for logic and expression)	27	7	25.9	9	33.3	10	37.0		0.0	1	3.7		0.0
C4	Standard English Conventions (legible print/cursive, spacing of words, spelling, end marks, punctuation)	32	1	3.1	5	15.6	14	43.8	4	12.5	7	21.9	1	3.1
C5	Organizing Ideas in Writing (order of events, details, logical progression)	31	4	12.9	9	29.0	11	35.5	5	16.1	1	3.2	1	3.2
C6	Research (gather information about a topic, steps of conducting research)	22	4	18.2	9	40.9	8	36.4		0.0	1	4.5		0.0
C7	Evaluating Writing and Presentations (decisions and judgments about writing; use of scoring rubrics)	18	5	27.8	6	33.3	6	33.3	1	5.6		0.0		0.0
	Total	193	32	16.6	50	25.9	70	36.3	20	10.4	19	9.8	2	1.0

Item	MEDIA	N	Attention n	Attention %	Mem/Recall n	Mem/Recall %	Perform n	Perform %	Comprehend n	Comprehend %	Apply n	Apply %	An/Syn/Eval n	An/Syn/Eval %
D1	Analysis of Media (text/film/play/website comparison)	22	9	40.9	9	40.9	1	4.5	2	9.1	1	4.5		0.0
D2	Media Production (PowerPoint or other technological presentation, video/audio tape)	26	13	50.0	6	23.1	3	11.5		0.0	4	15.4		0.0
	Total	48	22	45.8	15	31.3	4	8.3	2	4.2	5	10.4	0	0.0

Table E.2. ELA Instructional Methods and Level of Target Student's Participation (N = 50)

						Level of Student Participation			
ELA/reading instructional time during the **past week** in which the target student engaged in each of the following	0 None	1 Little (1 hour or less last week)	2 Some (2-4 hours last week)	3 Moderate (5-7 hours last week)	4 Considerable (8 or more hours last week)	N No Partici-pation	P Passive Partici-pation	AS Active Participa-tion with Supports	IA Independent Active Participation
Receive individualized instruction	0	16.0	24.0	20.0	40.0	2.0	6.0	80.0	12.0
Receive instruction in a small group	2.0	2.0	18.0	34.0	44.0	4.0	12.0	66.0	18.0
Collect, summarize, or analyze information	22.0	28.0	24.0	18.0	8.0	34.0	26.0	36.0	4.0
Engage in writing process	32.0	14.0	24.0	20.0	10.0	36.0	10.0	50.0	4.0
Learn to use resources	32.0	30.0	24.0	14.0	0	34.0	28.0	36.0	2.0
Use hands-on or manipulatives	4.0	10.0	6.0	38.0	42.0	2.0	10.0	72.0	16.0
Receive instruction with prompts or scaffolded support	2.0	6.0	12.0	28.0	52.0	2.0	12.0	80.0	6.0
Use computers or other assistive technology	2.0	20.0	30.0	32.0	16.0	4.0	18.0	52.0	26.0
Work independently	20.0	42.0	28.0	10.0	0	34.0	16.0	32.0	18.0
Perform assessment skills for data collection/grading	20.0	20.0	38.0	18.0	4.0	26.0	18.0	50.0	6.0
Take a test	50.0	36.0	6.0	6.0	2.0	52.0	8.0	30.0	10.0
Practice skills in different setting	18.0	26.0	42.0	10.0	4.0	14.0	28.0	54.0	4.0
Practice skills with a variety of similar materials	8.0	26.0	44.0	18.0	4.0	10.0	28.0	58.0	4.0
Engage in read aloud activities	16.0	38.0	14.0	22.0	10.0	22.0	22.0	48.0	8.0
View multi media presentations	24.0	32.0	26.0	10.0	8.0	28.0	28.0	28.0	16.0
Engage in speech or presentation	62.0	24.0	4.0	2.0	8.0	56.0	16.0	24.0	4.0
Use work center	42.0	10.0	32.0	12.0	4.0	40.0	14.0	40.0	6.0
Learn/demonstrate skills in repeated opportunity/direct instruction trials	8.0	16.0	28.0	30.0	18.0	8.0	16.0	62.0	14.0

Table E.3. Percent of Teachers Using Various Resources to Teach ELA (N = 55)

	Used to teach **ELA/Reading**
Materials	
Commercially made materials adapted (by you or someone else) from general education	89.1
Commercially made manipulatives adapted (by you or someone else) from general education	65.5
Age-appropriate, commercially made print or text materials *designed for this type of student*	72.7
Age-appropriate, commercially made manipulatives *designed for this type of student*	54.5
Other commercially made print or text materials *designed for this type of student*	54.5
Other commercially made age-appropriate manipulatives *designed for this type of student*	45.5
Teacher-made books, workbooks, materials	96.4
Teacher-made manipulatives	89.1
Materials or lessons from websites	80.0
Computer	81.8
Assistive technologies (e.g., CheapTalk, Big Mac, Dynavox, text reader, talking calculator, etc.)	72.7
Settings	
Real life or natural setting materials (e.g., coins, community signs, telephones)	78.2
Inclusive class setting	38.2
Other settings in my school	67.3
Other settings in the community	54.5
People	
Nondisabled peers	27.3
Teachers from other disciplines (e.g., academic or special subject areas)	34.5
Another staff member at the school (e.g., speech/occupational/physical therapist)	72.7
Other special education teachers	50.9

Table E.4. Teacher-Reported Influences on ELA Instruction (N = 55)

	No influence	Minimal influence	Moderate influence	Strong influence
State curriculum framework or content standards	0	27.3	25.5	47.3
Instructional materials	1.9	14.8	37.0	46.3
State alternate assessment requirements	0	10.9	25.5	63.6
State alternate assessment results from previous years	18.2	20.0	36.4	25.5
National ELA standards	31.5	29.6	24.1	14.8
ELA content, materials, and/or activities used by general education teachers in my school	33.3	20.4	25.9	20.4
Training from my degree program (undergraduate or graduate)	18.2	18.2	34.5	29.1
Students' needs as documented on IEPs	0	3.6	3.6	92.7
School or district initiatives or priorities	7.4	29.6	27.8	35.2
Principal or other administrator expectations	7.3	25.5	36.4	30.9
Professional development experiences	5.5	18.2	49.1	27.3
Classroom assessment results	0	9.1	18.2	72.7

Table E.5. Percent Reporting Frequency of Use of Classroom Assessments – ELA (N = 55)

	Not at all	< 1 time per month	1-4 times a month	1-4 times a week	> 4 times a week
Objective questions (e.g., true/false, multiple choice, yes/no)	11.1	11.1	13.0	35.2	29.6
Performance on-demand (e.g., task analysis steps, repeated trials, incidence recording)	5.5	1.8	16.4	32.7	43.6
Teacher observation (e.g., anecdotal or descriptive data)	1.8	7.3	10.9	20.0	60.0

Table M.1. Distribution of Math Content Taught, by Depth of Knowledge (N = 47)

Item			Attention		Mem/Recall		Perform		Comprehend		Apply		An/Syn/Eval	
Item	**Number Sense and Operations**	**N**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
A1	Number Sense (whole numbers, fractions, odd & even, sorting, matching, grouping, ordering; money)	47	8	17.0	5	10.6	11	23.4	5	10.6	17	36.2	1	2.1
A2	Operations (+,-,x /, commutative properties, order of operations)	35	6	17.1	4	11.4	12	34.3	5	14.3	6	17.1	2	5.7
A3	Computation and Estimation (comparisons, rounding, properties of addition, subtraction, multiplication, division)	34	6	17.6	5	14.7	11	32.4	5	14.7	5	14.7	2	5.9
	Total	**116**	**20**	**17.2**	**14**	**12.1**	**34**	**29.3**	**15**	**12.9**	**28**	**24.1**	**5**	**4.3**
	Patterns, Relations, and Algebra													
B1	Patterns, Relations, and Functions (identify, reproduce, create, count in patterns)	46	**8**	17.4	**4**	8.7	**15**	32.6	**5**	10.9	**12**	26.1	**2**	4.3
B2	Algebra (symbolic representations, variables, algebraic equations)	27	8	29.6	7	25.9	6	22.2	2	7.4	3	11.1	1	3.7
B3	Relationships and Mathematical Models (equivalent measurements, mathematical relationships, proportions)	32	11	34.4	5	15.6	9	28.1	3	9.4	4	12.5		0.0
B4	Variables and Change (process and rates of change, linear equations)	16	8	50.0	3	18.8	3	18.8	1	6.3	1	6.3		0.0
	Total	**121**	**35**	**28.9**	**19**	**15.7**	**33**	**27.3**	**11**	**9.1**	**20**	**16.5**	**3**	**2.5**
	Geometry													
C1	Characteristics of Geometric Shapes (two and three dimensional shapes, congruent shapes)	42	10	23.8	6	14.3	11	26.2	7	16.7	5	11.9	3	7.1
C2	Spatial Relationships/ Coordinate Geometry (coordinates, points on a line)	27	7	25.9	4	14.8	8	29.6	4	14.8	3	11.1	1	3.7
C3	Transformation/Symmetry (flipped, turned shapes, line and rotational symmetry)	29	6	20.7	11	37.9	7	24.1	2	6.9	2	6.9	1	3.4
C4	Visualization/Spatial Reasoning/Geometric Modeling (assembled and dissembled shapes, use of tools (e.g., ruler, compass) to create geometric figures)	30	10	33.3	3	10.0	12	40.0	2	6.7	3	10.0		0.0
	Total	**128**	**33**	**25.8**	**24**	**18.8**	**38**	**29.7**	**15**	**11.7**	**13**	**10.2**	**5**	**3.9**

Item			Attention		Mem/Recall		Perform		Comprehend		Apply		An/Syn/Eval	
Item	**Measurement**	**N**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
D1	Measurement Tools (clock, calendar, cylinder, tape measure, ruler)	46	10	21.7	7	15.2	13	28.3	4	8.7	9	19.6	3	6.5
D2	Concepts and Attributes of Measurement (length, weight, volume, capacity)	44	18	40.9	3	6.8	12	27.3	3	6.8	8	18.2		0.0
D3	Formulas of Measurement (area, perimeter, radius, diameter, circumference)	21	7	33.3	6	28.6	2	9.5	4	19.0	2	9.5		0.0
	Total	**111**	**35**	**31.5**	**16**	**14.4**	**27**	**24.3**	**11**	**9.9**	**19**	**17.1**	**3**	**2.7**
	Data Analysis, Statistics, And Probability													
E1	Data and Statistics (data collection and organization, mean, median, mode, use of plots and graphs)	37	13	35.1	5	13.5	12	32.4	2	5.4	1	2.7	4	10.8
E2	Probability (cause/effect, probabilities, combinations of potential outcomes)	30	12	40.0	8	26.7	3	10.0	5	16.7	1	3.3	1	3.3
	Total	**67**	**25**	**37.3**	**13**	**19.4**	**15**	**22.4**	**7**	**10.4**	**2**	**3.0**	**5**	**7.5**

Table M.2. Math Instructional Methods and Level of Target Student's Participation (N = 47)

						Level of student participation*			
Amount of math instructional time during the **past week** in which the target student engaged in each of the following…	None	Little (1 hour or less last week)	Some (2-4 hours last week)	Moderate (5-7 hours last week)	Considerable (8 or more hours last week)	No Partici-pation	Passive Partici-pation	Active Participa-tion with Supports	Independent Active Participation
Receive individualized instruction	0	10.6	36.2	23.4	29.8	0	10.6	80.9	8.5
Receive instruction in a small or large group	4.3	6.4	19.1	34.0	36.2	4.3	8.5	74.5	12.8
Collect, summarize, or analyze information	29.8	21.3	38.3	10.6	0	36.2	21.3	42.6	0
Complete symbolic math problems	29.8	23.4	21.3	23.4	2.1	27.7	12.8	51.1	8.5
Learn to use resources	29.8	29.8	21.3	17.0	2.1	31.9	21.3	44.7	2.1
Use hands-on or manipulatives to count or solve mathematical problems	4.3	8.5	17.0	34.0	36.2	2.1	12.8	68.1	17.0
Receive instruction with prompts or scaffolded support	2.1	12.8	19.1	36.2	29.8	0	12.8	83.0	4.3
Use computers, calculators or other assistive technology	10.6	17.0	31.9	14.9	25.5	12.8	6.4	59.6	21.3
Work independently	34.0	23.4	19.1	21.3	2.1	29.8	14.9	38.3	17.0
Perform assessment skills for data collection/grading	27.7	34.0	21.3	14.9	2.1	27.7	12.8	59.6	0
Take a test	53.2	23.4	14.9	4.3	4.3	53.2	8.5	34.0	4.3
Practice skills in different setting	19.1	29.8	23.4	27.7	0	17.0	14.9	61.7	6.4
Rote count	27.7	23.4	25.5	14.9	8.5	25.5	4.3	53.2	17.0
Practice skills with a variety of materials	4.3	14.9	40.4	27.7	12.8	4.3	14.9	70.2	10.6
Apply mathematical concepts to real world applications	6.4	25.5	36.2	23.4	8.5	6.4	21.3	68.1	4.3
Use work center	40.4	25.5	10.6	17.0	6.4	38.3	14.9	36.2	10.6
Learn/demonstrate skills in repeated opportunity/direct instruction trials	6.4	27.7	21.3	34.0	10.6	10.6	10.6	74.5	4.3

** Rated only for target students who received little, some, moderate, or considerable instruction using this method.*

Table M.3. Percent of Teachers Using Various Resources to Teach Math (N = 55)

	Used to teach **Math**
Materials	
Commercially made materials adapted (by you or someone else) from general education	81.8
Commercially made manipulatives adapted (by you or someone else) from general education	87.3
Age-appropriate, commercially made print or text materials *designed for this type of student*	54.5
Age-appropriate, commercially made manipulatives *designed for this type of student*	63.6
Other commercially made print or text materials *designed for this type of student*	49.1
Other commercially made age-appropriate manipulatives *designed for this type of student*	52.7
Teacher-made books, workbooks, materials	96.4
Teacher-made manipulatives	96.4
Materials or lessons from websites	70.9
Computer	81.8
Assistive technologies (e.g., CheapTalk, Big Mac, Dynavox, text reader, talking calculator, etc.)	65.5
Settings	
Real life or natural setting materials (e.g., coins, community signs, telephones)	90.9
Inclusive class setting	40.0
Other settings in my school	61.8
Other settings in the community	58.2
People	
Nondisabled peers	25.5
Teachers from other disciplines (e.g., academic or special subject areas)	27.3
Another staff member at the school (e.g., speech/occupational/physical therapist)	38.2
Other special education teachers	45.5

Table M.4. Teacher-Reported Influences on Math Instruction (N = 55)

	No influence	Minimal influence	Moderate influence	Strong influence
State curriculum framework or content standards	5.5	21.8	25.5	47.3
Instructional materials	3.6	16.4	47.3	32.7
State alternate assessment requirements	1.8	12.7	20.0	65.5
State alternate assessment results from previous years	16.7	31.5	27.8	24.1
National math standards	27.3	34.5	27.3	10.9
Math content, materials, and/or activities used by general education teachers in my school	29.1	27.3	29.1	14.5
Training from my degree program (undergraduate or graduate)	20.0	21.8	32.7	25.5
Students' needs as documented on IEPs	1.8	1.8	3.6	92.7
School or district initiatives or priorities	7.5	37.7	24.5	30.2
Principal or other administrator expectations	9.1	32.7	27.3	30.9
Professional development experiences	7.4	22.2	40.7	29.6
Classroom assessment results	0	31.0	20.4	66.7

Table M.5. Percent Reporting Frequency of Use of Classroom Assessments – Math (N = 55)

	Not at all	< 1 time per month	1-4 times a month	1-4 times a week	> 4 times a week
Objective questions (e.g., true/false, multiple choice)	20.0	12.7	14.5	34.5	18.2
Performance on-demand (e.g., data collected on student performance of task analysis steps)	1.8	5.5	20.0	29.1	43.6
Teacher observation	0	5.5	10.9	27.3	56.4

Table S.1. Distribution of Science Content Taught, by Depth of Knowledge (N = 47)

			Attention		Memorize/Recall		Perform		Comprehend		Apply		An/Syn/Eval	
Item	**Earth and Space Science**	**N**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
A1	Structure and energy in the Earth's system. (Weather, minerals, rocks)	41	10	24.4	8	19.5	8	19.5	7	17.1	5	12.2	3	7.3
A2	History, origin, and evolution of the earth and the universe. (Changes in the Earth's surface, Big Bang Theory)	20	10	50.0	3	15.0	3	15.0	4	20.0		0.0		0.0
A3	Earth, the Solar System, and objects in the sky. (Moon phases, tides, tilt of the earth, motion of the Earth)	27	10	37.0	4	14.8	5	18.5	6	22.2	2	7.4		0.0
	Total	**88**	**30**	**34.1**	**15**	**17.0**	**16**	**18.2**	**17**	**19.3**	**7**	**8.0**	**3**	**3.4**
	Life Science (Biology)													
B1	Characteristics of organisms (Organ systems, plants and animals, plant structures)	39	12	30.8	15	38.5	6	15.4	4	10.3	1	2.6	1	2.6
B2	Life cycles of organisms (birth, development, reproduction, death)	25	12	48.0	7	28.0		0.0	5	20.0	1	4.0		0.0
B3	Organisms and environments, populations, and ecosystems (extinction, food web, changes in ecosystems)	33	19	57.6	5	15.2	2	6.1	4	12.1	2	6.1	1	3.0
B4	Cellular and molecular basis of life. (animal cells, multicellular organisms, organic molecules, types of cells, organells)	17	8	47.1	4	23.5	2	11.8	3	17.6		0.0		0.0
B5	Reproduction and heredity, diversity, adaptations, and evolution of organisms. (traits and genes, reproduction, Mendel, Punnett squares, DNA, natural selection, biodiversity)	17	9	52.9	2	11.8	3	17.6	2	11.8	1	5.9		0.0
B6	Regulation and behavior of organisms (Instinct and learned behavior, animal and plant behaviors, interaction with the environment)	27	14	51.9	6	22.2	3	11.1	2	7.4	2	7.4		0.0
B7	Matter, energy, and organization in living systems	23	10	43.5	2	8.7	6	26.1	4	17.4	1	4.3		0.0
B8	Personal and Community Health (diseases, nutrition, fitness, environmental hazards)	38	14	36.8	3	7.9	9	23.7	4	10.5	5	13.2	3	7.9
	Total	**219**	**98**	**44.7**	**44**	**20.1**	**31**	**14.2**	**28**	**12.8**	**13**	**5.9**	**5**	**2.3**

Item			Attention		Memorize/Recall		Perform		Comprehend		Apply		An/Syn/Eval	
Item	**Physical Science (Chemistry and Physics)**	**N**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
C1	Properties of matter (size, shape, color, states of matter, weight and mass, elements and compounds, periodic table)	34	9	26.5	9	26.5	8	23.5	5	14.7	2	5.9	1	2.9
C2	Chemical and physical changes in matter. (changes in state, boiling and melting points, bonding, reactions, chemical equations, acids and bases)	23	8	34.8	4	17.4	6	26.1	2	8.7	2	8.7	1	4.3
C3	Motion and forces (speed and velocity, mass and inertia, vectors, Newton's laws, waves)	18	7	38.9	3	16.7	3	16.7	4	22.2		0.0	1	5.6
C4	Energy (conservation of energy, forms of energy, electricity, magnets, light, sound, heat, potential and kinetic energy, temperature)	30	11	36.7	8	26.7	7	23.3	3	10.0		0.0	1	3.3
C5	Atomic theory (Atoms and molecules, fission and fusion, nuclear reactions, Lewis dot structures)	5	3	60.0	1	20.0		0.0	1	20.0		0.0		0.0
	Total	**110**	**38**	**34.5**	**25**	**22.7**	**24**	**21.8**	**15**	**13.6**	**4**	**3.6**	**4**	**3.6**
	Technology /Engineering													
D1	Materials and Tools (uses of materials, proper uses, machines, technology, invention)	23	6	26.1	4	17.4	6	26.1	2	8.7	4	17.4	1	4.3
	Total	**23**	**6**	**26.1**	**4**	**17.4**	**6**	**26.1**	**2**	**8.7**	**4**	**17.4**	**1**	**4.3**
	History/Nature of Science													
E1	Science as a human endeavor. (diversity among scientists, talents and skills of scientists)	12	4	33.3	4	33.3	3	25.0		0.0		0.0	1	8.3
E2	Nature of science (scientific method, hypotheses, laws, and theories)	23	8	34.8	5	21.7	7	30.4	2	8.7		0.0	1	4.3
E3	History of science (Science in different cultures, rate of advancement, scientific revolutions)	12	7	58.3	3	25.0	2	16.7		0.0		0.0		0.0
	Total	**47**	**19**	**40.4**	**12**	**25.5**	**12**	**25.5**	**2**	**4.3**	**0**	**0.0**	**2**	**4.3**

Item	Science as Inquiry	N	Attention n	Attention %	Memorize/Recall n	Memorize/Recall %	Perform n	Perform %	Comprehend n	Comprehend %	Apply n	Apply %	An/Syn/Eval n	An/Syn/Eval %
F1	Understanding of and abilities necessary to do scientific inquiry. (Asking questions, forming hypotheses, conducting experiments)	32	13	40.6	6	18.8	8	25.0	2	6.3	1	3.1	2	6.3
	Total	**32**	**13**	**40.6**	**6**	**18.8**	**8**	**25.0**	**2**	**6.3**	**1**	**3.1**	**2**	**6.3**

Table S.2. Science Instructional Methods and Level of Target Student's Participation (N = 47)

						Level of student participation			
	0 None	1 Little (1 hour or less last week)	2 Some (2-4 hours last week)	3 Moderate (5-7 hours last week)	4 Considerable (8 or more hours last week)	N No Partici-pation	P Passive Partici-pation	AS Active Participa-tion with Supports	IA Independent Active Participation
Receive individualized instruction	17.0	40.4	21.3	8.5	12.8	2.6	28.2	64.1	5.1
Receive instruction in a small group	8.5	19.1	38.3	14.9	19.1	2.3	25.6	65.1	7.0
Collect, summarize, or analyze information	31.9	34.0	29.8	4.3	0	9.4	25.0	65.6	0
Engage in inquiry processes	42.6	21.3	31.9	4.3	0	22.2	22.2	55.6	0
Learn to use resources	42.6	23.4	19.1	14.9	0	18.5	14.8	66.7	0
Use hands-on materials or manipulatives	8.5	23.4	42.6	12.8	12.8	12.8	21.3	59.6	6.4
Receive instruction with prompts or scaffolded support	8.5	27.7	34.0	19.1	10.6	10.6	19.1	70.2	0
Use computers or other assistive technology	38.3	25.5	19.1	10.6	6.4	31.9	19.1	40.4	8.5
Work independently	48.9	29.8	14.9	6.4	0	55.3	10.6	29.8	4.3
Perform assessment skills for data collection/grading	46.8	36.2	12.8	4.3	0	42.6	19.1	38.3	0
Take a test	59.6	25.5	8.5	4.3	2.1	61.7	6.4	23.4	8.5
Practice skills in different setting	38.3	31.9	21.3	8.5	0	36.2	17.0	46.8	0
Practice skills with a variety of similar materials	25.5	38.3	27.7	6.4	2.1	27.7	14.9	57.4	0
Engage in read aloud activities	44.7	21.3	21.3	10.6	2.1	48.9	10.6	38.3	2.1
View multi media presentations	40.4	25.5	23.4	6.4	4.3	44.7	19.1	29.8	6.4
Engage in speech or presentation	63.8	19.1	17.0	0	0	63.8	10.6	25.5	0
Use work center	59.6	21.3	14.9	2.1	2.1	57.4	14.9	27.7	0
Learn/demonstrate skills in repeated opportunity/direct instruction trials	27.7	31.9	25.5	12.8	2.1	31.9	10.6	57.4	0

** Rated only for target students who received little, some, moderate, or considerable instruction using this method*

Table S.3. Percent of Teachers Using Various Resources to Teach Science (N = 55)

	Used to teach **Science**
Materials	
Commercially made materials adapted (by you or someone else) from general education	78.2
Commercially made manipulatives adapted (by you or someone else) from general education	65.5
Age-appropriate, commercially made print or text materials *designed for this type of student*	52.7
Age-appropriate, commercially made manipulatives *designed for this type of student*	50.9
Other commercially made print or text materials *designed for this type of student*	34.5
Other commercially made age-appropriate manipulatives *designed for this type of student*	38.2
Teacher-made books, workbooks, materials	80.0
Teacher-made manipulatives	80.0
Materials or lessons from websites	74.5
Computer	67.3
Assistive technologies (e.g., CheapTalk, Big Mac, Dynavox, text reader, talking calculator, etc.)	54.5
Settings	
Real life or natural setting materials (e.g., coins, community signs, telephones)	69.1
Inclusive class setting	41.8
Other settings in my school	50.9
Other settings in the community	45.5
People	
Nondisabled peers	27.3
Teachers from other disciplines (e.g., academic or special subject areas)	40.0
Another staff member at the school (e.g., speech/occupational/physical therapist)	38.2
Other special education teachers	41.8

Table S.4. Teacher-Reported Influences on Science Instruction (N = 55)

	No influence	Minimal influence	Moderate influence	Strong influence
State curriculum framework or content standards	17.0	17.0	28.3	37.7
Instructional materials	7.5	11.3	37.7	43.4
State alternate assessment requirements	9.4	15.1	15.1	60.4
State alternate assessment results from previous years	35.3	19.6	21.6	23.5
National science standards	37.7	39.6	13.2	9.4
Science content, materials, and/or activities used by general education teachers in my school	30.2	13.2	39.6	17.0
Training from my degree program (undergraduate or graduate)	30.2	28.3	24.5	17.0
Students' needs as documented on IEPs	9.4	3.8	11.3	75.5
School or district initiatives or priorities	20.8	24.5	26.4	28.3
Principal or other administrator expectations	22.6	26.4	26.4	24.5
Professional development experiences	24.5	20.8	35.8	18.9
Classroom assessment results	9.6	13.5	25.0	51.9

Table S.5. Percent Reporting Frequency of Use of Classroom Assessments – Science (N = 55)

	Not at all	< 1 time per month	1-4 times a month	1-4 times a week	> 4 times a week
Objective questions (e.g., true/false, multiple choice, yes/no)	18.2	14.5	18.2	32.7	16.4
Performance on-demand (e.g., task analysis steps, repeated trials, incidence recording)	12.7	5.5	25.5	36.4	20.0
Teacher observation (e.g., anecdotal or descriptive data)	9.1	5.5	16.4	32.7	36.4

CIS Results: Long Version

LONG VERSION: FACILITATOR RESPONSES

Twenty-two facilitators completed the long version of the CIS in June 2007. While they were instructed to complete the surveys based on the instructional practices of the "typical" teacher they worked with in 2006-07 and then identify any additional content taught by their "best" teacher, respondents did not differentiate between "typical" and "best" teachers. Therefore, the following results are intended to reflect a sample of the academic instruction of the "typical" teachers, as seen by facilitators.

Detailed tables providing frequency distributions for content within each academic subject and topic are provided in the appendix following this summary. In both the appendix and the summary tables that follow, two kinds of information are provided:

- The "intensity" column provides a rough estimate of the frequency with which the content was taught, across teachers. Responses on the 0-4 scale were summed across the 22 facilitator responses, yielding a total possible score of 88 per item (which would mean all "typical" teachers taught the content systematically, with daily or nearly daily coverage throughout the entire school year). A score of zero would mean that all of the responding facilitators indicated that no "typical" teacher taught that content during 2006-07. In the summary tables that follow on the next three pages, the maximum possible intensity score varies depending on the number of items within the topic. More detailed information about intensity is provided within the appendix tables.
- The remaining columns provide a frequency distribution with which each item was endorsed, at each level of depth of knowledge (DOK).

Following is a list of highlights from the survey responses for each subject.

English language arts (ELA)

- The areas with the greatest instructional emphases were Vocabulary and Concept Development; Questioning, Listening, and Contributing; Beginning Reading; and Discussion.
- Evaluating Writing and Presentations and Style and Language were the topics with the least instructional emphasis.
- There were no clear patterns related to differences across topics in performance expectations (DOK) at which facilitators reported the teachers typically taught. In general, the analysis/synthesis/evaluation level was least frequently endorsed.

Intensity and Distribution of DOK for Content Taught within ELA Topics

	Int*	Attention		Mem/Rec		Perform		Compre-hension		Application		An/Syn/Eval	
		n	%	n	%	n	%	n	%	n	%	n	%
Discussion	55	13	23.6	1	1.8	29	52.7	5	9.1	5	9.1	2	3.6
Questioning, Listening and Contributing	58	5	8.6	7	12.1	26	44.8	10	17.2	9	15.5	1	1.7
Oral Presentation	40	2	5.0	3	7.5	28	70.0	3	7.5	3	7.5	1	2.5
Vocabulary and Concept Development	60	5	8.3	20	33.3	22	36.7	6	10.0	7	11.7	0	0.0
Structure & Origins of Modern English	36	7	19.4	3	8.3	19	52.8	3	8.3	4	11.1	0	0.0
Formal and Informal English	43	5	11.6	10	23.3	14	32.6	7	16.3	6	14.0	1	2.3
Beginning Reading	57	4	7.0	8	14.0	32	56.1	7	12.3	6	10.5	0	0.0
Understanding Text	49	8	16.3	10	20.4	11	22.4	9	18.4	6	12.2	5	10.2
Making Connections	30	13	43.3	4	13.3	8	26.7	3	10.0	1	3.3	1	3.3
Genre	29	9	31.0	5	17.2	7	24.1	6	20.7	2	6.9	0	0.0
Theme	32	6	18.8	8	25.0	11	34.4	6	18.8	0	0.0	1	3.1
Fiction	45	2	4.4	11	24.4	17	37.8	11	24.4	2	4.4	2	4.4
Nonfiction	38	3	7.9	17	44.7	5	13.2	11	28.9	0	0.0	2	5.3
Poetry	28	16	57.1	3	10.7	9	32.1	0	0.0	0	0.0	0	0.0
Style and Language	9	6	66.7	0	0.0	0	0.0	0	0.0	2	22.2	1	11.1
Myth, Traditional Narrative, and Classical Literature	17	7	41.2	3	17.6	1	5.9	3	17.6	3	17.6	0	0.0
Dramatic Literature	21	6	28.6	7	33.3	2	9.5	1	4.8	4	19.0	1	4.8
Dramatic Reading and Performance	17	0	0.0	6	35.3	5	29.4	0	0.0	5	29.4	1	5.9
Writing	24	2	8.3	8	33.3	5	20.8	2	8.3	5	20.8	2	8.3
Consideration of Audience and Purpose	19	4	21.1	7	36.8	0	0.0	1	5.3	6	31.6	1	5.3
Revising	24	0	0.0	7	29.2	5	20.8	0	0.0	12	50.0	0	0.0
Standard English Conventions	39	3	7.7	17	43.6	7	17.9	2	5.1	8	20.5	2	5.1
Organizing Ideas in Writing	16	7	43.8	2	12.5	1	6.3	0	0.0	6	37.5	0	0.0
Research	18	5	27.8	1	5.6	9	50.0	0	0.0	3	16.7	0	0.0
Evaluating Writing and Presentations	8	1	12.5	0	0.0	1	12.5	0	0.0	3	37.5	3	37.5
Analysis of Media	16	1	6.3	2	12.5	5	31.3	0	0.0	3	18.8	5	31.3
Media Production	21	6	28.6	0	0.0	7	33.3	0	0.0	5	23.8	3	14.3

*Int = Intensity

Mathematics

- The areas with the greatest instructional emphases were Numbers and Operations, Measurement, and Characteristics of Geometric Shapes.
- Variables and Change and Probability were the topics with the least instructional emphasis.
- In general, the most frequently reported DOKs were memorize/recall, performance, and application.

			Attention		Mem/Rec		Perform		Compre-hension		Application		An/Syn/ Eval	
	Int.*	N	n	%	n	%	n	%	n	%	n	%	n	%
Numbers & Operations	2009	749	43	5.7	139	18.6	344	45.9	30	4.0	189	25.2	4	0.5
Patterns, relations, and functions	446	165	10	6.1	28	17.0	72	43.6	13	7.9	41	24.8	1	0.6
Algebra	131	66	3	4.5	15	22.7	20	30.3	0	0.0	28	42.4	0	0.0
Relations and mathematical models	208	81	0	0.0	28	34.6	25	30.9	2	2.5	25	30.9	1	1.2
Variable and change	28	18	0	0.0	1	5.6	2	11.1	0	0.0	15	83.3	0	0.0
Characteristics of geometric shapes	531	222	39	17.6	73	32.9	58	26.1	9	4.1	43	19.4	0	0.0
Spatial relationships and coordinate geometry	121	59	18	30.5	12	20.3	10	16.9	3	5.1	16	27.1	0	0.0
Transformation and symmetry	166	88	13	14.8	11	12.5	43	48.9	0	0.0	21	23.9	0	0.0
Visualization/special reasoning/ Geometric modeling	103	47	4	8.5	15	31.9	13	27.7	1	2.1	14	29.8	0	0.0
Measurement	576	220	6	2.7	65	29.5	81	36.8	11	5.0	57	25.9	0	0.0
Data & Statistics	455	191	12	6.3	43	22.5	70	36.6	4	2.1	55	28.8	7	3.7
Probability	95	52	8	15.4	6	11.5	8	15.4	1	1.9	22	42.3	7	13.5

*Int = Intensity

Science

- The areas with the greatest instructional emphases were Life Science and Earth and Space Science.
- History and Nature of Science, and Technology and Engineering were the topics with the least instructional emphasis.
- Science instruction was most frequently provided with expectations for memorization/recall and application levels.

			Attention		Mem/Rec		Perform		Compre-hension		Application		An/Syn/Eval	
	Int.*	N	n	%	n	%	n	%	n	%	n	%	n	%
Earth and Space Science	826	493	79	16.0	205	41.6	46	9.3	69	14.0	86	17.4	8	1.6
Life Science (Biology)	1025	519	58	11.2	211	40.7	48	9.2	65	12.5	115	22.2	22	4.2
Physical Science and Chemistry	417	234	21	9.0	70	29.9	32	13.7	34	14.5	61	26.1	16	6.8
Technology and Engineering	88	50	10	20.0	8	16.0	9	18.0	6	12.0	17	34.0	0	0.0
History and Nature of Science	55	24	2	8.3	6	25.0	4	16.7	2	8.3	6	25.0	4	16.7
Science as Inquiry	132	58	9	15.5	11	19.0	12	20.7	6	10.3	17	29.3	3	5.2

*Int = Intensity

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

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Abstract

This study examines the learner characteristics of students in the alternate assessment based on alternate achievement standards in three geographically and demographically different states. Based on our results, it can be argued that students in this assessment include at least two, distinct sub-groups within this population. The first set of learners has either symbolic or emerging symbolic levels of communication, evidences social engagement, and possesses at least some level of functional reading and math skills. The second set of students in our sample has not yet acquired a formal, symbolic communication system, may not initiate, maintain, or respond to social interactions consistently, and has no awareness of print, Braille, or numbers. This article provides implications and considerations of the findings of the Learner Characteristics Inventory (LCI) for states and practitioners in developing alternate assessments based on alternate achievement standards (AA-AAS).

Knowing What Students Know: Defining the Student Population Taking Alternate Assessments Based on Alternate Achievement Standards

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 conceptualized originally for students with more severe disabilities (Kleinert & Thurlow, 2001). Alternate assessment was mandated nationally by IDEA 97 as a mechanism for inclusion in large-scale educational assessments for those students who could not participate in regular state and district assessments, even with accommodations and modifications. Although IDEA 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 allow 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 on alternate achievement standards (AA-AAS) for students with significant cognitive disabilities must evidence a rigorous technical quality comparable to 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 alternate assessment to consider (Kleinert et al., 1997; Kleinert, Haigh, Kearns, & Kennedy, 2000), and only three 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. Further, with the exception of studies of Kentucky’s alternate assessment (see Kampfer, Horvath, Kleinert, & Kearns, 2001; Kleinert & Kearns, 1999; Kleinert, Kennedy, & Kearns, 1999; and Turner, Baldwin, Kleinert, & Kearns, 2000) and subsequent work by Browder and colleagues (Browder, Spooner, Algozzine, Ahlgrim-Delzell, Flowers, & Karvonen, 2003; Flowers, Ahlgrim-Delzell, Browder, & Spooner, 2005), little is known about how alternate assessments have impacted teacher practice, access to the general curriculum, and most importantly, student outcomes. The challenges are extremely complex. At this time, many states are not only struggling with issues of technical quality of alternate assessment, but they 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 our attention on how models of large-scale assessment reflect the characteristics of good teaching and learning, and 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 suggest that these pillars make up an *assessment triangle*, and that this triangle—cognition, observation, interpretation—must be articulated, aligned, and coherent for inferences drawn from the assessment to have integrity. The triangle is illustrated in Figure 1. This study intends to examine a critical part of the assessment triangle - the cognition vertex, and more precisely, one element of that vertex - the learner characteristics of the students who are assessed with AA-AAS.

The students for whom AA-AAS is 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. Secondly, 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, little 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 1997 and 2004, alternate assessments are designed for a very small percentage of the student population for whom traditional assessments, even with appropriate accommodations, would be an inappropriate measure of student progress within the general education curriculum. Indeed, these students represent multiple categories of disability under IDEA including: mental retardation, autism, and multiple disabilities (US Department of Education, 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 an Individualized Education Program (IEP), b) have a cognitive disability, c) require instruction under multiple conditions to generalize learning, and d) may receive a “functional curriculum”. 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 alternate assessment on alternate achievement standard pilot across five states that, these students were most likely to have a different curricular focus, require communication supports and assistive technology, and require physical supports.

Validity Evaluation

Based on the conceptual framework of Pellegrino et al. (2001), the learning characteristics of the assessed population have significant implications for the assessment’s validity. Specifically, the validity evaluation of an assessment should consider two questions. First, we need to know whether the assessment is appropriate for the intended population. Secondly, in high stakes accountability environments, we want to ensure that the appropriate population is, in fact, the population being assessed. This study represents the first systematic attempt to address each of these two questions.

Methodology

Research Design

A survey research design was used to gather data on the learning characteristics of students participating in the alternate assessment judged against alternate achievement standards (AA-AAS) in three states. Please see Table 1 outlining the options for each of the three states in data collection. Although the survey could be completed in different modalities (i.e., online or paper/pencil), the directions for completing the survey were all consistent: a) teachers were to complete an LCI for each student participating in the AA-AAS, and b) for each item on the survey, teachers were to choose the best answer that most appropriately described the student. The following outlines the specific data collection options used in each state.

All special education teachers in State 1 were sent an email inviting them to complete a Learner Characteristics Inventory (LCI) for each student they had participating in the AA-AAS during the 2005-2006 school year. In the email, teachers were offered three ways in which to complete the LCI:

1) Teachers could click on a link that directed them to the inventory where they could complete it 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 student(s).

2) Teachers could complete the inventory by printing off the version attached to the invitation email. Teachers were asked to print the inventory for each student participating in the alternate assessment and bring the LCI(s) with them when dropping off the assessment(s) at their scoring site.

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 to the scoring site, inventories were available for them at the scoring site. At all times, teachers were given the choice not to participate in the LCI.

In State 2, all district administrators were sent an email from the Chief of the Bureau of Assessment. District administrators were asked to forward an attached email 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 three week window to complete the inventory for their student(s) and then the inventory was taken offline.

In State 3, an email invitation was sent to 247 teachers who attended alternate assessment regional trainings. 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 two weeks. After the first week, a friendly reminder was sent to teachers. The online survey was extended by one 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 instrument 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). As we were interested in student and not teacher descriptive data, we did not ask teachers to complete demographic data on themselves.

Instrumentation

The Learner Characteristics Inventory (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/Language Pathology/ Communication Disorders, Deaf-blindness, Reading, Mathematics, and Special Education. The LCI went through an expert validation and changes to the categories were made given thoughtful feedback from the experts. The LCI was emailed 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, understandability), but for the questions that tapped individual expertise, experts were asked to provide specific recommendations on content and clarity for those questions. 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 a partner respondent (such as speech/language pathologist, school psychologist, general education teacher) and both were to independently score an LCI for a single student so 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 the instrument was valid to investigate the learning characteristics of students with the most significant cognitive disabilities.

The instrument includes 10 questions, nine that are on a continuum of skills in the areas of expressive communication, receptive language, vision, hearing, motor, engagement, health issues/attendance, reading and mathematics. The other question is a dichotomous variable that asks if students used an augmentative communication system. Teachers were asked to rate where each student in their class participating in an AA-AAS would rank on this continuum or dichotomy for each variable. **Please email the lead author for a copy of the survey.*

Data Analysis

The variables of expressive communication, receptive language, vision, hearing, motor, engagement, health issues/attendance, reading and mathematics are continuous variables, and we chose to measure them as such for data analyses 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 performed on 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 response rate, descriptive statistics, and findings from the correlational analyses.

Results

During the 2005-2006 school year, there were approximately 1,394 students who completed an AA-AAS in State 1 from grades 4, 8, and 12. Teachers completed LCIs for 1,120 students during the Spring of 2006. The response rate was 80%. In State 2, there were approximately 2,800 students who completed an AA-AAS from grades 3-8 and 10. Teachers completed LCIs for 201 students also in the Spring of 2006. The response rate was approximately 7%. It is possible the response rate was reduced in State 2 for two reasons: a) time of year in which the inventory was conducted (very busy time of year) and b) emailing teachers through district administrators (which required administrators to forward the email to teachers increasing attrition). During the 2006-2007 school year, teachers completed LCIs for 219 students in State 3 in the Spring of 2007. There were approximately 467 students who completed an AA-AAS from grades 3-8 and 11. 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/textures, points, etc., to clearly express a variety of intentions (17%, 26%, and 17% respectively). An even smaller group of students primarily used cries, facial expressions, change in muscle tone, etc., to communicate, but these students had no clear use of objects/textures, regularized gestures, pictures, signs, etc., to communicate (8%, 11%, and 8% respectively).

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

Overall, only a minority of students in each state used an augmentative communication system, in addition to or in place of oral speech (18%, 30%, and 15% 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, change in muscle tone, etc., used a formalized augmentative communication system. Further, only 42% of the students in State 1, 44% of the students in State 2, and 43% of students in State 3 who communicated through such modes as gestures, pictures, objects/textures, points, etc., used a formalized augmentative communication system 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 student's present performance in that area. In State 1 and State 3, teachers noted that over 2% of the population read fluently with critical understanding in print or Braille. State 2 did not provide this option on the inventory. 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/short passages with narrative/ informational texts in print or Braille. The largest group from all three states (50%, 47%, and 33%) was 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. A smaller percentage of students (17%, 14%, and 18%) were 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 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.

Under math skills, teachers were again asked to select the performance description that best indicated the skill level of their student(s). 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%, 37%, and 51% 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 make numbered sets of items. A smaller percentage 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, in State 1 nearly 9%, in State 2 almost 15%, and in State 3 exactly 10% 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 in both states (95%, 93%, and 97%) had hearing within normal limits or corrected hearing loss within normal limits. A small percentage of the population in States 1 and 2 (2% and 5% respectively) had significant and profound hearing loss, even with aids. No students in State 3 had these characteristics. For almost 2% of the population in all three states, teachers were unable to determine 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/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 others people.

As 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 due to health issues. In States 1 and 3, 2% of the population attended approximately 50% *or less* of school days with absences primarily due to health issues; in State 2 that percentage was 1%.

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 the student's expressive language and the student's level of reading. As might be expected, students who were symbolic learners were also reading at a higher level than those who were not. In addition, a significant correlation was also found between the level of a student's receptive communication and level of reading in all three states. Consequently, students with a higher level 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. As again might be expected, students with higher levels of expressive language and receptive communication were working at a higher level in mathematics.

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

Discussion

The No Child Left Behind Act of 2001 requires that all educational assessments, including AA-AAS, that are used for determining school and state-level adequate yearly progress (AYP), 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 the 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 paper was to describe the learner characteristics of students taking AA-AAS in three demographically and geographically dissimilar states. In order to describe the population of the students in the AA-AAS for these three states, we created a brief scale – the Learner Characteristics Inventory (LCI) – across nine separate dimensions in which students with significant cognitive disabilities are known to have highly variable abilities (expression communication, receptive communication, social engagement, motor, 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 there are still some important conclusions that can be drawn.

1) Students in these three states who are being identified to take the AA-AAS are for the most part, students for whom the regular assessment, even with accommodations, would probably not be appropriate. For example, only 2 – 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 of the above skills would be required for the successful completion of grade-level reading and math assessments under NCLB.

2) Yet the majority of students taking the AA-AAS represented in our survey from these three states *do* 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 from State 1 could, at a minimum, do computational problems with or without a calculator.

3) 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 pre-symbolic (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 whom teachers report do *not* respond to social interactions.

4) Even larger percentages of students in each of the three states have no observable awareness of print or Braille (15%, 25%, and 13% for the three states respectively) and no observable awareness or use of numbers (13%, 22%, and 11% respectively).

5) 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, as also might be expected, were between academic ratings in math and reading for

the students in these states (.78, .84, and .85 respectively), indicating a very strong relationship between math and reading performance on the LCI for these students. Our findings suggest that while the majority of students in our sample in their respective states' AA-AAS did have functional math and reading skills, there is a smaller percentage of students whose lack of a formalized, symbolic communication system, or whose 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 due to severe motor deficits, to students 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, since 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, or 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, or formalized augmentative communication boards or electronic systems (level 1 of Expressive Communication in the LCI). These are clearly symbolic systems. The use of regularized gestures, points or objects to express communicative intent (level 2 in the LCI), while understandable, falls at the level of illocution and can be considered at an emergent symbolic level, but not formalized language. Finally, the individual who uses less differentiate cries, muscle tone changes, etc., to communicate (level 3 in the LCI) may require interpretation on the part of the listener and while these individuals are definitely communicative, they would not be considered at a *symbolic* level of communication. Mirenda (2003), a noted authority in functional and augmentative communication development for students with significant disabilities, has listed multiple options for “symbols” which can be used for functional communication. These might include sign, pictures, partial objects, gestures, etc. 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/she uses *any* symbol as a representation, even a real object, or should he/she be utilizing 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, 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.

A second limitation is that the LCI is our own instrument, but no other measures existed that would succinctly capture the essential dimensions in which we needed to describe the population of students potentially eligible for the alternate assessment on alternate achievement standards. In order 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/Language Pathology/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 inter-rater agreement; and achieved a final interrater agreement of 95% upon subsequent revisions based upon expert panel 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 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 the respondent 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 each of the data collection techniques.

The fourth significant limitation is, of course, the very low response rate for State 2. With a response rate of approximately only 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 the AA-AAS. Despite this limitation, we did include the results from this state for two reasons: 1) we did have over 200 individual responses from the state; and 2) while this was a very limited sample, in general the student characteristic results of from State 2 mirror those of States 1 and 3, for which we had response rates of 80% and 47% respectively. This is especially true in the overall percentage of students in each state who score 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 initiate/sustain or respond to social interactions. While State 2 teachers did report a higher incidence of students who used an augmentative communication system, who had no observable awareness of print or numbers, and a higher incidence of students who required assistance for all motor activities than did teachers from States 1 and 3, we simply cannot identify if 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 Learner Characteristics Inventory 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 instrument. To begin, we have no current data that outline how many students with the most significant cognitive disabilities are also English Language Learners (ELL) who participate in the AA-AAS. This is an important consideration to add to the LCI instrument in order to identify the number of students who are both students with significant cognitive disabilities and ELL. In addition, this information will help states to be sure teachers are providing appropriate instruction based on these particular students' learning needs.

Secondly, the AA-AAS for every state is being used to determine AYP 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 pre-symbolic 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.

Thirdly, 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 alternate assessments on alternate achievement standards. For states who may be over-identifying 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 inservice 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 U.S. 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 pre-symbolic 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 pre-symbolic 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 pre-symbolic 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 also 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, 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 U.S. 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 this option. Given that the one percent 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 *pre-symbolic* 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 pre-symbolic level of communication, states are to consider alternate achievement standards linked to grade-level content standards, and that 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 U.S. Department of Education (2005) has described the relationships that should exist between those multiple sets of standards, specifically: “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, based on the results of this study, a decision to create multiple alternate assessment standards based upon 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 has examined the learner characteristics of students in the alternate assessment on alternate achievement standards in three very geographically and demographically different states. Based on our results, it can be argued that students in the alternate assessment include at least two sub-groups within this population although it should be noted there is no distinct line between the two and most likely a continuum rather than a precise demarcation of symbolic language levels. The first set (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 upon the measure and the state) have not yet acquired a formal, symbolic communication system, 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 alternate assessments on alternate achievement standards. Most importantly, states will need to thoughtfully consider, especially for students at a pre-symbolic level of communication, how to ensure linkage to grade-level content standards in ways that provide meaningful and useful educational targets for those students.

References

Almond, P., & Bechard, S. (2005). *In-depth look at students who take alternate assessments: What do we know now?* Retrieved [March 16, 2006] from http://www.measuredprogress.org/Resources/SpecialEd.html

Bates, E. (1976). *Language in context: Studies in the acquisition of pragmatics.* New York: Academic Press.

Browder, D., Karvonen, M., Davis, S., Fallin, K, & Courtade-Little. (2005). The impact of teacher training on state alternate assessment scores. *Exceptional Children, 71*(3), 267-282.

Browder, D. M., Spooner, R., Algozzine, R., Ahlgrim-Delzell, L., Flowers, C., & Karvonen, M. (2003). What we know and need to know about alternate assessment. *Exceptional Children, 70,* 45-61.

Browder, D., Wallace, T., Snell, M., & Kleinert, H. (2005). *The use of progress monitoring with students with significant cognitive disabilities*. Washington, DC: American Institutes of Research, National Center on Student Progress Monitoring.

Flowers, C., Ahlgrim-Delzell, L., Browder, D., & Spooner, F. (2005). Teachers' perceptions of alternate assessments. *Research and Practice for Persons with Severe Disabilities, 30*(2), 81-92.

Heward, W. (2006). *Exceptional children: An introduction to special education* (8th ed.). Upper Saddle River, NJ: Merrill/Prentice Hall.

Individuals with Disabilities Education Act Amendments of 1997 (IDEA), PL 105-17, 20 U.S.C. §§ 1400 *et seq*.

Individuals with Disabilities Education Improvement Act of 2004 (IDEA), PL 108-446, 20 U.S.C. §§ 1400 *et seq*.

Kampfer, S., Horvath, L., Kleinert, H., & Kearns, J. (2001). Teachers' perceptions of one state's alternate assessment portfolio program: Implications for practice and preparation. *Exceptional Children, 67*(3), 361-374.

Kleinert, H., Haigh, J., Kearns, J., Kennedy, S. (2000). Alternate assessments: Lessons learned and roads to be taken. *Exceptional Children, 67* (1), 51-66.

Kleinert, H., & Kearns, J. (1999). A validation study of the performance indicators and learner outcomes of Kentucky's alternate assessment for students with significant disabilities. *Journal of the Association for Persons with Severe Handicaps, 24* (2), 100-110.

Kleinert, H., Kearns, J., & Kennedy, S. (1997). Accountability for all students: Kentucky's Alternate Portfolio system for students with moderate and severe cognitive disabilities. *Journal of the Association for Persons with Severe Handicaps, 22* (2), 88-101.

Kleinert, H., Kennedy, S., and Kearns, J. (1999). Impact of alternate assessments: A statewide teacher survey. *Journal of Special Education, 33*(2), 93-102.

Kleinert, H., & Thurlow, M. (2001). An introduction to alternate assessment. In H. Kleinert & J. Kearns (2001). *Alternate assessment: Measuring outcomes and supports for students with disabilities* (pp. 1-15). Baltimore: Paul Brookes.

Midsouth Regional Resource Center. (2004). *Compilation of state alternate assessment participation guidelines.* Retrieved March 15, 2007, from http://www.rrfcnetwork.org/images/stories/MSRRC/DOCS/ASSESSMENT/alt%20assess%20participation%20guidelines%202.04.doc

Mirenda, P. (2003). Toward functional augmentative and alternative communication for students with autism: Manual signs, graphic symbols, and voice output communication aids. *Language, Speech, and Hearing Services in the Schools, 34*, 203-216.

National Alternate Assessment Center (NAAC) (2005). *Access and alignment to grade level content for students with significant cognitive disabilities*. Pre-session conducted at the meeting of the Chief Council for State School Officers, San Antonio, Texas.

No Child Left Behind Act of 2001, PL.107-110, 115 Stat.1425, 20 U.S.C. §§ 6301 *et seq*.

Orelove, F., Sobsey, D., & Silberman, R. (Eds.) (2004). *Educating children with multiple disabilities: A collaborative approach* (4th ed.). Baltimore, MA: Paul Brookes.

Pellegrino, J, Chudowsky, N., & Glaser, R. (Eds.) (2001). *Knowing what students know: The science and design of educational assessment.* Washington, DC: Committee on the Foundations of Assessment, National Academy Press.

Turner, M., Baldwin, L., Kleinert, H., & Kearns, J. (2000). An examination of the concurrent validity of Kentucky's alternate assessment system. *Journal of Special Education*, *34* (2), 69-76.

U. S. Department of Education. (2002-2003). Education Week analysis of data from the Office of Special Education Programs, Data Analysis System.

United States Department of Education (2004). *Standards and assessment peer review guidance*. Washington, DC: US Department of Education, Office of Elementary and Secondary Education.

United States Department of Education (2005). *Alternate achievement standards for students with the most significant cognitive disabilities: Non-regulatory guidance*. Washington, DC: US Department of Education, Office of Elementary and Secondary Education.

Figure 1

The Assessment Triangle (Pellegrino et al., 2001)

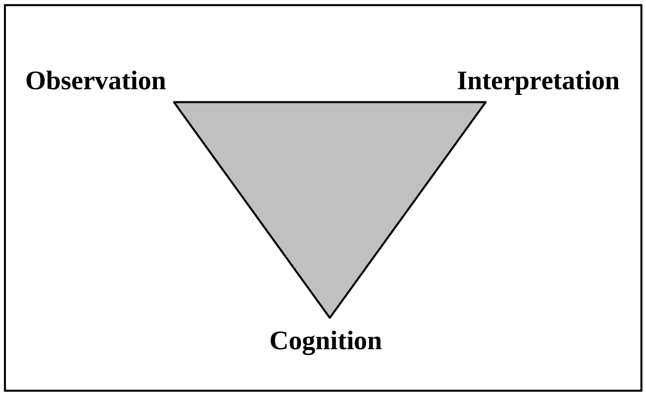

Table 1

Data Collection Techniques for the LCI in States 1, 2, and 3

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

Table 2

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

	State 1		State 2		State 3	
Expressive Language	N	Percent	N	Percent	N	Percent
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, points, 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	1120	100%	201	100%	219	100%
Receptive Language						
Independently follows 1-2 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 1-2 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	1120	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	1120	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	153	14%	24	12%	73	33%

or Braille.						
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	1120	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	211	19%	49	24%	59	27%

numbered sets of items.						
Counts by rote to 5.	76	7%	20	10%	13	6%
No observable awareness or use of numbers.	144	13%	45	22%	25	11%
Multiple answers	8	1%	0	0%	0	0%
No response	11	1%	4	2%	2	1%
Total	1120	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	1120	100%	201	100%	219	100%

Hearing						
Hearing within normal limits.	1040	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	1120	100%	201	100%	219	100%

Motor						
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	1120	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	1120	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 due to health issues.	156	14%	27	13%	26	12%
Attends approximately 50% or less of school days; absences primarily due to health issues.	27	2%	1	1%	5	2%
Receives Homebound Instruction due to health issues.	6	1%	0	0%	0	0%
Highly irregular attendance or homebound instruction due to 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	1120	100%	201	100%	219	100%

Table 3

Relationship between Expressive Communication, Receptive Language, Reading, and Mathematics

Variables	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				-

* $p > .01$