

ELPA21 White Paper: Developing an Alternate **ELPA21** for English Learners with the Most Significant Cognitive Disabilities

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Developing an Alternate ELPA21 for English Learners with the Most Significant Cognitive Disabilities

ELPA21 White Paper

The English Language Proficiency Assessment for the 21st Century (ELPA21) project developed and implemented a college- and career-ready assessment of English language proficiency (ELP). This assessment is designed for all English learners (ELs) except those who have the most significant cognitive disabilities.

In 2015, the reauthorization of the Elementary and Secondary Education Act (ESEA), the Every Student Succeeds Act (ESSA), clarified that states must develop and implement an alternate ELP assessment for those ELs with the most significant cognitive disabilities. A letter from Patrick Rooney, Office of State Support, (2017) clarified that the alternate ELP assessment could be based on alternate achievement standards.

This White Paper was developed as part of the commitment of the ELPA21 project to the development and implementation of an alternate ELP assessment for ELs with the most significant cognitive disabilities.¹ It builds on the ELPA21 report titled "*White Paper on English Language Learners with Significant Cognitive Disabilities*" by Thurlow, Christensen, and Shyyan (2016) that addresses the need for an ELP assessment based on alternate achievement standards for ELs with significant cognitive disabilities.

The purpose of this White Paper, *Developing an Alternate ELPA21 for English Learners* with the Most Significant Cognitive Disabilities, is to propose steps that ELPA21 might take to

¹ "Students with the most significant cognitive disabilities" is a term used in federal law. Although the term is not defined in law, the ELPA21 states have agreed on criteria for participation in the ELPA21 Alternate Assessment of English Language Proficiency. In this document, the term "students with significant cognitive disabilities" is used instead of the longer term used in federal law.

ensure that it develops and implements a technically adequate and appropriate alternate assessment for ELs with significant cognitive disabilities. It also proposes a possible workplan and timeline for Alt-ELPA21 assessment development activities. This White Paper will undergo iterative revision by ELPA21 and review by its Technical Advisory Committee. The final White Paper will be the result of these processes and reviews.

This White Paper **does not address** the complex question of how to accurately identify students who are ELs from among those students who have significant cognitive disabilities. There is limited evidence on this topic as well as on the topic of how to best instruct and assess ELs with significant cognitive disabilities. A recent literature review (Liu, Thurlow, & Quenemoen, 2015), focusing on academic assessments, confirmed this dearth of information and pointed to the urgent need for more research on effective instruction and assessment practices for ELs with significant cognitive disabilities. The authors concluded: "Educators need a body of best practices to draw on and at the present time that knowledge base does not exist" (p. 24). This conclusion applies to English language development instruction and assessment of English language development as much as it does to instruction and assessment of academic content.

This White Paper also **does not address** ELs whose disabilities are not considered to be significant cognitive disabilities, but whose disabilities do make it impossible to measure their English proficiency in a domain. The ESSA assessment regulations did address these students by indicating that they need not participate in the domain that essentially measures their disability:

There are a small number of ELs with disabilities, however, for whom the disability precludes assessment in one or more domains of the ELP assessment such that there are no appropriate accommodations for the affected domain(s) (*e.g.*, a non-verbal EL who, because of the student's identified disability and the absence of appropriate

accommodations, cannot take the speaking portion of the assessment). (Federal Register, 2016)

Background

Since 2000, when the 1997 reauthorization of the Individuals with Disabilities Education Act (IDEA) first required alternate assessments, states have developed them for those students with disabilities unable to participate in the general assessment, even with accommodations. At the time of the enactment of the reauthorized IDEA, the focus was on states' academic assessments, particularly those required in Title I of the Elementary and Secondary Education Act (ESEA), known at that time as the Improving America's Schools Act (IASA).

When ESEA was reauthorized in 2001 as the No Child Left Behind Act (NCLB), it contained requirements for increased school accountability for Title I assessment results, including accountability for subgroups of students such as students with disabilities who had Individualized Education Programs (IEPs) and students who were learning English, called students with limited English proficiency (LEP) at the time, before the term was replaced by English learners (ELs) in 2015. NCLB also continued the requirement that states administer assessments of English language proficiency (ELP) to their ELs, and for the first time, connected the accountability requirements for Title III to performance on Title I assessments.

ESEA regulations in 2003 confirmed that alternate assessments could be based on alternate achievement standards for those students with significant cognitive disabilities. These regulations clarified that the alternate achievement standards should be appropriately rigorous for the students for whom they were intended and could count as proficient scores for school accountability, with up to 1% of the total population being counted as proficient even though more than 1% could participate in the assessments. The reauthorization of IDEA in 2004

confirmed this intention and reinforced the belief that an alternate assessment should be available for each state assessment.

A logical progression in the implementation of the requirements of ESEA and IDEA was not confirmed until 2014, when federal guidance made clear that states should develop alternate ELP assessments for those ELs with disabilities "who cannot participate in regular assessments, even with accommodations, as indicated in their respective IEPs" (U.S. Department of Education, 2014, p. 8). In 2015, federal regulations confirmed that only alternate assessments based on alternate achievement standards (AA-AAS) for students with significant cognitive disabilities could be used for ESEA accountability (U.S. Department of Education, 2015).

In December 2015, ESEA was reauthorized as the Every Student Succeeds Act (ESSA). Although ESSA included many new provisions, such as the inclusion of English language proficiency as a Title I accountability indicator, it did not directly address English learners with disabilities, other than to require that states publicly disaggregate data on the English language proficiency of English learners with disabilities for Title I reporting as well as report on the numbers and percentages of English learners with disabilities for Title III reporting. Of all the mentions of students with significant cognitive disabilities and alternate assessments in ESSA, there was no mention of English learners with significant cognitive disabilities or alternate ELP assessments. In 2017, the U.S. Department of Education provided a letter to chief state school officers (Rooney, 2017) requiring that an alternate assessment to be developed for ELs with significant cognitive disabilities and that these students could be held to alternate achievement standards.

There has been considerable confusion in the field about what "alternate achievement standards" are. Some have mistakenly assumed that they are different standards of English

language—that what ELs with significant cognitive disabilities need to know and do in English is based on different standards from those for other ELs. That is not the case. "Achievement standards" is the new name in federal law, replacing the previously used term, "performance standards"; both of these terms refer to how well students need to perform in relation to the ELP standards.

Language proficiency standards, like content standards, are to be grade-appropriate indicators of **what students need to know and do**. For alternate assessments, the ELP standards that apply to all other ELs (i.e., those without significant cognitive disabilities) can be reduced in depth, breadth, and complexity (see Quenemoen & Thurlow, 2015, for one way in which the regular standards can be adjusted for an alternate assessment yet still assess the "same" content).

Achievement standards (i.e., performance standards) for an alternate ELP assessment also can be different from those for the ELP assessment that all other students take. The U.S. Department of Education (2005) defined "alternate achievement standard" in terms of content assessments as follows:

An alternate achievement standard sets an expectation of performance that differs in complexity from a grade-level achievement standard. The December 9, 2003 regulations clarify that a State is permitted to use alternate achievement standards to evaluate the performance of students with the most significant cognitive disabilities. In general, alternate achievement standards must be aligned with a State's academic content standards, promote access to the general curriculum, and reflect professional judgment of the highest standards possible. (See 34 C.F.R. § 200.1(d).)

The characteristics of an alternate achievement standard are the same as thosedescribed in the Title I assessment regulations for a grade-level achievement

standard. That is, they are aligned with the State's academic content standards (although they may reflect prerequisite skills rather than grade-level skills); describe at least three levels of attainment; include descriptions of the competencies associated with each achievement level; and include assessment scores (cut scores) that differentiate among the achievement levels and a description of the rationale and procedures use to determine each achievement level. These standards will be considered during the Department's peer review of each State's standards and assessment system under NCLB. (p. 20) This definition applies to ELP standards in the same way. In other words, alternate achievement standards for alternate assessments of English language proficiency should be like those of the achievement standards, although they may reflect prerequisite skills rather than grade-level skills.

Steps for ELPA21 to Implement an Alternate ELP Assessment

The remainder of this paper delineates the steps that ELPA21 might take to develop and implement an alternate ELP assessment for students with significant cognitive disabilities. It builds on the White Paper developed by Thurlow et al. (2016).

Eleven steps are proposed for ELPA21 to consider as it undertakes the development of the Alt-ELPA21 for students with significant cognitive disabilities. The 11 steps, which would position Alt-ELPA21 for pilot and field-testing activities of an ELP assessment system (including a screener) are:

- 1. Develop a Theory of Action (ToA).
- 2. Describe the characteristics of ELs with significant cognitive disabilities.
- 3. Develop participation guidelines for Alt-ELPA21.

- 4. Examine ELP standards and agree on those that will be the focus of the alternate ELP assessment.
- 5. Identify achievement levels.
- 6. Consider accessibility and accommodations from the beginning.
- 7. Develop assessment accessibility features and accommodations policies.
- 8. Identify the assessment approach that will be taken for the alternate ELP assessment.
- 9. Develop blueprints for four domains that match the ToA and the targeted standards.
- 10. Develop item templates, and then gather and develop items and tasks.
- 11. Conduct cognitive labs with items and tasks.

Each of these steps is discussed further in this paper.

Theory of Action (ToA)

A Theory of Action for the assessment should define the inputs, processes, and outcomes that underlie the development of the alternate ELP assessment based on alternate achievement standards. It must include the **purpose** of assessing ELs with significant cognitive disabilities what does the assessment user expect to do with the results? How will the results help the user know how best to provide learning opportunities for students?

An example of the framework of a ToA is included in Figure 1. It shows the inputs on the left, the processes that will occur in the educational system to ensure that students will reach desired outcomes, and on the right, the desired outcomes. In this model, outcomes are broken up into short-term outcomes, intermediate outcomes, and long-term outcomes.

Figure 1. Theory of Action Template



Adapted from http://www.dovetailing.us/theory-action-template.

ELPA21 developed a ToA when it created its ELP assessment for ELs without significant cognitive disabilities. The ELPA21 ToA logically could be the basis for a ToA for an alternate ELPA21 assessment (Alt-ELPA21). A committee of ELPA21 states should carefully examine the ELPA21 ToA to determine how it may be adjusted to be appropriate for ELs with significant cognitive disabilities. Following adjustments made by the committee, an Alt-ELPA21 ToA should be presented to the ELPA21 Governing Board for approval.

Characteristics of ELs with Significant Cognitive Disabilities

As noted by Pellegrino, Chudowsky, and Glaser (2011), it is essential that the test developer understand the characteristics of the students for whom an assessment is being developed. They describe the cognition vertex of the assessment triangle as including a description of the students. Understanding the characteristics of the students to be tested is particularly important for the group of ELs who have significant cognitive disabilities.

Little published data are available on these students. It is possible to obtain data on students with disabilities by category of disability, but there is no category called "significant cognitive disability." Although the primary disability categories represented in alternate content assessments developed for students with significant cognitive disabilities are intellectual disabilities, autism, and multiple disabilities (Kearns, Towles-Reeves, Kleinert, Kleinert, & Thomas, 2011; Towles-Reeves, Kearns, Flowers, Hart, Kerbel, Kleinert, Quenemoen, & Thurlow, 2012; Towles-Reeves, Kearns, Kleinert, & Kleinert, 2009), not all of the students in these three categories have significant cognitive disabilities. Thus, it is not accurate to use the number of ELs in the three IDEA disability categories as an estimate of the number of ELs with significant cognitive disabilities.

Towles-Reeves et al. (2012) provided some of the most recent publicly available data and identified how many ELs were in a population of students with significant cognitive disabilities. With data from 18 states, they found an average of 13% were students with a primary language other than English, with an intrastate range from 3% to 36%. These data are consistent with earlier studies (e.g., Kearns et al., 2011), including ones that also used the Learner Characteristics Inventory (Kearns, Kleinert, Kleinert, & Towles-Reeves, 2006).

Thurlow et al. (2016) estimated the number of ELs with disabilities for a subset of ELPA21 states, concluding that the number would range from fewer than 200 to more than 6000, depending on the state (2010–11 data, grades K–12).. ELPA21 indicated that it expects the overall number to be about 1% of all ELs tested in 2016–17, which would be fewer than 400 students across all grades K–12. Even if more than 1% is included in the Alt-ELPA21, the number of students is still quite small in each grade.

Regardless of the number, it is important to gather information on ELs with significant cognitive disabilities who will participate in the alternate ELP assessment. This information will ensure that test designers and developers understand who the students are for whom the

assessment is being developed. It will also be part of the basis for establishing participation guidelines for the alternate ELP assessment.

We reviewed existing approaches to collecting this type of information. Specifically, we examined the *Learner Characteristics Inventory* – *LCI* (Kearns et al., 2006), the *First Contact Survey* used by the Dynamic Learning Maps consortium (DLM, 2014), and the *Individual Characteristics Questionnaire* – *ICQ* developed at the University of Minnesota for the ALTELLA project (NCEO, 2016). Following this review, a draft *Student Profile* form was developed for collecting information on ELs with significant cognitive disabilities who would participate in the Alt-ELPA21 (see Appendix A).

Participation Guidelines

Participation guidelines are used by IEP teams to determine the assessment in which an individual student should participate. It is important that these guidelines be concise and clear enough that they can be applied by teams weighing whether an ELP assessment based on grade-level achievement standards or an alternate ELP assessment based on alternate achievement standards is most appropriate for an individual EL. It may be important to also to develop an explicit statement defining "ELs with significant cognitive disabilities" to include in developed guidelines. Many states have these definitions for "students with significant cognitive disabilities" (Thurlow, Lazarus, Larson, Albus, Liu, & Kwong, 2017). It is unknown how these definitions may change to describe students who are also ELs.

Participation guidelines for alternate content assessments of English language arts (ELA), mathematics, and science have several commonalities. The report by Thurlow et al. (2017) indicated that the three most frequent criteria included in AA-AAS participation guidelines for the school year 2017–18 were: (a) student has significant cognitive disabilities or low intellectual

and adaptive functioning; (b) student needs extensive, intensive, individualized instruction and support; and (c) instruction involves the use of an alternate or modified curriculum. States' participation guidelines indicated the following factors should not be the basis for a participation decision should **not** be the basis for a participation decision were: (a) social, cultural, linguistic, or environmental factors, such as English learner status; (b) excessive absences; (c) poor performance or impact on the accountability system; and (d) disability label, placement, or services.

The consortia of states developing alternate assessments of ELA and mathematics— Dynamic Learning Maps (DLM) and National Center and State Collaborative (NCSC)—worked together to develop potential common participation guidelines for their assessments that reflect their definition of students with significant cognitive disabilities:

A student with a significant cognitive disability is one who has records that indicate a disability or multiple disabilities that significantly impact intellectual functioning and adaptive behavior. Adaptive behavior is defined as actions essential for an individual to live independently and to function safely in daily life. Having a significant cognitive disability is not determined by an IQ test score, but rather a holistic understanding of a student. (NCSC, 2014)

The alternate assessment participation guidelines for the WIDA Alternate ACCESS are:

- The student is classified as an ELL.
- The student has a significant cognitive disability and receives special education services under IDEA (2004).
- An IEP Team determined that the student will participate in an alternate curriculum.

- The student routinely uses accommodations and modifications within the general education curriculum.
- The decision to participate in the alternate curriculum is not primarily due to social, cultural, or economic factors.
- The student's curriculum more closely reflects the Alternate Model Performance Indicators than typical age- or grade-appropriate benchmarks.
- The student is or will be participating in his or her statewide alternate accountability assessment for academic content areas. (WIDA website, see

https://www.wida.us/assessment/alternateaccess.aspx#participation-criteria)

The decision about participation in the Alternate ACCESS is to be decided by the student's IEP team.

As might be surmised, these relatively simple guidelines become very complex in implementation. Determining whether difficulties in speaking, reading, writing, or understanding the English language are due to limited English proficiency rather than significant disabilities in intellectual functioning or adaptive behavior is a challenge, especially for those students for whom a viable communication system has not yet been identified.

Considerations about participation in alternate ELP assessments for some ELs with disabilities may be complicated by a perceived lack of receptive or expressive communication skills. In some cases, an EL may be misidentified as having a significant cognitive disability because of the student's inability to communicate. In these cases, providing appropriate communication systems can make an important difference in the student's access to instruction. Ultimately, the most practical skill an EL with a significant cognitive disability can develop is communicative competence in English. For ELs with significant cognitive disabilities, learning to communicate within the context of academic English is important because facial expressions and other nonverbal means are culturally bound. A smile may mean many things. In some parts of Asia, for example, it may signify embarrassment. Developing expressive and receptive language skills in English, as well as the use of Augmentative and Alternative Communication (AAC), is an important goal for ELs with significant cognitive disabilities.

States will need to decide whether participation in the alternate assessment of English language proficiency is open only to those ELs who are participating in the ELA, math, or science alternate assessment, or is also open to ELs who participate in general assessments of ELA, math, or science. Assuming that the student has been accurately identified as an EL and also as a student with a significant cognitive disability, the criteria reflected in the guidelines for the two AA-AAS consortia and in the guidelines for the ASSETS alternate ELP assessment can be applied by ELPA21 for its alternate ELP assessment. ELPA21 states should agree on the criteria they will use so that students with similar characteristics are identified to participate in the alt-ELPA21 assessment. Continued monitoring of the decision-making process and appropriate placement of students should take place in all ELPA21 states.

ELP Focused Standards

ELPA21 adopted the CCSSO (2014) open-source standards of English language proficiency. These standards reflect the language used for grade-level instruction in ELA, math, and science that ELs must understand to be college- and career-ready. According to the ELPA21 website (www.elpa21.org), the standards, which are described in Table 1, were developed to be:

- Based on theory, research, and best practice
- Understandable, usable, and easily transferable to classroom curricula and instruction for English language proficiency development

- Meaningful and coherent
- At an appropriate level of specificity and granularity, with examples
- Rigorous
- Concise and measurable
- Aligned horizontally and vertically

These standards can be the foundation for the standards assessed by an alternate assessment of

English language proficiency. To be most appropriate for students with significant cognitive

disabilities, they need to be adjusted in some way to reflect reduced breadth, depth, and

complexity.

Table 1. ELPA21 Description of ELP Standards

Standard	Description		
1	Construct meaning from oral presentations and literary and informational text		
	through grade-appropriate listening, reading, and viewing		
2	Participate in grade-appropriate oral and written exchanges of information, ideas,		
Δ	and analyses, responding to peer, audience, or reader comments and questions		
3	Speak and write about grade-appropriate complex literary and informational texts		
5	and topics		
4	Construct grade-appropriate oral and written claims and support them with		
+	reasoning and evidence		
5	Conduct research and evaluate and communicate findings to answer questions or		
5	solve problems		
6	Analyze and critique the arguments of others orally and in writing		
7	Adapt language choices to purpose, task, and audience when speaking and writing		
8	Determine the meaning of words and phrases in oral presentations and literary and		
	informational text		
9	Create clear and coherent grade-appropriate speech and text		
10	Make accurate use of standard English to communicate in grade-appropriate		
10	speech and writing		

In the development of alternate assessments of ELA and math, states derived their adjustments to the standards in several ways. The Dynamic Learning Maps (DLM) consortium created maps of the content that illustrated the interrelations among the knowledge, skills, and understanding needed to meet the content standards, providing many pathways to a common destination. In the map, individual concepts and skills are called nodes. Students are assessed on Essential Elements, which are grade-level-specific expectations for students with significant cognitive disabilities; these expectations are related to college and career readiness standards. DLM uses linkage levels based on small collections of nodes for its assessments. Students who have not reached a target linkage level may be assessed on a precursor linkage level.

The National Center and State Collaborative (NCSC) took a different approach. It did not change the standards but made adaptations in the design of the assessment. NCSC identified the content that was most critical for students with significant cognitive disabilities to be able to move from grade to grade with their peers without disabilities (Browder, Flowers, Wakeman, Lee, Quenemoen, & Thurlow, 2015); this work indicated which standards to prioritize. It also meant that some complex content standards were broken down into smaller segments to pinpoint the targets for the assessment.

Other alternate assessments use slightly different approaches to the standards to be measured. The most common approach is to develop "Extended standards," or "Expanded standards," both of which reduce the academic content standards in breadth, depth, and complexity.

The approach that ELPA21 takes will need to be clearly defined and explained so that educators understand what English language proficiency for ELs with significant cognitive disabilities means. Only with this understanding will they be able to provide appropriate language development instruction for their ELs with significant cognitive disabilities.

As the extensions, essences, expansions, or prioritizations of the ELP standards are created, ELPA21 needs to consider how the standards could be assessed, in a general sense (e.g., what kinds of responses would need to be elicited to understand the degree to which the student

has acquired the skills in the standards). This work is the basis for an Evidence-Centered Design (ECD; see Mislevy & Haertel, 2006) approach to the development of standards for the alternate ELP assessment.

Performance Levels²

ELPA21 will need to determine whether the number of performance levels for the alternate ELP assessment will be the same as for the general ELP assessment. Having the same number of performance levels or fewer is recommended. At the same time, it will be important to develop draft policy definitions for each performance level.

ELPA21 developed policy definitions for five levels of performance, as shown in Table 2. These are broad descriptions of the nature of what the student can do at each of the projected performance levels, without differentiation by grade.

Level	Definition		
Level 1: Beginning	Displays few grade-level English language skills and will benefit		
Level 1. Beginning	from EL Program support.		
Level 2: Early	Presents evidence of developing grade-level English language skills		
Intermediate	and will benefit from EL Program support.		
Level 3: Intermediate	Applies some grade-level English language skills and will benefit		
Level 5. Intermediate	from EL Program support.		
Level 4: Early	Demonstrates English language skills required for engagement with		
Advanced	grade-level academic content instruction at a level comparable to		
Auvalietu	non-ELs.		
Level 5: Advanced	Exhibits superior English language skills, as measured by ELPA21.		

Table 2. ELPA21 Policy Definitions for Performance Levels 1-5

Accessibility and Accommodations

Accessibility and accommodations approaches should be integral throughout the process

of conceptualizing and designing an assessment. During design, the consideration of accessibility

² "Performance level" is used here. It is considered to be equivalent to the term "achievement level" used in the *Every Student Succeeds Act* of 2015. "Performance level" is the term used for the ELPA21 assessment; its use for Alt-ELPA21 ensures that there is consistent language throughout the entire ELPA21 assessment system, including its alternate assessment of English language proficiency.

and accommodation needs is an integral part of the ECD process. Just as ELPA21 carefully considered its assessment approach in light of ELs' accessibility and accommodations needs, so must consideration of these occur for the alternate ELP assessment.

Accessibility and Accommodations Policies

ELPA21 includes three levels of accessibility and accommodations: universal features; designated features; and accommodations (see ELPA21 Accessibility and Accommodations Manual, www.ELPA21.org). Universal features are available to all students. Designated features are available to students for whom a need has been identified by an educator; these must be assigned to the student in advance of the assessment. Accommodations are available to ELs with disabilities (either 504 plans or IEPs). All of the levels include both embedded and nonembedded features.

In developing policies for accessibility and accommodations for the alternate ELPA, careful review of the standards identified for each domain at each grade band will need to occur as well as consideration of the policies for ELPA21. Based on this information, appropriate accessibility features and accommodations for ELs with significant cognitive disabilities should be identified by domain. As part of this work, careful consideration will need to be given to the possible use of assistive technology and its compatibility with the assessment platform as well as the individual characteristics and needs of ELs with significant cognitive disabilities warranting possible adjustments to the format.

Assessment Approach

ELPA21 uses innovative technology-enhanced items throughout its assessment. Although alternate content assessments have used a variety of approaches (e.g., portfolios, item-based tests, rating scales; see Rogers, Thurlow, & Lazarus, 2015), ELPA21 has indicated that it will

use an item-based approach for its alternate ELP assessment. Still, there will be a need to consider the nature of those items carefully, and whether they may need to be supplemented with some type of observation protocol or the development of performance tasks that allow students to use their assistive devices.

Instructional programs for ELs with significant cognitive disabilities is another important area to consider. Unfortunately, there is limited information on current classroom practices used with ELs with significant cognitive disabilities to improve their English language proficiency and on current assessment practices with these students. Liu et al. (2015) found in a review of research literature on instructional practices and educators' perspectives that there are many instructional and assessment challenges for ELs with significant cognitive disabilities.

Research has demonstrated that students with significant cognitive disabilities, in general, may not be receiving the language services they need. For example, teachers from five states participating in focus groups on ELs with disabilities (Liu, Goldstone, Thurlow, Ward, Hatten, & Christensen, 2013) indicated that ELs with certain types of disabilities or for whom there did not exist an appropriate ELP assessment, such as an alternate assessment, simply did not participate in an ELP assessment. Further, state policies provided ways for these and other ELs with disabilities to not participate in all or part of the ELP assessment (Rieke, Lazarus, Thurlow, & Dominguez, 2013).

Eight studies that incorporated students' native language into the tested instructional strategies indicated that the most appropriate language for instruction varied with the individual characteristics and needs of each student. Among the characteristics was whether the student had an established communication system and how that system is used at home with home language speakers. Other important characteristics were the student's prerequisite skills for doing a task,

the educator's proficiency in the home language, and the availability of home language resources for instruction.

Liu et al. also examined literature on the training, background, and skills possessed by educators who worked with ELs with moderate to severe disabilities. The four studies addressing these topics confirmed a general lack of administrative knowledge and support as well as a pervasive lack of needed training. Most teachers simply used English for instruction, similar to the instruction for ELs with significant cognitive disabilities.

As an assessment approach is developed, ELPA21 will need to think about whether the assessment format needs to vary in accordance with student characteristics (without having different levels of the assessment). Also to be considered is whether there will be a need for one or more accommodated forms that meet specific needs to include all ELs with significant cognitive disabilities (e.g., those who are blind; those lacking a communication system). These considerations, of course, are closely tied to ECD.

Blueprints for Four Domains

ELPA21 will need to develop blueprints for each of the four domains for its alternate ELP assessment. These blueprints should reflect the Theory of Action and the targeted standards that have been selected for Alt-ELPA21. Further, ELPA21 must be prepared to revise the blueprint as tasks or items are developed.

Item and Task Templates

Based on all of the preceding decisions, ELPA21 will need to develop item templates for the types of items it will include in its alternate ELP assessment. These item templates should be consistent with an ECD approach. Developing a template means thinking about item or task specifications that match what is to be measured and how it will be measured. When these are

created, then item or task development begins. ELPA21 should gather existing items (from available ELPA21 items that are appropriate for ELs with significant cognitive disabilities) and also develop new items and tasks for the targeted population.

Cognitive Labs

As items and tasks are being developed, it will be important to conduct cognitive labs (Ericsson & Simon, 1993) with the items to ensure that they are working as intended. The results of the cognitive labs can then be used to adjust item and task templates, and items and tasks. The procedures for these cognitive labs will need to be refined from typical cognitive lab procedures to be appropriate for ELs with significant cognitive disabilities (e.g., Almond et al., 2009; Johnstone, Altman, & Thurlow, 2006; Johnstone, Bottsford-Miller, & Thompson, 2006; Johnstone, Liu, Altman, & Thurlow, 2007).

Work of the AA-AAS consortia can provide a foundation for developing the techniques used in the cognitive labs. For example, DLM used cognitive labs as part of its process for gathering evidence of the accessibility and utility of DLM technology-enhanced items (DLM, 2014). It recognized the challenges of having students with significant cognitive disabilities verbalize, so it included observational and post-hoc interviews as part of its process. NCSC used cognitive labs during its iterative development process. Referring to these as "student interaction studies," NCSC recruited teachers and their students with significant cognitive disabilities in two areas of the country and targeted students with specific levels of communicative competence (NCSC, 2016). The study process involved researchers observing teachers administering items, after which they conducted interviews about content and difficulty of items, cognitive processes students appeared to be using, the administration process, student engagement, the effects of the technology platform, and teachers' suggestions for improvements. During the administration, researchers also directed teachers to use a cognitive laboratory approach when appropriate to ask students about the process they used to answer items.

The reports and experiences of the alternate assessment consortia, as well as ELPA21's experiences in conducing cognitive labs for its blind/low vision form, provide a strong basis for developing appropriate procedures for Alt-ELPA21 cognitive labs.

Workplan and Timeline

ELPA21 is committed to a speedy yet research-based development of an alternate assessment of English language proficiency based on alternate achievement standards. For this to happen, the workplan and timeline will need to be strictly adhered to, with checks and balances to ensure that each step forms the basis for the next step in the process.

Figure 2 proposes an overall timeline for the Alt-ELPA21 effort.

Figure 2. Alt-ELPA21 Timeline

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2017	2018	2019	2020	2021
OCT – DEC	JAN – DEC	JAN – DEC	JAN – DEC	JAN – DEC
NOITATE	 Observe test administrations Create Administration Documents and Training Train Test Admins to administer Alt Pilot 	 Alt Administration Pilots and Trials Data Collection: Educator Survey Train Test Admins on Phase 1 Alt 	• Alt Phase 1 Pilot	• Alt Operational

Δ	2017	2018	2019	2020	2021
	OCT – DEC	JAN – DEC	JAN – DEC	JAN – DEC	JAN - DEC
ASSESSMENT DEV	 Kick-off: Development Workplan Workgroup Recruitment Alt Dev Plan/White Paper 	 Theory of Action (Jan.) Determine Participation Criteria (March – April 2018) Determine AA Guidelines (April – May 2018) 	• Refine Participation, Administration, and AA Guidance using input from pilots and trials	 Produce Alt Scores: Alt Cut Score Linking Panels Produce Alt ALDs Produce Alt Scores Report Alt Scores 	 Produce Alt Scores: Alt Cut Score Linking Panels Produce Alt Scores Report Alt Scores

	2017	2018	2019	2020	2021
	OCT – DEC	JAN - DEC	JAN – DEC	JAN - DEC	JAN - DEC
RESEARCH & ITEM DEV	 Literature Review on alt-assessment and SCDs Identify Research Questions 	 Data Collection: Educator Survey Design Cog Labs Create (new) Item Development Plan Identify Accessible Task Types 	 Cog Labs on Accessible Task Types Target Standards and Task Types for Development Train Item Writers; Develop Alt Items Modify Items Internal and Educator Reviews (APIP, Content, Sensitivity, Accessibility) Hand off FT Batch 	 Field Test Rubric Validation, DIF, Data Review 	

>	2017 OCT – DEC	2018 JAN – DEC	2019 JAN – DEC	2020 JAN – DEC	2021 JAN – DEC
OS DE		• Develop Performance Expectations for ELSCD	• States acknowledge Alt- ELP Standards	• States implement Alt- ELP Standards	
ARDS		• Create Alt-ELP Standards			
STAND		• ELP to Alt-ELP Correspondence Study			
STA		• Release Alt-ELP Standards			

Conclusions

The steps identified here should enable ELPA21 to successfully engage in the next steps of assessment development, including pilot testing, field testing, standard setting, and the implementation of an operational assessment. ELPA21 will need to use some of its innovative approaches to complete its work, most likely including psychometric analysis techniques for small *n* sizes. As ELPA21 proceeds, it is recommended that ELPA21 continue its research-based approach to its work. Specifically, as recommended by Thurlow et al. (2016), ELPA21 should:

- Investigate and compare states' strategies for identifying ELs among students with significant cognitive disabilities.
- Monitor decision-making processes and placement of ELs.
- Document current language development practices.

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- Evaluate the effectiveness of various accessibility features and accommodations.
- Document ways to identify viable communication systems.

References

- Almond, P. J., Cameto, R., Johnstone, C. J., Laitusis, C., Lazarus, S., Nagle, K., Parker, C. E.,
 Roach, A. T., & Sato, E. (2009). White paper: Cognitive interview methods in reading test design and development for alternate assessments based on modified academic achievement standards (AA-MAS). Dover, NH: Measured Progress and Menlo Park, CA: SRI International.
- Browder, D. M., Flowers, C., Wakeman, S., Lee, A., Quenemoen, R. F., & Thurlow, M. L.
 (2015, December). NCSC's content model for grade-aligned instruction and assessment: *"The same curriculum for all students"* (NCSC Brief #7). Minneapolis, MN: University of Minnesota, National Center and State Collaborative.
- CCSSO. (2014). English language proficiency (ELP) standards, with correspondences to K–12 English language arts (ELA), mathematics, and science practices, K–12 ELA standards, and 6–12 literacy standards. Retrieved from http://www.ccsso.org/Documents/Final %204_30%20ELPA21%20Standards(1).pdf.
- DLM. (2014). First contact survey. Available in *Test Administration Manual 2014-15*. Available at https://www.educateiowa.gov/sites/files/ed/documents/test_administration_manual_im _2014-15.pdf.
- Ericsson, K. A., & Simon, H. A. (1993). Protocol analysis: Verbal reports as data (Revised edition). Cambridge, MA: MIT Press.

Federal Register. (2016). Improving the academic achievement of the disadvantaged – academic assessments (34 C.F.R. § 200 (2016)). Available at https://www.gpo.gov/fdsys/pkg/FR-2016-12-08/pdf/201629128.pdf.

- Johnstone, C. J., Altman, J., & Thurlow, M. (2006). A state guide to the development of universally designed assessments. Minneapolis, MN: University of Minnesota, National Center on Educational Outcomes.
- Johnstone, C. J., Bottsford-Miller, N. A., & Thompson, S. J. (2006). Using the think aloud method (cognitive labs) to evaluate test design for students with disabilities and English language learners (Technical Report 44). Minneapolis, MN: University of Minnesota, National Center on Educational Outcomes.
- Johnstone, C., Liu, K., Altman, J., & Thurlow, M. (2007). Student think aloud reflections on comprehensible and readable assessment items: Perspectives on what does and does not make an item readable (Technical Report 48). Minneapolis, MN: University of Minnesota, National Center on Educational Outcomes.
- Kearns, J. F., Kleinert, H. L., Kleinert, J. O., & Towles-Reeves, E. A. (2006). Learner characteristics inventory. Lexington: University of Kentucky, National Alternate Assessment Center.
- Kearns, J., Towles-Reeves, E., Kleinert, H., Kleinert, J., & Thomas, M. (2011). Characteristics of and implications for students participating in alternate assessments based on alternate academic achievement standards. *Journal of Special Education*, 45(1), 3–14.
- Liu, K., Goldstone, L., Thurlow, M., Ward, J., Hatten, J., & Christensen, L. (2013). Voices from the field: Making state assessment decisions for English language learners with disabilities. Minneapolis, MN: University of Minnesota, Improving the Validity of Assessment Results for English Language Learners with Disabilities (IVARED).
- Liu, K. K., Thurlow, M. L., & Quenemoen, R. F. (2015). English language learners with significant cognitive disabilities who participate in alternate assessments based on

alternate achievement standards (AA-AAS): Planning for educating and assessing the academic achievement of these students. Available at https://nceo.umn.edu/docs/OnlinePubs/2015ELswSCDreport.pdf.

- Mislevy, R. J., & Haertel, G. D. (2006). Implications of evidence-centered design for educational testing. *Educational Measurement: Issues and Practice*, 25(4), 6–20.
- NCSC. (2016). National Center and State Collaborative 2015 operational assessment technical manual. Available at http://www.ncscpartners.org/Media/Default/PDFs/Resources /NCSC15_NCSC_TechnicalManualNarrative.pdf.
- NCEO. (2016). *Individual characteristics questionnaire* (Draft). Minneapolis, MN: University of Minnesota, National Center on Educational Outcomes.
- Pellegrino, J., Chudowsky, N., & Glaser, R. (Eds.). (2001). Knowing what students know: The science and design of educational assessment. Washington, DC: National Research Council.
- Quenemoen, R. F., & Thurlow, M. L. (2015, June). AA-AAS: Standards that are the "same but different" (NCSC Brief #1). Minneapolis, MN: University of Minnesota, National Center and State Collaborative. Available at http://www.ncscpartners.org/Media/Default/PDFs /Resources/NCSCBrief1.pdf.
- Rieke, R., Lazarus, S. S., Thurlow, M. L., & Dominguez, L. M. (2013). 2012 survey of states: Successes and challenges during a time of change. Minneapolis, MN: University of Minnesota, National Center on Educational Outcomes.
- Rogers, C. M., Thurlow, M. L., & Lazarus, S. S. (2015). Science alternate assessments based on alternate achievement standards (AA-AAS) during school year 2014-2015 (Synthesis

Report 99). Minneapolis, MN: University of Minnesota, National Center on Educational Outcomes.

- Rooney, P. (2017, June 28). *Letter to state assessment directors and Title I directors*. Available at http://www.eseanetwork.org/news-and-resources/blogs/others/u-s-department-of-education-update-on-english-language-proficiency-assessments.
- Thurlow, M. L., Christensen, L. L., and Shyyan, V. V. (2016). White Paper on English Language Learners with Significant Cognitive Disabilities. Minneapolis, MN: University of Minnesota, National Center on Educational Outcomes, English Language Proficiency Assessment for the 21st Century.
- Thurlow, M. L., Lazarus, S. S., Larson, E., Albus, D. Liu, K. K., & Kwong, E. (2017). 2017-18 alternate assessment participation guidelines and definitions. Minneapolis, MN: University of Minnesota, National Center on Educational Outcomes.
- Towles-Reeves, E., Kearns, J., Flowers, C., Hart, L., Kerbel, A., Kleinert, H., Quenemoen, R., & Thurlow, M. (2012, August). *Learner characteristics inventory project report: A product of the NCSC validity evaluation*. Minneapolis, MN: University of Minnesota, National Center and State Collaborative.
- Towles-Reeves, E., Kearns, J., Kleinert, H., & Kleinert, J. (2009). An analysis of the characteristics of students taking alternate assessments based on alternate achievement standards. *Journal of Special Education*, *43*(4), 241–254.
- U.S. Department of Education. (2005, August). Alternate achievement standards for studens with the most significant cognitive disabilities: Non-regulatory guidance. Available at https://www2.ed.gov/policy/elsec/guid/altguidance.doc.

U.S. Department of Education. (2014, November). *Questions and answers regarding inclusion of English learners with disabilities in English language proficiency assessments and Title III annual measurable achievement objectives*. Available at http://www2.ed.gov/policy /speced/guid/idea/memosdcltrs/q-and-a-on-elp-swd.pdf.

Appendix A

Alt-ELPA21 Student Profile³ (ELs with Disabilities)

Student ID_	 Date _	
Teacher ID	 State _	

This form should be filled out about a student who is an English learner with a significant cognitive disability. Its purpose is to gather additional information on the characteristics of this student to inform the development of the Alt-ELPA21.

Student Background Information

- 1. Student's age in years _____
- 2. Student's enrolled grade _____
- 3. Student's gender _____
- 4. Student's ethnicity:
 - a. Hispanic or Latino
 - b. Asian
 - c. Black or African American
 - d. Native Hawaiian or Other Pacific Islander
 - e. White
 - f. Other, please specify: _____
- 5. What is the student's home language(s)?
- 6. How long has the student been in school in the United States?
- 7. What is the student's primary classroom setting? (choose the best description)
 - a. Special school.
 - b. Regular school, self-contained special education classroom; some inclusion in non-academic classes.
 - c. Regular school, primarily self-contained special education classroom; some academic

³ The Alt-ELPA21 *Student Profile* was developed by the National Center on Educational Outcomes for ELPA21. It is based on several existing instruments, including: *Learner Characteristics Inventory – LCI* (Kearns, Kleinert, Kleinert, & Towles-Reeves, 2006), the *First Contact Survey* used by Dynamic Learning Maps consortium (DLM, 2014), and the *Individual Characteristics Questionnaire – ICQ* developed at the University of Minnesota for the ALTELLA project (NCEO, 2016).

inclusion in academic general education classes (less than 40% of the school day).

- d. Regular school, primarily resource room or general education classes; in general education classes 40%–79% of the school day.
- e. Regular school, primarily inclusive or collaborative general education class for at least 80% of the school day; special education services are delivered primarily in general education classes.
- f. Other (please describe)

8. What is the student's primary disability category?

- a. Autism
- b. Deaf-Blindness
- c. Developmental Delay
- d. Emotional Disturbance
- e. Hearing Impairment
- f. Intellectual Disability
- g. Multiple Disabilities
- **9. Vision** (choose the best description)
 - a. Vision within normal limits
 - b. Corrected vision within normal limits
 - c. Low vision; uses vision for some activities
 - d. No use of vision for activities
 - e. Unable to determine use of any vision

10. Hearing (choose the best description)

- a. Hearing within normal limits
- b. Corrected hearing loss within normal limits
- c. Hearing loss aided, but still with a significant loss
- d. Profound loss, even with aids
- e. Unable to determine use of any hearing
- **11. Motor** (choose the best description)
 - a. No significant motor dysfunction that requires adaptations
 - b. Requires adaptations to support motor movement (e.g., walker, adapted utensils, and/or keyboard)
 - c. Uses a wheelchair, positioning equipment, and/or assistive devices for most activities
 - d. Needs personal assistance for most or all motor activities

Student Communication

12. Does the student regularly use Augmentative and Alternative Communication (AAC)?

- a. Yes, please describe
- b. No

NOTE: For Questions 13–18, assume that AAC can be used to demonstrate the skills.

- h. Orthopedic Impairment
- i. Other Health Impairment
- j. Specific Learning Disability
- k. Speech or Language Impairment
- 1. Traumatic Brain Injury
- m. Visual Impairment
- n. Eligible Individual (non-categorical)

- **13. Receptive skills** <u>in English</u> (choose the best description for student with or without use of AAC)
 - a. Independently follows 1–2 step directions presented through words in English (e.g., words may be spoken, signed, printed, or any combination) and does NOT need additional cues.
 - b. Requires additional cues in English (e.g., gestures, pictures, objects, or demonstrations/models) to follow 1–2 step directions.
 - c. Alerts to sensory input from another person speaking English (auditory, visual, touch, movement) BUT requires actual physical assistance to follow simple directions.
 - d. Uncertain response to sensory stimuli (e.g., sound/voice; sight/gesture; touch; movement; smell).
- 14. Receptive skills in a language other than English (choose the best description for student with or without use of AAC)
 - a. Independently follows 1–2 step directions presented through words in a language other than English (e.g., words may be spoken, signed, printed, or any combination) and does NOT need additional cues.
 - b. Requires additional cues in a language other than English (e.g., gestures, pictures, objects, or demonstrations/models) to follow 1–2 step directions.
 - c. Alerts to sensory input from another person speaking a language other than English (auditory, visual, touch, movement) BUT requires actual physical assistance to follow simple directions.
 - d. Uncertain response to sensory stimuli (e.g., sound/voice; sight/gesture; touch; movement; smell).
 - e. No opportunity to observe.
- **15.** Use of symbolic language (choose the best description for student with or without use of AAC)
 - a. Uses symbolic language in English to communicate: uses English verbal or written words, braille, or language-based augmentative systems to request, initiate, and respond to questions, describe things or events, and express refusal.
 - b. Uses symbolic language in another language to communicate: uses verbal or written words, braille, or language-based augmentative systems to request, initiate, and respond to questions, describe things or events, and express refusal.
 - c. Uses sign language to communicate.
 - d. Does *not* use a symbolic language to communicate (Answer item 16).
 - e. No opportunity to observe.
- **16.** Use of non-symbolic communication (Answer only if "d" was chosen for Question 15). Student does not use symbolic language, but does communicate in the following way:
 - a. Communicates primarily through such modes as gestures, pictures, objects/textures, pointing, etc., to clearly express a variety of intentions.
 - b. Communicates primarily through cries, facial expressions, changes in muscle tone, etc., but no clear use of objects/textures, regularized gestures, pictures, signs, etc., to communicate.
 - c. No opportunity to observe.
- 17. Engagement <u>in English</u> (choose the best description for student with or without use of AAC)

- a. Initiates and sustains social interactions in English.
- b. Responds with social interaction, but does not initiate or sustain social interactions in English.
- c. Alerts to others speaking English.
- d. Does not alert to others speaking English.
- 18. Engagement in a language other than English (choose the best description for student

with or without use of AAC)

- a. Initiates and sustains social interactions in a language other than English.
- b. Responds with social interaction, but does not initiate or sustain social interactions in a language other than English.
- c. Alerts to others speaking a language other than English.
- d. Does not alert to others speaking a language other than English.
- e. No opportunity to observe.

NOTE: For Questions 19–24, assume that Augmentative and Alternative Communication (AAC) can be used to demonstrate the skills.

READING

- **19. Describe the student's <u>reading in English</u> (choose the best description for student with or without use of AAC)**
 - a. Reads fluently with critical understanding in print or braille in English (e.g., to differentiate fact from opinion, point of view, emotional response, etc.).
 - b. Reads fluently with basic (literal) understanding from paragraphs/short passages with narrative or informational texts in print or braille in English.
 - c. Reads basic sight words, simple sentences, directions, bullets, and/or lists in print or braille in English.
 - d. Aware of text, follows directionality, makes letter distinctions, or tells a story from the pictures or manipulatives that are not linked to the text in English.
 - e. No observable awareness of print or braille in English.
- 20. Describe the student's reading in a language other than English (choose the best

description for student with or without use of AAC)

- a. Reads fluently with critical understanding in print or braille in a language other than English (e.g., to differentiate fact/opinion, point of view, emotional response, etc.).
- b. Reads fluently with basic (literal) understanding from paragraphs/short passages with narrative/informational texts in print or braille in a language other than English.
- c. Reads basic sight words, simple sentences, directions, bullets, and/or lists in print or braille in a language other than English.
- d. Aware of text, follows directionality, makes letter distinctions, or tells a story from pictures or manipulatives that are not linked to the text in a language other than English.
- e. No observable awareness of print or braille in a language other than English.
- f. No opportunity to observe.

WRITING/COMPOSTION

21. Describe the student's composition skills, without copying a model, in English (choose

the best description for student with use of AAC)

- a. Composes full sentences in English.
- b. Composes phrases in English.
- c. Composes words in English.
- d. Creates letters in English.
- e. Does not compose in English.

22. Describe the student's writing skills, without copying a model, in a language other than

- **English** (choose the best description for student with use of AAC)
 - a. Composes full sentences in a language other than English.
 - b. Composes phrases in a language other than English.
 - c. Composes words in a language other than English.
 - d. Creates letters in a language other than English.
 - e. Does not compose in a language other than English.
 - f. No opportunity to observe.

MATHEMATICS

- **23. Describe the student's <u>mathematics skills in English</u> (choose the best description for student with or without use of AAC)**
 - a. Applies computational procedures to solve real-life or routine word problems from a variety of contexts in English.
 - b. Does computational procedures with or without a calculator in English.
 - c. Makes numbered sets of items in English
 - d. Counts with 1:1 correspondence to at least 10 in English.
 - e. Counts by rote to 5 in English.
 - f. No observable awareness or use of numbers in English.
- 24. Describe the student's <u>mathematics skills in a language other than English</u> (choose the

best description for student with or without use of AAC)

- a. Applies computational procedures to solve real-life or routine word problems from a variety of contexts in a language other than English.
- b. Does computational procedures with or without a calculator in a language other than English.
- c. Makes numbered sets of items in a language other than English.
- d. Counts with 1:1 correspondence to at least 10 in English.
- e. Counts by rote to 5 in a language other than English.
- f. No observable awareness or use of numbers in a language other than English.

25. Other Comments

Please indicate the positions of all who contributed to the information in this Student Profile:

- □ ESL/Bilingual Education teacher
- □ General Education teacher
- □ Special Education teacher

- □ Paraprofessional
- \Box Others (please specify)

References:

- DLM. (2014). First contact survey. Available in *Test Administration Manual 2014-15*. Available at https://www.educateiowa.gov/sites/files/ed/documents/test_administration_manual_im _2014-15.pdf.
- Kearns, J. F., Kleinert, H. L., Kleinert, J. O., & Towles-Reeves, E. A. (2006). Learner characteristics inventory. Lexington: University of Kentucky, National Alternate Assessment Center.
- NCEO. (2016). *Individual characteristics questionnaire* (Draft). Minneapolis, MN: University of Minnesota, National Center on Educational Outcomes.

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