Understanding Learning Progressions and Learning Maps to Inform the Development of Assessment for Students in Special Populations

Topic 2 White Paper

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Acknowledgments

Audience and Purpose

Target audiences for this paper are researchers, cognitive scientists, instructional design experts, test developers, and practitioners. Researchers with expertise in the cognitive sciences will be needed to help increase understanding of cognitive pathways. Instructional design experts can help translate what is known about the cognitive pathways into learning progressions. Instructional experts can help design learning environments that maximize the effective implementation of learning progressions. Test developers will need to draw on research findings and the expertise of cognitive scientists, technology and instructional designers, psychometricians, and engineers to develop reliable and valid assessments. Ultimately, practitioners who work with the students will need expertise in diagnosis, intervention, and assessment. Clearly, a teamwork approach is required to realize the potential of the research agendas proposed in the papers to strengthen the validity of next-generation assessments that are appropriately inclusive of special student populations.

SRI/CETE Invitational Symposium

Using Cognitive Learning Models to Inform the Development of Assessments for Students in Special Populations

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Abstract

This white paper reflects recent and emerging work relevant to describing student learning models (SLMs), particularly models sensitive to the learning of students with disabilities (SWDs) and English language learners (ELLs). We address how SLMs may be used in developing assessments that are equitable and reliable, and that yield valid outcomes for those students. Given the dearth of empirical evidence supporting specific SLMs relevant to diverse learners, experts from disciplines that pertain to SLMs and special populations convened to discuss relevant theory, research, and available strategies. They considered how (1) educators chart diverse learners' likely progress toward proficiency in the academic content areas, and (2) establishing a research and theoretically based foundation can help inform how diverse learners learn vis-à-vis the design, development, and implementation of "next-generation" assessments and related instructional practices.

Introduction

Student learning models (SLMs) consisting of learning progressions and learning maps visually and verbally represent the hypothesized pathways students commonly follow as they progress toward increased understanding of learning targets over time. SLMs reflect: systematic consideration of interactions among learning, content, and learning context (e.g., situational, socio-cultural, nature of support), as well as the cumulative outcomes of these interactions. SLMs also reflect the societal expectations (values) for what students should know and be able to do in the given content area (Alonzo & Steedle, 2009; Berland & McNeill, 2010; Heritage, Kim, Vendlinski, & Herman, 2009; Hess, 2008; National Assessment Governing Board, 2007; National Research Counci [NRC]l, 2007; Smith, Wiser, Anderson, & Krajcik, 2006; Steedle & Shavelson, 2009).

Cognitive, content-specific, and action research have informed the development of learning progressions (Hess, 2008). Cognitive science in particular has offered insights into how individuals learn academic content across a number of curricular areas (Bransford, Brown, & Cocking, 2000) and has resulted in cognitive models of learning important for grounding expectations of how students learn, what they know, and how knowledge and understanding develop over time (e.g., Alonzo & Steedle, 2009; Brown, Wilson, Dray, & Lee, 2008; Draney, 2009; NRC, 2001).

Learning progressions and learning maps that build on cognitive models of learning have important implications for test design, the inferences drawn from student test performance, and related instructional practice in terms of their validity and effectiveness. For assessment in particular, research and theory-supported models of learning are important for identifying "the set of knowledge and skills that is important to measure for the task at hand, whether that be characterizing the competencies students have acquired thus far or guiding instruction to increase learning" (NRC, 2001, p. 44). Without clear definitions of how students represent knowledge and develop competence, arriving at valid inferences about students' thinking processes, including misconceptions, strengths, and abilities, and effective support for student learning, is questionable.

Currently, states are promulgating more rigorous standards for *all* students (e.g., as reflected in the Common Core State Standards [CCSS]); however, they are doing so without the benefit of clear models for supporting learners with diverse backgrounds and needs (e.g., ELLs SWDs). Although such studies are limited, research suggests that ELLs and SWDs may not follow the hypothesized "most common" manner for advancing over time toward understanding (e.g., Bailey, 2006; Bialystok, 1999; Graham, Schwartz, & MacArthur, 1993; Kopriva & Bauman, 2008; Luk & Bialystok, 2008; Valdes, 1993; Wong & Zou, 1993). The paths to an achievement target may differ across contexts (e.g., content topics, test administration conditions, the amount and nature of supports needed) for diverse learners, and may reflect inter- and intra-individual learning differences (e.g., dynamic learning maps[1] that embed multiple pathways) (A. Sheinker, personal communication, July 14, 2011; Tatsuoka, 2009). Diverse learners may also progress along alternate or multiple[2] paths toward a learning target that are not typical for the development hypothesized for non-ELL and non-SWD students.

Without clear models of how ELLs and SWDs s learn, the quality, equitability, and inclusiveness of assessments of those students have varied considerably. Without clear models of how ELLs and SWDs represent knowledge and develop competence, the validity of inferences about their thinking processes (e.g., misconceptions, strengths, abilities) is open to question, as is how to effectively support their learning.

Given these variable practices and uncertainties, using the results of currently available assessments for instructional and accountability purposes will fall short of the goal of improving these learners' achievement. Therefore, better articulation of how the learning of diverse learners advances over time toward understanding is needed. Such understanding will help ensure that assessment practices are inclusive of diverse learners and that those students have appropriate access to more rigorous content and can meet higher expectations.

The focus here is thus on research and theory that can inform clearer models of how diverse learners represent knowledge as they develop academic competencies. Taken together, the research findings and theoretical information are useful for developing assessments that will enable these students to demonstrate what they know and can do more fully and effectively.

We examine the need for flexibility in conceptualizing, defining, and using SLMs (i.e., learning progressions, learning maps) to ensure inclusive and equitable practice vis-à-vis special student populations. More specifically, we review research related to learning models that hypothesize how ELLs and SWDs represent knowledge and develop academic competencies.

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[1] A learning map is a network of sequenced learning targets. **Dynamic learning maps** are designed to show not only the mastery of a single tested skill but also all the related skills that the student needs to master to achieve that skill. Learning is typically construed as one skill building on another single skill. A learning map, by comparison, shows a learning landscape in which multiple skills are related to many other skills. Because learning maps show multiple relationships between skills, they also illustrate more than one way to learn tested skills. Learning maps give teachers and parents a clearer view of a student's knowledge (Dynamic Learning Maps, 2011).

[2] For the purposes of this paper**, alternate pathways** refer to student learning models related to comparable constructs for which functional equivalence, but not construct equivalence, may exist. For example, "Language Arts" proficiency can be demonstrated through Spanish or English; however, some of the two languages' constructs (e.g., rhetorical features) do not directly correspond. **Multiple pathways** refer to student learning models related to equivalent constructs and can help to account for learners with diverse backgrounds and needs who, for example, use accommodations but do not follow an *alternative pathway* for content learning.

Because expectations for these diverse learners are expected to be similar to those for their non-ELL/non-SWD peers (e.g., in terms of curricular goals and content expectations), we also examine how these learning models relate to the "more common" pathways of their peers (e.g., construct comparability, functional comparability [Gong & Marion, 2006]). Relying on these examinations, we present critical considerations, guidelines, and examples relevant to establishing and using learning models appropriate for special student populations. That information serves to inform assessment practice for ELLs and SWDs, and to recommend further research needed to validate the models' appropriateness in promoting inclusive and equitable assessment practices and in improving the achievement of students with diverse backgrounds and needs.

SLMs, Learning Progressions, and Learning Maps

We use "SLM" to refer both to learning progressions and learning maps that visually and verbally represent the hypothesized pathways students commonly follow as their understanding of a learning targets increases over time. Figure 1 shows key similarities and differences between learning progressions and learning maps.

Figure 1. Learning models: Learning progressions and learning maps

Learning Models

Learning Progressions

- Are built around "big ideas" or "unifying ideas"
- Consist of pathways and key learning targets
- Imply multiple pathways

- Are based on cognition, concepts, and skills
- Are multidimensional
- Can be sequential and/or cyclical
- Can have a range or granularity
- Have components that are: static. based on normative data; and/or dynamic, based on individual learning data
- Reflect consideration of interactions among learner characteristics, content, and context
- Have data-based validation and are iterative and iterative

Learning Maps

- Reflect the "universe" of cognition (abilities), concepts (knowledge), and skills related to a domain
- Consist of networks of sequenced learning targets
- Embed multiple pathways
- Are sometimes more detailed than progressions

A critical SLM characteristic is their consideration of the interaction among learner characteristics (e.g., cognition), content, and context (see Figure 1). Research shows that ELLs, including SWDs who also are ELLs, need access and supports (e.g., accommodations), which must be addressed systematically and purposefully to ensure they achieve academic learning targets (Kerns et al., 2010).

The following section describes the ELL and SWD populations in greater detail. Subsequent sections present content and context considerations from the ELL and SWD perspectives and implications related to the need for SLMs that are sensitive to, and reflective of, students' diverse backgrounds and needs.

English Language Learners

The ELL population consists of students whose first language is not English and are in the process of learning English (Antunez, 2002). Demographers project that from 2002 to 2025 the ELL population will grow by 57%. Furthermore, the pattern of growth is shifting. The 10 states

that have traditionally had the largest number of ELLs are not those experiencing the fastest growth (McHugh, Gelatt, & Fix, 2007). For example, South Carolina, Kentucky, and Indiana's PK–12 public school ELL populations grew by more than 400% from 1995 to 2005 (August & Shanahan, 2006). The ELL population is also changing: second- and third-generation ELLs (i.e., students born and schooled in the United States) constitute the largest and fastest growing group of ELLs, and research suggests that our current educational system is not meeting their needs adequately (Abedi, 2008). Furthermore, for a substantial portion of the ELL population, achieving English language and subject matter proficiency poses a persistent and intergenerational challenge that contributes to a major achievement gap (Batalova & Fix, 2005).

ELLs' academic and linguistic needs differ from those of their non-ELL peers, and their primary challenge is learning English while simultaneously learning academic content (Antunez, 2002; Abedi, 2008). Given individual differences in educational history, continuous formal schooling in the student's country of origin and in the United States, socio-cultural background and values, and literacy and fluency in their native or home language, ELLs access and interpret academic content in different ways (Assessment and Accountability Comprehensive Center, 2009; Kopriva, 2000; Rivera & Stansfield, 2001; Sato, 2008; Solano-Flores & Trumbull, 2003).

Students with Disabilities

SWDs are generally those in the population served under the Individuals with Disabilities Education Act (IDEA) (U.S. Department of Education, 2004). This group includes students who have specific learning disabilities, autism, multiple disabilities, developmental delay, other health impairments, intellectual disability, emotional disturbance, speech or language impairments, hearing impairments, deafness, deaf-blindness, orthopedic impairments, visual impairments including blindness, and traumatic brain injury. Between 1991 and 2005, the students with disabilities population grew from 11.4% to 13.8% of the total school population (http://nces.ed.gov/programs/coe/tables/table-cwd-1.asp). According to the most recent data 41% of children with disabilities aged 6-21 are classified as having "specific learning disabilities" (IDEAdata.org, https://www.ideadata.org/arc_toc13.asp#partbCC). Currently, SWDs achieve significantly below their general education counterparts across the nation. The average difference between general education students and SWDs on high school exit examinations across states, for example, was 34 percentage points in mathematics and 37 percentage points in English language arts (ELA; Rabinowitz et al., 2005). This trend is independent of the difficulty of the test and level of overall student achievement.

SWDs' access needs, which are distinct from those of their non-SWD peers, include sensory, physical, linguistic, and cognitive categories—all of which have implications for how SWDs interpret, engage with, and demonstrate understanding of academic content, as well as their learning rate of academic content (Dolan & Rose, 2000; Johnstone, Bottsford-Miller, & Thompson, 2006; Ketterlin-Geller, Yovanoff, & Tindal, 2007; Rose & Meyer, 2000; Thurlow, Thompson, & Lazarus, 2006).

Table 1 summarizes key characteristics of ELLs and SWDs that have implications for the development of the SLMs discussed in this paper, and the assessments based on these models.

Table 1. Summary of Critical Characteristics of ELLs and SWDs that Affect their Access to, and Learning of, Academic Content

ELLs	SWDs[a]
• Various levels of literacy and fluency in their native language and in English • Range of ability to communicate in English • Learning affected by factors that include: – Socio-cultural background and experiences – Amount and length of formal education (in the country of origin as well as in the United States) • Multiple ways of expressing and receiving information • The challenge of learning English while learning rigorous academic content • A heterogeneous student population	• Variable rates of learning that may vary across time and content[b] • Learning affected by factors that include: – Socio-cultural background and experiences – Familiarity with content, methods (e.g., accommodations used), and context • Multiple and/or restricted ways of expressing and receiving information • Learning challenges due to cognitive, sensory, behavioral, physical, and health characteristics • Low teacher expectations for academic performance • A heterogeneous student populations

[a]SWDs are students with IEPs and 504 plans

[b]The rate of learning (faster/slower) can vary because of the time needed for students to progress along a pathway in a progression or map or because the particular pathway for the student may require more/less time (i.e., it may be a longer/shorter pathway to the learning target).

ELLs and SWDs: Access to, and Learning of, Academic Content

Research indicates that instructional and assessment tasks reflect variations in complexity vis-à-vis knowledge and skill as well in and in their degree of structure vs. flexibility (Messick, 1996). Accordingly, students may need to process different tasks differently; that is, the learner's interaction with the task may affect student access to, engagement with, and learning of or demonstration of the understanding of the task's content (Messick, 1996; Pearson & Garavaglia, 2003; Sato, Rabinowitz, Gallagher, & Huang, 2010; Thissen, Wainer, & Wang, 1994). According to Pearson and Garavaglia (2003), although two assessment tasks, for example, may be *psychometrically* equivalent, they may not be *psychologically* equivalent because each requires the student to process content differently. Accordingly, they may measure skills or knowledge that differ from the intended content (construct irrelevance), or they may entail processing challenges that interfere with students' ability to fully demonstrate what they know and can do (underrepresentation). ELLs and SWDs may thus diverge from the "most common" manner in which non-ELLs and non-SWDs students are hypothesized to engage with tasks/content (e.g., Bailey, 2006; Bialystok, 1999; Graham, Schwartz, & MacArthur, 1993; Kopriva & Bauman, 2008; Luk & Bialystok, 2008; Valdes, 1993; Wong & Zou, 1993). Thus, if specific student characteristics (e.g., access needs) are not carefully considered and addressed upfront during task development and implementation (instructional, assessment), the validity of interpretations of student performance on tasks is suspect, and the subequent services and supports provided to them may be inappropriate.

SLMs for Diverse Learners: A Process and Examples

This two-part section describes a process for developing SLMs that considers the interaction among individual student characteristics, academic content, and context. Part A presents sample

learning profiles for three diverse learners: Gabriella, Mia, and Trevor, each of whom has different learning strengths and needs. Part B illustrates how the three individual learning profiles can be integrated into a comprehensive, content specific SLM that can be used to inform and guide assessment and related instructional practice. Appendix A provides additional examples of learning profiles for two other students with different learning characteristics.

Part A. Sample Learning Profiles

The Student Learning Profile (SLP) is developed by using an SLP Template (SLPT) whose development consists of five steps:

- Part 1: General description of the student
- Part 2: Academic target
- Part 3: The student's cognitive background knowledge, and additional knowledge skills and abilities (AKSA)
- Part 4: The student's academic and access needs
- Part 5: The SLP.

SLP: Gabriella

Part 1: General description of Gabriella:

Gabriella, a Spanish-speaking 7th grade student, came from Mexico with her family when she was 9. Spanish is spoken at home and in her community. Her parents' English language ability is limited but enough to get by with. Gabriella attended school in Mexico through the 3rd grade. When she started 4th grade at her current school, she had little proficiency in English and was placed in a transitional bilingual education (TBE) program. Most students in the TBE program are mainstreamed into English-only classrooms in 1 or 2 years. Gabriella stayed in the TBE program through sixth grade, and this is the first year that she has all of her classes in English. To continue English language support, Gabriella takes a developmental literacy class one period each day. A teacher's aide also assists her and other ELLs in her core content classes. Her oral language skills are well developed, but she struggles with reading and writing English. The state assessment classified her at the intermediate level this year. As expected, her highest scores on this assessment were in listening and speaking. Her lowest scores were in reading and writing. A pleasant, compliant student, she tries hard, but it is clear that she struggles to read the mathematics texts. Classes that do not require extensive reading or writing (e.g., art and music) are her favorites. Her teachers do not believe she has developmental disabilities, and feel that she is progressing in her English language development as expected. She struggles in the language arts, social studies, and science classes but is performing on average in her mathematics class. Gabriella is about two or three grade levels below her grade in literacy skills. She manages common social interactions at school very well, but has more difficulty with academic language, and specifically the academic language associated with mathematics. Given that the complex noun-phrases and technical definitions used in mathematics class are difficult for her to process. Additional scaffolding of technical terms and text based problems (e.g., word problems) aid in her access and understanding of the content.

Part 2: Academic target

This section describes the academic content with which the Gabriella interacts. In this instance her academic target is based on a grade 7 ELA content strand from the CCSS in narrative text. The same academic target is used throughout this paper.

CCSS (Reading 7.3A): analyze elements. Analyze how particular elements of a story or drama interact (e.g., how the setting shapes the characters or plot).

Focal KSA (FKSA) to be assessed. Determine how the plot of a story or drama advances in response to characters' actions

Part 3: Gabriella's cognitive background knowledge, AKSAs

For students to demonstrate the target ability, they may need prior academic skills and background knowledge, called Cognitive Background Knowledge (CBK)-Additional Knowledge, Skills, and Abilities (AKSAs). This section provides information on the Gabriella's opportunity to learn the CBK-AKSAs and contributes to her placement in the learning progression outlined in Section 2. For the FKSA, *Ability to determine how the plot of a story or drama advances in response to characters' actions*, content experts identified two CBK-AKSAs:

- Ability to identify how a story's or drama's plot unfolds in a series of episodes
- Knowledge that elements of a story or drama (setting, characters, plot) interact with each other

Table 2. Gabriella: CBK-AKSAs

Cognitive: Background Skills and Knowledge	Gabriella's Opportunities to Demonstrate/Use this Skill/Knowledge				
	A lot, *without* an adaptation or accommodation	A lot, *with* an adaptation or accommodation	Less frequently *without* an adaptation or accommodation	Less frequently *with* an adaptation or accommodation	Minimal (e.g., heard or read about it)
Ability to identify how a story's or drama's plot unfolds in a series of episodes		X			
Knowledge that story or drama elements(setting, characters, plot) interact with each other		X			

Part 4: Gabriella's academic and access needs

To prevent CBK-AKSAs from impinging on student ability to demonstrate knowledge about the FKSA, these additional knowledge requirements can be supported with CBK Variable Features (VFs; Cameto, Haertel, DeBarger, & Morrison, 2011). In addition, students may have other access needs that can be supported through consideration of Universal Design for Learning (UDL) principles in the following areas: (1) perceptual (receptive), (2) skill and fluency

(expressive), (3) language and symbols, (4) cognitive, (5) executive, and (6) affective (Center for Applied Special Technology [CAST], 2011). Similar to CBK-AKSAs, UDL AKSAs can be supported with UDL VFs (Nagle et al., 2012). UDL VFs are used to support student abilities associated with perceiving task stimuli, expressing responses to tasks, comprehending linguistic components of tasks, information processing, executive functioning, and engagement (Table 3).

Table 3. Definitions of Categories of Additional KSAs and VFs

Category	Definitions of Additional KSA	VF Definitions
Cognitive Background Knowledge	Prerequisite KSAs required for students to demonstrate proficiency on FKSAs	Task options for supporting recall and application of prerequisite KSAs
Perceptual (Receptive)	KSAs associated with perceiving or receiving images, physical objects, and linguistic components of tasks	Ways to vary the delivery mechanisms by which tasks are perceived and task supports for the use of equipment required for assessments
Skill and Fluency (Expressive)	KSAs associated with communicating/ expressing a response and using/ manipulating equipment and physical materials	Task supports for responding to and composing a response, and supports for manipulating equipment and physical materials
Language and Symbols	KSAs associated with decoding, recognizing, and comprehending text, symbols and images, and understanding vocabulary and syntax in which tasks are presented	Task options for presenting language and symbols and supporting students in comprehending essential text, symbols, and images
Cognitive	KSAs associated with cognitive and information processing (e.g., processing multistep problems, recalling and using information presented in the task) and skills associated with using supports provided as part of the task (e.g., understanding the purpose of highlighted features in text or illustrations)	Task options for varying the complexity of tasks; for guiding exploration and information processing (e.g., sequential highlighting); for supporting the identification of critical task features, big ideas, and relations (e.g., graphic organizer); and for supporting memory and transfer (e.g., embedding a task in a scenario)
Executive	KSAs associated with monitoring, planning and sequencing, self-regulating and reflecting, and setting goals and expectations	Task options for the provision of guides, checklists, graphic organizers, and templates; for prompts, scaffolds, and questions to monitor progress; and for adjusting levels of challenge and support
Affective	KSAs associated with engaging, persisting, and sustaining effort in tasks	Task options for engagement (e.g., enhancing relevance, value, salience of tasks) and teacher options for supporting student attention and engagement (e.g., prompting the student to engage)

Individual student needs are considered across multiple learning domains and then matched with the scaffolds and supports from a standardized list (Appendix B).

Table 4 shows Gabriella's AKSAs and the variable features that have been identified to meet her learning and access needs

Table 4. Gabriella's Academic and Access Needs

FKSA/Target Construct: Ability to determine how the plot of a story or drama advances in response to characters' actions

Additional KSA	Student Need (Yes/No)	VFs from the Design Document
Cognitive background Ability to identify how a story's or drama's plot unfolds in a series of episodes	Yes	VF1. Remind her of the definition of "plot" VF3. Remind her of the definition of "character traits"
Cognitive background Knowledge that elements of a story or drama (setting, characters, plot) interact with each other	Yes	VF4. Provide a *simplified* Freytag's pyramid (or adaptation of same) – and sequence of events flowchart superimposed on the pyramid. VF5. Make the elements in the text explicit
Sensory (VF: Language and Symbols)	Yes	P1. Provide delivery mechanisms for use in perceiving the question P3. Define delivery parameters for orally presenting of the material
Cognitive (VF:Perceptual/Receptive: Skill and Fluency/Expressive)	Yes	C5. Preteach[a] background content C6. Provide analogies and examples C10. Provide concept maps C11. Remind her of prior experiences with the target construct. C12. Remind her of materials or activities used to teach foundational reading/ELA skills. C13. Provide graphic organizers C15. Highlight the information C18. Provide translation tools C20. Provide a response template C34. Locate items near the relevant text C35. Reread the question/stimulus
Physical (VF: Skill and Fluency)	No	
Linguistic	Yes	L4. Make all key information in the dominant language (e.g., English) available in the prevalent first language (e.g., Spanish) for ELLs; use translation software or a bilingual dictionary L11. Read language and symbols aloud
Socio-linguistic	Yes	L3. Embed support for vocabulary and symbols (e.g., technical and nontechnical glossary, hyperlinks/footnotes to definitions, illustrations, background knowledge) L8 Highlight essential elements, words, or phrases
Executive functioning/ executive processes (VF: Executive)	Yes	E2. Provide prompts, scaffolds, and questions for use in monitoring progress, encouraging "stop and think," and categorizing and systematizing
Emotional (VF: Affective)	Yes	A1. Cover up part of text so that she is not overwhelmed A4. Provide feedback to support the engagement A11. Enhance relevance, value, and authenticity of tasks

[a] "Preteaching" consists of teaching a student for the first time the definition of a word or concept that is included in the narrative of a test item but not part of the construct being measured

Part 5: Gabriella's SLP

Table 5 presents the overall student learning profile, including the supports and scaffolds for the student across multiple domains of learning to support student access in representation, expression, and engagement.

Table 5. Gabriella's SLP

UDL Categories of Support	Receptive (representation)	Expressive (expression)	Engagement
Sensory	Provide delivery mechanisms for use in perceiving the question t Define delivery parameters for orally presenting the material		
Cognitive (knowing)	Remind her of the definition of "plot" Remind her of the definition of "character traits" Make the elements in the text explicit Preteach background content Provide analogies and examples Remind her of prior experiences with the target construct Remind her of materials or activities used to teach foundational reading/ELA Provide alternative forms of key concepts Reread question/stimulus Provide concept maps Provide graphic organizers Highlight information Provide translation tools	Use an item/task format Provide a response template Locate test items near the relevant text	
Physical			
Linguistic	Make all key information in the dominant language (e.g., English) available in the prevalent first language (e.g., Spanish) for ELLs; use translation software or a bilingual dictionary Read language and symbols aloud	Provide supports for composing a response in text	

Table 5. Gabriella's SLP, concluded

UDL Categories of Support	Receptive (representation)	Expressive (expression)	Engagement
Socio-linguistic	Embed support for vocabulary and symbols Highlight essential elements, words, or phrases		
Emotional	Cover up part of text so that she is not overwhelmed		Provide feedback to support engagement Enhance relevance, value, and authenticity of tasks
Executive functioning/ Executive processes	Provide concept maps Provide graphic organizers Highlight information Remind her of the function of tools/features designed to aid comprehension and process information. (e.g., highlighting, graphic organizers, captions, headings)	Use an item/task format	Provide prompts, scaffolds, and questions for use in monitoring progress, encouraging "stop and think," and categorizing and systematizing

Note. Supports provided to address student needs should not alter the targeted construct.

SLP: Mia

Part 1: General description of Mia

Mia is a seventh grader in a general education classroom who has intellectual disabilities and cerebral palsy. She is nonverbal and uses a powered wheelchair that she controls with a joystick. Her hearing is within the normal range, and she can follow verbal one-step directions as long as they are given in the context of a familiar context or routine and use simplified language. For expressive communication, she uses various augmentative and alternative communication methods (e.g., vocalizations for yes/no, pointing to enlarged picture communication symbols displayed on a communication board or a screen of an assistive technology device). In the afternoon when fatigue makes her pointing less accurate, she sometime directs her gaze to communication symbols mounted on a Plexiglass board to make selections. Her teachers and classmates who are familiar with her know to ignore her involuntary eye movement (nystagmus) when looking for her gaze response. Mia can become fatigued and frustrated easily and needs activities to be broken into short segments. She can read approximately 50 single words (e.g., high-frequency and high-need words, environmental print). With a reading partner, she "reads" simplified text with picture symbols. She identifies main characters and sequences pictures to indicate the order in which events took place in a narrative text. She can also answer literal 'w' comprehension questions, such as who, what, when, by selecting from an array of three to four picture choices displayed on an IntelliKeys alternative keyboard. During mathematics activities, Mia uses manipulatives, pictures, and numerals to solve problems. She can match numerals to quantities up to 20. She adds and subtracts using manipulatives. Because she easily becomes fatigued, her partner moves the manipulatives, and Mia indicates when the partner should stop moving them. She can interpret data presented on pictograms and tables (e.g., identifying largest

or smallest value). She measures length and area using nonstandard units. She can match similar shapes (e.g., right triangles, equilateral triangles).

Part 2: Academic target

CCSS (Reading 7.3A), Analyze elements. Analyze how particular elements of a story or drama interact (e.g., how the setting shapes the characters or plot)

FKSA (FK5). Determine how the plot of a story or drama advances in response to characters' actions

Part 3: Mia's cognitive background knowledge AKSAs

Table 6. Mia's CBK-AKSAs

Cognitive: Background Skills and Knowledge	Mia's Opportunities to Demonstrate/Use Skills/Knowledge				
	A lot *without* an adaptation or accommodation	A lot *with* an adaptation or accommodation	Less frequently *without* an adaptation or accommodation	Less frequently *with* an adaptation or accommodation	Minimal (e.g., heard or read about it)
Ability to identify how a story's or drama's plot unfolds in a series of episodes					X
Knowledge that story or drama elements (setting, characters, plot) interact with each other					X

Part 4: Mia's academic and access needs

Table 7. Mia's Academic and Access Needs

FKSA/Target Construct: Ability to determine how the plot of a story or drama advances in response to characters' actions

Additional KSA	Student Need (Yes/No)	VFs from the Design Document
Cognitive background Ability to identify how a story's or drama's plot unfolds in a series of episodes	Yes	VF1. Remind her of the definition of "plot" VF3. Remind her of the definition of "character traits"
Cognitive background Knowledge that elements of a story or drama (setting, characters, plot) interact with each other	Yes	VF4. Provide a *simplified* Freytag's pyramid (or adaptation of same) – and sequence of events flowchart superimposed on the pyramid. VF5. Make the elements in the text explicit
Sensory (VF: Language and Symbols)	Yes	P1. Provide delivery mechanisms for use in perceiving the question P3. Define delivery parameters for orally presenting the material
Cognitive (VF: Perceptual/Receptive: Skill and Fluency/Expressive)	Yes	C1. Determine her depth of knowledge about the content – C2. Determine the complexity of the content C3. Provide an item/task format (selected response vs. constructed response, performance, etc.) C5. Preteach background content C6. Provide analogies and examples C11. Remind her of prior experiences with the target construct. C12. Remind her of materials or activities used to teach foundational reading/ELA. C15. Highlight the information C16. Provide alternative forms of key concepts C19. Provide modeled prompts (on nonconstruct, relevant content) C20. Provide a response template C34. Locate items near the relevant text. C35. Reread the question/stimulus
Physical (VF: Skill and Fluency)	Yes	P2. Provide supports for the use of equipment required for the task. S1. Provide response mode options S2. Provide supports for composing a response in text S3. Provide supports for manipulating physical materials 4. Provide supports for manipulating digital/electronic equipment
Linguistic	Yes	L1. Determine the level of abstraction required (e.g., concrete objects, images, text) L6. Use multiple representations L7. Use alternative syntactic levels (simplified text) L11. Read language and symbols aloud
Socio-linguistic	Yes	L3. Embed support for vocabulary and symbols.

Table 7. Mia's Academic and Access Needs, concluded

Additional KSA	Student Need (Yes/No)	VFs from the Design Document
Executive functioning/ executive processes (VF: Executive)	Yes	E2. Provide prompts, scaffolds, and questions for use in monitoring progress, encouraging "stop and think.," and categorizing and systematizing
Emotional (VF: Affective)	Yes	A1. Cover up part of text so that she is not overwhelmed
		A2. Prompt her to engage/re-engage
		A3. Provide verbal/gestural prompts
		A4. Provide feedback to support the engagement
		A5. Provide supports to reduce her frustration (e.g., noise reduction, extended test taking time, contingencies, number of items administered at one time)
		A6. Provide varied levels of challenge and support
		A7. Provide optimal postural positioning (positions that encourage alertness, as opposed to recumbence)
		A8. Administer the assessment at the optimal time of day for her engagement

Part 5: Mia's SLP

Table 8. Mia's SLP

UDL Categories of Support	Receptive (representation)	Expressive (expression)	Engagement
Sensory	Provide delivery mechanisms for use in perceiving the question Define delivery parameters for orally presenting the material		
Cognitive (knowing)	Remind her of the definition of "plot" Remind her of the definition of "character traits" Provide a *simplified* Freytag's pyramid Make the elements in the text explicit Determine her depth of knowledge about the content, including its complexity. construct Preteach background content Provide analogies and examples	Present items as a discrete unit or embed them in a scenario Locate items near the relevant text Provide a response template Use an item/task format (selected response vs. constructed response, performance, etc.)	Use consistent signals/cues

Table 8. Mia's SLP, concluded

UDL Categories of Support	Receptive (representation)	Expressive (expression)	Engagement
	Remind her of prior experiences with the target		
	Highlight information		
	Remind her of materials or activities used to teach foundational reading/ELA		
	Provide alternative forms of key concepts		
	Provide modeled prompts		
	Reread the question/stimulus		
Physical	Provide supports for manipulating physical materials	Provide supports for the use of equipment required for the task	
	Provide supports for manipulating digital/electronic equipment	Provide supports for composing a response in text	
		Provide response mode options	
Linguistic	Use alternative syntactic levels (simplified text)		
	Indicate the level of abstraction required		
	Use multiple representations		
	Read language and symbols aloud		
Socio-linguistic	Embed support for vocabulary and symbols		
Emotional	Cover up part of the text so that she is not overwhelmed	Provide verbal/gestural prompts	Provide feedback to support engagement
			Provide supports to reduce her frustration
			Prompt her to engage/re-engage
			Assess at the optimal time of day for her engagement
			Provide for optimal student postural positioning
Executive functioning/ Executive processes	Provide familiar organizational tools and familiar concrete objects and/or use a familiar organizational processes	Provide prompts, scaffolds, and questions for monitoring progress, encouraging "stop and think," and categorizing and systematizing	
	Outline information		
	Highlight information		
	Remind her of the function of tools/features designed to aid comprehension and process information Adjust levels of challenge and support		

SLP: Trevor

Part 1: General description of Trevor

Trevor, who is enrolled in the 7th grade, has been diagnosed as having learning disability in reading skills, reading comprehension, mathematics reasoning, mathematics computation, and written language. Trevor has been receiving services as a student with a learning disability since the 3rd grade when testing revealed a cognitive (IQ) score in the above-average range (119) and academic scores more than 2 standard deviations below his expected achievement. Trevor has received special education services through a variety of service delivery models. Currently, he receives instruction in reading/English and mathematics in the general education classroom and then moves to the resource room to receive re-teaching and support in completing the assignments. Trevor does not demonstrate any fine or gross motor difficulties. It is anticipated that Trevor will graduate with his current classmates with a "regular" diploma.

Academically, Trevor struggles with decoding unknown, multisyllabic words. He listens to audio versions of text while reading the print version. He has difficulty with new words in the content subjects and does not effectively utilize context clues to figure out word meanings. He uses dictionaries and other resources to find out the meanings of words. The difficulty in vocabulary skills adversely affects Trevor's ability to answer comprehension questions. His struggle in reading words results in fluency levels that prevent Trevor from reading the quantity of work expected in 7th grade and in making sense of passages. Trevor has good ideas but is unable to craft sentences that convey those ideas in a grammatically or mechanically correct manner. Trevor's weakest area is his mathematics skills. He has been taught a variety of methods for mathematics computation and as a result suffers from confusion in selecting the appropriate approach for use in solving problems. Trevor has difficulty in reading and understanding story problems (problem solving). He does not demonstrate a consistent or effective way to attack mathematics problems. He is able to solve computation problems with the use of a calculator, but cannot explain the steps used or articulate an understanding of the concepts. Although he has not been identified as a student with an emotional disability, Trevor's difficulty in academic areas has resulted in some behavior concerns. He resists leaving his peer group to go to the resource room, yet when the class work becomes too difficult, rather than asking for help, he acts out and needs to be removed from the classroom.

Part 2: Academic target

CCSS (Reading 7.3A), analyze elements. Analyze how particular elements of a story or drama interact (e.g., how the setting shapes the characters or plot)

FKSA (FK5): Determine how the plot of a story or drama advances in response to characters' actions.

Part 3: Trevor's CBK-AKSAs

Table 9. Trevor's CBK-AKSAs

Cognitive: Background Skills and Knowledge	Trevor's Opportunities to Demonstrate/Use this Skill/Knowledge				
	A lot *without* an adaptation or accommodation	**A lot *with* an adaptation or accommodation**	**Less frequently *without* an adaptation or accommodation**	**Less frequently *with* an adaptation or accommodation**	**Minimal (e.g., heard or read about it)**
Ability to identify how a story's or drama's plot unfolds in a series of episodes (AK1)		X			
Knowledge that story or drama elements (setting, characters, plot) interact with each other (AK3)		X			

Part 4: Trevor's academic and access needs

Table 10. Trevor's Academic and Access Needs

FKSA/Target Construct: Ability to determine how the plot of a story or drama advances in response to characters' actions

Additional KSA	Student Need (Yes)	VFs from the Design Document
Cognitive background. Ability to identify how a story's or drama's plot unfolds in a series of episodes	Yes	VF1. Remind him of the definition of "plot" VF3. Remind him of the definition of "character traits"
Cognitive background Knowledge that elements of a story or drama (setting, characters, plot) interact with each other	Yes	VF4. Provide a *simplified* Freytag's pyramid showing the structure of dramatic piece: exposition, rising action, climax, falling action, and dénouement VF5. Make the elements in the text explicit
Sensory (VF: Language and Symbols)	Yes	P1. Provide delivery mechanisms for use in perceiving the question P3. Define delivery parameters for oral presentation of the material

Table 10. Trevor's Academic and Access Needs, concluded

Additional KSA	Student Need (Yes)	VFs from the Design Document
Cognitive (VF: Perceptual/Receptive: Skill and Fluency/Expressive,)	Yes	C5. Preteach background content C6. Provide analogies and examples C10. Provide concept maps C11. Remind him of prior experiences with the target construct. C12. Remind him of materials or activities used to teach foundational reading/ELA skills. C13. Provide graphic organizers C15. Highlight information C16. Provide alternative forms of key concepts C20. Provide a response template C34. Locate items near relevant text. C35. Reread the question/stimulus C37. Cover up part of text so that he is not overwhelmed C38. Prompt him to engage/re-engage C39. Provide verbal/gestural prompts C40. Provide feedback to support attention C41. Provide supports to reduce student frustration C44. Enhance the relevance, value, and authenticity of tasks
Physical (VF: Skill and Fluency)	Yes	S2. Provide supports for composing a response in text.
Linguistic	Yes	L11. Read language and symbols aloud
Socio-linguistic	Yes	L3. Embed support for vocabulary and symbols L8 Highlight essential elements, words, or phrases
Executive functioning/ Executive processes (VF: Executive)	Yes	E2. Use prompts, scaffolds, and questions for use in monitoring progress, encouraging "stop and think,, and categorizing and systematizing
Emotional (VF: Affective)	Yes	A1. Cover up part of text so that the student is not overwhelmed A2. Prompt him to engage/re-engage A3. Provide verbal/gestural prompts A4. Provide feedback to support engagement A5. Provide supports to reduce student frustration (e.g., noise reduction, extended test taking time, contingencies, number of items administered at one time) A11. Enhance the relevance, value, and authenticity of tasks

Part 5: Trevor's SLP

Table 11. Trevor's SLP

UDL Categories of Support	Receptive (representation)	Expressive (expression)	Engagement
Sensory	Provide delivery mechanisms for use in perceiving the question Define delivery parameters for oral presentation of the material.		
Cognitive (knowing)	Remind him of the definition of "plot" Remind him of the definition of "character traits" Provide Freytag's pyramid Make elements in the text explicit Preteach background content Remind him of prior experiences with the target construct. Remind him of materials or activities used to teach foundational reading/ELA Provide analogies and examples Provide concept maps Provide graphic organizers Highlight information Provide alternative forms of key concepts Reread question/stimulus Cover up part of the text so that he is not overwhelmed	Provide a response template Locate items near the relevant text	Read language and symbols aloud
Physical		Provide supports for composing a response in text	
Linguistic	Read language and symbols aloud		
Socio-linguistic	Embed support for vocabulary and symbols Highlight essential elements, words, or phrases.		

Table 11. Trevor's SLP, concluded

UDL Categories of Support	Receptive (representation)	Expressive (expression)	Engagement
Emotional	Cover up part of the text so that he is not overwhelmed	Provide verbal/gestural prompts	Prompt him to engage/re-engage Provide feedback to support engagement Provide supports to reduce his frustration Enhance the relevance, value, and authenticity of tasks
Executive functioning/ Executive processes	Provide concept maps Provide graphic organizers Highlight information Reread the question/stimulus		Provide prompts, scaffolds, and questions for use in monitoring progress, encouraging "stop and think," and categorizing and systematizing Use consistent signals/cues

Part B: Student Learning Models

This section illustrates how the three individual learning profiles presented in Part A can be integrated into a content-specific learning progression to create a comprehensive individualized SLM.

Learning Progression. The ability to determine how the plot of a story or drama advances in response to characters' actions.

Table 12 presents the simplified learning progression for the target construct. The assessment target consists of determining how the plot of a story or drama advances in response to characters actions. The knowledge and skills required by this construct include (1) understanding how plot and character interact with each other in a narrative; (2) understanding plot and character; (3) identifying the correct elements of narrative texts; (4) understanding the structural and character elements of a narrative; and (5) making a response.

Table 12. Learning Progression: Ability to determine how the plot of a story or drama advances in response to characters' actions

Current knowledge		To advance:
Unknown		Student needs to be able to attend to the story and respond to the question.
Awareness of story Student attends to the story but does not attend to the structural and character elements of narrative text.		Student needs to identify the structural and character elements of narrative text: theme, setting, characters, characterization, and plot.
Some knowledge of elements of narrative text Student focuses on different elements of narrative text (e.g., setting) and not characters' actions and plot.		Student needs to correctly identify the elements of narrative text involved: main characters, characterization, and the components of plot (exposition statement, rising action, conflict, climax, falling action, resolution).
Plot Student can identify how a story's or drama's plot unfolds in a series of episodes.	**Characters** Student can identify the main characters, and characterization	Student needs to know that elements of a story or drama (characters, plot) interact with each other.
Plot advancement and characters' actions Student correctly identifies how the plot of a story or drama is advanced in response to character's actions. For example, the student shows how in the Island of the Blue Dolphin, Ramos' decision to retrieve his spear leads to him and Karana being left on the island to survive on their own.		

Thus the learning progression illustrates, albeit at a fairly large grain size, the milestones/nodes that a student must progress through to reach the target construct. For example, a student needs to know what the structural and character elements of a narrative are before he or she can focus on the specific ones required by the target construct. A student who does not know these elements will be at the "off target" stage of the learning progression. Using the information from the five learning profiles presented earlier, we "place" each student to the learning progression and detail some of the supports and scaffolds required for the student to interact with the target construct to create an SLM.

SLM: Gabriella

Generally, the most significant accessibility concern for students with limited English proficiency is the nature of the language used in the assessment. Although Gabriella functions well socially in English, she struggles with academic language, and her cultural and social experiences may differ from those of other students. To place a student with limited English proficiency into the learning progression, the student's cognitive background content knowledge, linguistic, and socio-linguistic needs must be considered carefully. Table 13 shows where Gabriella would enter the learning progression for this target construct and also shows some of the individualized UDL features that she may need to demonstrate her knowledge of the

construct. The first step is to determine where Gabriella is in the learning progression. From her profile, we know that Gabriella is a Spanish speaking 7th grade student, who came from Mexico with her family when she was 9. She attended school in Mexico and was placed in a TBE program through sixth grade. This is the first year she has had all of her classes in English. Currently, Gabriella receives in-class support in her core content classes through a bilingual aide who helps her understand content area technical language. We know Gabriella struggles with reading content area text and with writing, and that she is 2 to 3 grade levels below her peers in literacy. In addition, we know that Gabriella has completed the milestones associated with the target construct in that she has had lots of opportunities in her ELA class to identify how a story's plot unfolds in a series of episodes and knows that the elements of a story interact with each other. However, those opportunities were supported through the use of instructional accommodations, and the accommodations should continue to be provided during the assessment if they do not interfere with the target construct. The information in Gabriella's profile indicates that she is entering the learning progression at the assessment target; and as long as the item stimulus and accompanying materials accessible for students with limited English proficiency are provided, Gabriella should be able to demonstrate her knowledge and skills.

Table 13. SLM: Gabriella

Gabriella's Current Knowledge		To advance Gabriella needs:	UDL supports/scaffolds/variable features
Unknown She leaves the response blank.		To respond to the question.	
Awareness of story She does not attend to the structural and character elements of narrative text.		To identify the structural and character elements of the narrative: theme, setting, characters, point of view, characterization, and plot	
Some knowledge of elements of narrative text She focuses on different elements of narrative text (e.g., setting, theme) and not on characters' actions and plot.		To correctly identify the elements of narrative text involved: main characters, characterization, and points of view and the components of the plot (exposition statement, rising action, conflict, climax, falling action, resolution).	
Plot She can identify how a story's plot unfolds in a series of episodes.	**Characters** She can identify the main characters, characterization, and points of view	To know that elements of a story or drama (characters, plot) interact with each other.	
Gabriella has had lots of opportunities with identifying how a story's plot unfolds in a series of episodes and knows that the elements of a story interact with other—thus has the cognitive background knowledge associated with the task target. Gabriella's needs are linguistic and socio linguistic			
Plot advancement and characters' actions She correctly identifies how the plot of a story or drama advances in response to characters' actions. For example, she shows how on the Island of the Blue Dolphin, Ramos' decision to retrieve his spear leads to his and Karana's being left on the island to survive on their own.			Control explicitness of elements in the text Remind her of the definition of "plot" Remind her of the definition of "character traits" Remind her of prior experiences with the target construct Provide a translation of the text and item in Spanish Provide a glossary of unfamiliar terms from the text Provide extra time Provide supports for composing a response

SLM: Mia

Mia is a 7th grade student with significant cognitive disabilities, including intellectual disabilities and cerebral palsy. Table 14 shows where Mia would enter the learning progression, given her SLP. From her SLP we know that Mia can recognize about 50 high-frequency/high-need words and that she can understand simplified text if supported with picture symbols. We also know that she can identify main characters in simplified stories and sequence pictures to indicate the order in which events took place. Mia is nonverbal and communicates her responses using a variety of augmentative and alternative communication methods, such as pointing and gaze. Mia also tires easily and becomes frustrated when tasks are too long. We know that Mia has had minimal opportunities to demonstrate the background skills and knowledge required for the target construct, such as the ability to identify how a story's plot unfolds in a series of episodes and the knowledge that the elements of a story interact with each other. These opportunities she does have are supported through the use of adaptations, including simplified text and picture supports, and instructional and UDL accommodations. Given this information, Mia enters the learning progression above no response (NR) because she is able to answer "w" questions and is below off target (OT) because she has not yet acquired the cognitive background knowledge required by the target construct. Given Mia's limited exposure to the background knowledge required by the target construct, she needs further instruction on the structural and character elements of narrative text and how these elements interact with each other. Finally, instruction for Mia needs to build on her ability to sequence events to understand how a story's plot unfolds in a series of episodes. In the assessment to elicit the observations and work products that provide evidence that Mia can demonstrate the focal skills and knowledge the target construct requires, we would provide the content area cognitive background scaffolds and supports listed after the stage that Mia enters the learning progression. For example we would:

- Remind her of the definition of "plot"
- Remind her of the definition of "character traits"
- Remind her that elements of a story interact
- Remind her of prior experiences with the target construct
- Read the language and symbols aloud
- Provide a graphic organizer to sequence events
- Provide her with a character map
- Provide supports for the use of equipment required for the task
- Provide alternative forms of the key concepts (pictures).

In addition, during the administration of the assessment task or tasks, we would provide the UDL scaffolds and supports in the sensory, physical, linguistic, socio-linguistic, emotional, and executive functioning/executive processes categories.

Table 14. SLM: Mia

Mia's Current Knowledge		To advance Mia needs:	UDL supports/scaffolds/variable features
Unknown She leaves the response blank.		To respond to the question.	
Mia can make a response. She identifies main characters and sequence pictures to show the order in which events took place. She can answer literal who, what, when, why, and where questions from picture answer choices. She cannot reliably identify the structural and character elements of narrative text.			
Awareness of story She does not attend to the structural and character elements of narrative text.		To identify the structural and character elements of the narrative: theme, setting, characters, point of view, characterization, and plot	Provide her with a simplified definition and visual representation of the structural and character elements of narrative text
Some knowledge of elements of narrative text She focuses on different elements of narrative text (e.g., setting, theme) and not on characters' actions and plot.		To correctly identify the elements of narrative text involved: main characters, characterization, and points of view and the components of the plot (exposition statement, rising action, conflict, climax, falling action, resolution).	Provide her with a visual depiction of the plot elements Remind her of narrative elements Remind her of prior experiences with narrative text Use multiple representations of characters and plot Read the language and symbols aloud
Plot She can identify how a story's plot unfolds in a series of episodes.	**Characters** She can identify the main characters, characterization, and points of view	To know that elements of a story or drama (characters, plot) interact with each other.	Remind her of the definition of "character traits." Provide her with a character map Provide examples of how elements of a story interact. Provide her with a graphic organizer to sequence events Provide a *simplified* Freytag's pyramid Provide analogies and examples
Plot advancement and characters' actions			Make elements in the text explicit Remind her of the definition of "plot" Remind her of the definition of "character traits" Remind her that elements of a story interact. Remind her of prior experiences with target construct Read language and symbols aloud Administer the assessment over several days at an optimal time Provide her with a blank graphic Provide alternative forms of the key concepts Provide her with a character map Provide supports for the use of the equipment required for the task Determine her depth of knowledge, given the content and its complexity Provide an item/task format

SLM: Trevor

Trevor, who has a learning disability in reading, writing, and mathematic, has received special education services since 3rd grade. Trevor is placed in the regular education setting and receives resource room support for additional instructional and support in completing assignments. Trevor does not have a behavior support plan in place but exhibits problematic behaviors such as refusing to go to the resource room and acting out when he finds the academic work overwhelming. Trevor has had many opportunities to identify how a story's or drama's plot unfolds in a series of episodes and to demonstrate the knowledge that elements of a story or drama (setting, characters, plot) interact with each other. However, these instructional opportunities have been supported and scaffolded by accommodations and adaptations that must be considered. Table 15 shows where Trevor would enter the learning progression for this target construct and some of the individualized supports that he may need to demonstrate his knowledge of this target construct. The first step entails determining where Trevor would enter the learning progression. From his profile we know that he has had opportunities to acquire the background skills and knowledge required by the target construct and thus enters the learning progression at the assessment target. However, he will also need to be provided with supports for his sensory, cognitive, emotional, and executive functioning and process needs.

Table 15. SLM: Trevor

Trevor's Current Knowledge		To advance Trevor needs:	UDL supports/scaffolds/variable features
Unknown He leaves the response blank.		To respond to the question.	
Awareness of story He does not attend to the structural and character elements of narrative text.		To identify the structural and character elements of the narrative: theme, setting, characters, point of view, characterization, and plot	
Some knowledge of elements of narrative text He focuses on different elements of narrative text (e.g., setting, theme) and not on characters' actions and plot.		To correctly identify the elements of narrative text involved: main characters, characterization, and points of view and the components of the plot (exposition statement, rising action, conflict, climax, falling action, resolution).	
Plot He can identify how a story's plot unfolds in a series of episodes.	**Characters** He can identify the main characters, characterization, and points of view.	To know that elements of a story or drama (characters, plot) interact with each other.	
Trevor has had lots of opportunities with identifying how a story's plot unfolds in a series of episodes and knows that the elements of a story interact with others—thus has the cognitive background knowledge associated with the task target. His needs are cognitive, emotional, and executive			
Plot advancement and characters' actions			Control explicitness of elements in the text Orally present the material Remind him of the definitions of "plot" and "character traits" Remind him of prior experiences with target construct Provide the Freytag Pyramid Provide a glossary of unfamiliar terms/words from the text Cover up part of the text; Place assessment items near relevant text Provide supports for composing a response in text Provide extra time and small group administration Provide a graphic organizer/response template Prompt him to engage/re-engage Provide prompts to stay on task, and stop and think Provide supports to reduce frustration

Concluding Comments and the Need for Additional Research

Students with diverse backgrounds and needs (e.g., SWDs, ELLs) may demonstrate knowledge, skills, and abilities along customary pathways of learning and/or may display their learning of content and concepts in noncustomary ways (e.g., in accordance with the alternative or multiple pathways discussed previously). Therefore, the full range of needs of diverse learners, as well as the supports they may need to access, engage with, and learn academic content from, need to be carefully considered and purposefully considered as SLMs are defined. That is particularly the case because such models are increasingly being used to inform the design and development of assessments and related instructional practice intended to be equitable for and inclusive of all our students.

Given current contexts for learning (e.g., CCSS, assessment consortia, reauthorization of the Elementary and Secondary Education Act), future work on SLMs, especially those necessarily sensitive to diverse learners, need to systematically consider learner characteristics, content characteristics, and context— factors that interact and affect learning and achievement. Further research is needed to more clearly explicate the salient characteristics of learners, content, and context that are critical to the development of viable SLMs, as well as the interaction of those characteristics vis-à-vis desired student learning outcomes. Such considerations ought to be grounded in a theory or theories of learning that accounts for the range of ways that diverse learners learn, and those theory/theories need to be articulated. An evidentiary framework is also needed for systematically gathering data that support, refute, or refine the efficacy of SLMs. Once gathered, the data need to be used to examine whether the SLMs developed are appropriate for the diverse student population, facilitate valid interpretations of related assessments, and improve the effectiveness of related instructional practice that helps the diverse student population progress academically.

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Appendix A: Additional Student Learning Profiles

SLP: Sierra

Part 1: General description of Sierra

Sierra, a 7th grade student, is not identified as a student with a disability, although she does have a 504 plan to provide reasonable accommodations during her school day. In kindergarten she was diagnosed as having attention deficit disorder with hyperactivity (ADHD. The family uses a variety of stimulant and nonstimulant medications, some time-released, and some administered at school for Sierra. School testing data do not indicate a significant academic impact due to the ADHD.

Sierra has been repeatedly tested to determine whether she qualifies for special education services, and found not to do so. Under the regression formula model, she has not demonstrated a significant discrepancy between ability and performance, with her full-scale cognitive score measured at the low-average range (79) to average (92), depending on her attentiveness to the test and the rapport with the examiner. At each referral for special education, Sierra was tested and her academic achievement scores were commensurate with her cognitive scores. Standard Scores in Broad Reading, Broad Math, and Broad Written Language ranged between 68 and 74 during one evaluation session. At another evaluation, her scores ranged from 84 to 90. The evaluation team referred her for a 504 plan.

She repeated third grade and has difficulty focusing on tasks in the classroom. She is quickly overwhelmed when presented with an entire chapter to read or a page of problems. She frequently has been accused of cheating because she looks over at her neighbor's paper or checks on what her peers are doing during class. She blurts out in class and often must be reminded to stay in her assigned seat. Sierra is currently in the Response to Intervention RtI process. She was identified as "at risk" during the beginning of the year screening and through teacher referral.

She receives additional support in reading and mathematics from an instructional coach during "study hall" for 40 minutes each day. Sierra is responsible for bringing her work from class to study hall. Previously, Sierra received interventions at Tier 1 and Tier 2. She is currently working at the Tier 3 level, receiving individual or small group assistance with frequent monitoring of her progress.

Sierra is making adequate progress with her current support and referral to special education is not being considered. Classroom interventions used with Sierra include: shortened assignments, presentation of assignments in smaller parts to avoid overwhelming her, textbooks provided as audio recordings so that she can listen to the content while following along in her book, extended time to complete assignments, work on all class work at home or in the intervention room, preferential seating, and prompting to stay on task. Sierra is seated in the back of the room, which allows her to survey the entire class without turning around, thereby minimizing distractions for other students. Sierra has a behavior program administered by the classroom teachers and coordinated by the instructional coach. She earns tokens for prizes and activities for staying on task, staying in her seat, being quiet in class and completing her work. The behavior program has been successful and is part of her 504 plan.

Part 2: Academic Target

This section describes the academic content that the Sierra interacts with. In this instance the academic target is a grade 7 ELA content strand based on the CCSS in narrative text—the academic target used throughout this paper.

CCSS (Reading 7.3A). Analyze Elements: Analyze how particular elements of a story or drama interact (e.g., how setting shapes the characters or plot)

FKSA) to be assessed. Ability to determine how the plot of a story or drama advanced in response to characters' actions (FKSA5).

Part 3: Sierra's CBK-AKSAs

Table A1. Sierra's CBK-AKSAs

Cognitive Background Skills and Knowledge	Sierra's Opportunities to Demonstrate/Use Skill/Knowledge				
	A lot *without* an adaptation or accommodation	A lot *with* an adaptation or accommodation	Less frequently *without* an adaptation or accommodation	Less frequently *with* an adaptation or accommodation	Minimal (e.g., heard or read about it)
Ability to identify how a story's or drama's plot unfolds in a series of episodes (AK1)		X			
Knowledge that story or drama elements (setting, characters, plot) interact with each other (AK3)		X			

Part 4: Sierra's academic and access needs

Table A2. Sierra's Academic and Access Needs

FKSA/Target Construct: Ability to determine how the plot of a story or drama advances in response to characters' actions

Additional KSA	Student Need (Yes/No)	Scaffolds and Supports
Cognitive background: Ability to identify how a story's or drama's plot unfolds in a series of episodes	Yes	VF1. Remind her of definition of "plot" VF3. Remind her of the definition of "character traits"
Cognitive background: Knowledge that elements of a story or drama (setting, characters, plot) interact with each other		VF4. Provide a *simplified* Freytag's pyramid (or adaptation of same) – VF5. Make the elements in the text explicit
Sensory (VF: Language and Symbols)	Yes	P1. Provide delivery mechanisms for use in perceiving the question P3. Define delivery parameters for orally presenting material
Cognitive (VF: Perceptual/Receptive: Skill and Fluency/ Expressive,)	Yes	C5. Preteach background content C11. Remind her of prior experiences with the target construct. C13. Provide graphic organizers C20. Provide a response template C34. Locate items near the relevant text C35. Reread question/stimulus C44. Enhance relevance, value, and authenticity of tasks
Physical (VF: Skill and Fluency)	Yes	S2. Provide supports for composing a response in text (e.g., speech to text, text written by the teacher, keyboarding, word prediction software)
Linguistic	Yes	L11. Read language and symbols aloud
Socio-linguistic	Yes	L3. Embed support for vocabulary and symbols L8. Highlight essential elements, words, or phrases
Executive functioning/ executive processes (VF: Executive)	Yes	E4. Provide guides, checklists, graphic organizers, and/or templates
Emotional (VF: Affective)	Yes	A1. Cover up part of text so that she is not overwhelmed A2. Prompt her to engage/re-engage A3. Provide verbal/gestural prompts A4. Provide feedback to support engagement A5. Provide supports to reduce her frustration A8. Administer assessment at the optimal time of day for her engagement A11. Enhance the relevance, value, and authenticity of tasks

Part 5: SLP: Sierra

Table A3. SLP: Sierra

UDL Categories of Support	Receptive (representation)	Expressive (expression)	Engagement
Sensory	Provide delivery mechanisms for use in perceiving the question Define delivery parameters for orally presenting material	Provide response mode options Provide supports for composing a written response	
Cognitive (knowing)	Remind her of the definition of "plot" Remind her of the definition of "character traits" Make text elements explicit Preteach background content Remind her of prior experiences with the target construct. Provide analogies and examples Provide graphic organizers Reread question/stimulus	Provide a response template Locate assessment items near relevant text	Enhance the relevance, value, and authenticity of tasks Use consistent signals/cues
Physical		Provide supports for composing a response in text	
Linguistic	Read language and symbols aloud		
Socio-linguistic	Embed support for vocabulary and symbols Highlight essential elements, words, or phrases		
Emotional	Cover up part of text so that she is not overwhelmed		Prompt her to engage/re-engage Provide feedback to support engagement Provide supports to reduce her frustration Provide prompts, scaffolds, and questions for monitoring progress and encouraging "stop and think" Provide verbal/gestural prompts Enhance relevance, value, and authenticity of tasks Administer assessment at the optimal time of day for her engagement

Table A3. SLP: Sierra, concluded

UDL Categories of Support	Receptive (representation)	Expressive (expression)	Engagement
Executive functioning/ Executive processes	Provide concept maps Provide graphic organizers Highlight information Reread question/stimulus Embed supports for vocabulary and symbols Highlight essential elements, words, or phrases	Provide a response template	

SLM: Sierra

Sierra has not been identified as having a disability, but does have a Section 504 plan to provide reasonable accommodations during the school day. Because the school's universal screener identified her as at risk of academic failure in reading and mathematics, she is currently in the RtI process for those subjects and receives positive behavioral interventions and supports (PBIS). Sierra has had many opportunities to identify how a story's or drama's plot unfolds in a series of episodes and to demonstrate the knowledge that elements of a story or drama (setting, characters, plot) interact with each other. However, these instructional opportunities have been supported and scaffolded by accommodations and adaptations that must be considered when placing Sierra in the learning progression. In particular, attention should be paid to the supports for her cognitive, emotional, and executive functioning and processes access needs. Table A4 shows where Sierra would enter the learning progression for this target construct and also indicates individualized supports she may need to demonstrate her knowledge of this target construct. In determining where Sierra would enter the learning progression, from her profile we know that she has had opportunities to acquire the background skills and knowledge required by the target construct and thus can enter the learning progression at the assessment target. However, she will also need to be provided with supports for her cognitive, emotional, and executive functioning and processes needs.

Table A4. SLM: Sierra

Sierra's Current Knowledge		To advance Sierra needs:	UDL supports/scaffolds/variable features
Unknown She leaves the response blank.		To respond to the question.	
Awareness of story She does not attend to the structural and character elements of narrative text.		To identify the structural and character elements of the narrative: theme, setting, characters, point of view, characterization, and plot	
Some knowledge of elements of narrative text She focuses on different elements of narrative text (e.g., setting, theme) and not on characters' actions and plot.		To correctly identify the elements of narrative text involved: main characters, characterization, and points of view and the components of the plot (exposition statement, rising action, conflict, climax, falling action, resolution).	
Plot She can identify how a story's plot unfolds in a series of episodes.	**Characters** She can identify the main characters, characterization, and points of view	To know that elements of a story or drama (characters, plot) interact with each other.	
Sierra has had lots of opportunities to identify how a story's plot unfolds in a series of episodes and knows that the elements of a story interact with one other; thus she has the cognitive background knowledge associated with the task target. Sierra's needs are cognitive, emotional, and executive			
Plot advancement and characters' actions			Make elements in the text explicit Remind her of the definitions of "plot" and "character traits" Remind her of prior experiences with the target construct Provide a glossary of unfamiliar terms from the text Cover up part of the text Provide supports to reduce frustration Orally present the material Provide supports for composing a response in text Provide extra time and small group administration Provide a graphic organizer/response template Prompt her to engage/re-engage Provide prompts to help her stay on task and stop and think Use consistent signals/cues

SLP: Ethan

Part 1: General Description of Ethan

Ethan, who is in 7th grade, has intellectual disabilities and moderate visual impairment (20/150 with correction) and needs to wear glasses for both near and distance work. Because of that impairment Ethan's hand-eye coordination is poor, he needs extra time to read and finish assignments, and he loses his place when reading. Ethan has been educated in inclusive classrooms throughout his schooling. His fine motor limitations make it hard for him to draw shapes or copy patterns. He writes slowly, and he keeps his face 4-6 inches from his work. He is learning to use a keyboard and a computer (which is equipped with the antiglare screen he needs) in the classroom and to change the font size and screen contrast. He can follow 1-2 step verbal directions with frequent verbal prompting. Ethan has some off-task behaviors and can be distracted especially by peers but is easily redirected.

He orally communicates and can sound out letter sounds and common consonant blends. Ethan likes reading simplified fiction and nonfiction books (2nd grade level) and also enjoys listening to audio books. He shows growing understanding of characters and understands common emotions in others. He can paraphrase simple paragraphs and understands cause and effect. Ethan can skip count by 2s, 5s, and 10s, and he can match patterns. Ethan recognizes and understand operations +, -, x, and =, and he can use an adapted calculator with large buttons to solve double-digit addition and subtraction. He uses manipulatives to solve simple multiplication and division problems. Ethan knows the names of common shapes and is somewhat familiar with the simple attributes of shapes. He can independently solve 2-digit addition and subtraction problems.

Part 2: Academic Target

CCSS: Reading 7.3A. Analyze Elements: Analyze how particular elements of a story or drama interact (e.g., how setting shapes the characters or plot)

Target construct. Ability to determine how the plot of a story or drama advances in response to characters' actions

Part 3: Ethan's CBK-AKSAs

Table A5. Ethan's CBK-AKSAs

Cognitive: Background Skills and Knowledge	Ethan's Opportunities to Demonstrate/Use this Skill/Knowledge				
	A lot *without* an adaptation or accommodation	A lot *with* an adaptation or accommodation	Less frequently *without* an adaptation or accommodation	Less frequently *with* an adaptation or accommodation	Minimal (e.g., heard or read about it)
Ability to identify how a story's or drama's plot unfolds in a series of episodes.				X	
Knowledge that story or drama elements (setting, characters, plot) interact with each other		X			

Part 4: Ethan's Academic and Access Needs

Table A6. Ethan's Academic and Access Needs

FKSA/Target Construct: Ability to determine how the plot of a story or drama advances in response to characters' actions

Additional KSA	Student Need (Yes/ No)	VFs from the Design Document
Cognitive background Ability to identify how a story's or drama's plot unfolds in a series of episodes.	Yes	VF1. Remind him of the definition of "plot" VF3. Remind him of the definition of "character traits"
Cognitive background Knowledge that elements of a story or drama (setting, characters, plot) interact with each other	Yes	VF4. Provide a *simplified* Freytag's pyramid showing the structure of dramatic piece: exposition, rising action, climax, falling action, and dénouement (or adaptation of same) VF5. Make the elements in the text explicit
Sensory (VF: Language and Symbols)	Yes	P1. Provide delivery mechanisms for use in perceiving the question P3. Define delivery parameters for orally presenting the material
Cognitive (VF: Perceptual/Receptive: Skill and Fluency/ Expressive)	Yes	C1. Determine the depth of knowledge needed to understand the content – C2. Determine the complexity of the content C3. Provide an item/task format (selected response vs. constructed response, performance, etc.) C5. Preteach background content C11. Remind him of prior experiences with the target construct C12. Remind him of materials or activities used to teach foundational reading/ELA skills C15. Highlight information C16. Provide alternative forms of key concepts C20. Provide a response template C35. Reread question/stimulus C38. Prompt him to engage/re-engage C39. Provide verbal/gestural prompts C40. Provide feedback to support attention C41. Provide supports to reduce his frustration
Physical (VF: Skill and Fluency)	Yes	S1. Provide response mode options S2. Provide supports for composing a response in text (e.g., speech to text, written by teacher, keyboarding, word prediction software) S3. Provide supports for manipulating physical materials S4. Provide supports for manipulating digital/electronic equipment.
Linguistic	Yes	L1. Determine the level of abstraction required L6. Use multiple representations L7. Use alternative syntactic levels (simplified text) L11. Read language and symbols aloud
Socio-linguistic	Yes	L3. Embed support for vocabulary and symbols L8. Highlight essential elements, words, or phrases

Table A6. Ethan's Academic and Access Needs, concluded

Additional KSA	Student Need (Yes/No)	VFs from the Design Document
Executive functioning/executive processes (VF: Executive)	Yes	E2. Provide prompts, scaffolds, and questions for monitoring progress and encouraging "stop and think E4. Provide guides, checklists, graphic organizers, and/or templates
Emotional (VF: Affective)	Yes	A2. Prompt him to engage/re-engage A3. Provide verbal/gestural prompts A4. Provide feedback to support engagement A5. Provide supports to reduce his frustration A7. Provide optimal student positioning A8. Administer assessment at optimal time of day for his engagement

Part 5: Ethan's SLP:

Table A7. Ethan's SLP

FKSA/Target Construct: Ability to determine how the plot of a story or drama advances in response to characters' actions			
UDL Categories of Support	**Receptive (representation)**	**Expressive (expression)**	**Engagement**
Sensory	Provide delivery mechanisms for use in perceiving the question Define delivery parameters for orally presenting the material		
Cognitive (knowing)	Determine his depth of knowledge about the content Determine the complexity of the content Remind him of the definition of "plot" Remind him of the definition of "character traits" Provide a *simplified* Freytag's pyramid showing the structure of a dramatic piece: exposition, rising action, climax, falling action, and dénouement Make elements in the text explicit Remind him of prior experiences with the target construct Remind him of materials or activities used to teach foundational reading/ELA skills Provide alternative forms for key concepts Use alternative syntactic levels Preteach background content Highlight information Reread question/stimulus	Use an tem/task format Locate items near the relevant text Provide a response template	Use consistent signals/cues Prompt him to engage/re-engage Provide verbal/gestural prompts Provide feedback to support attention Provide supports to reduce his frustration
Physical	Provide supports for manipulating physical materials Provide supports for manipulating digital/electronic equipment	Provide supports for composing a response in text Provide response mode options	
Linguistic	Determine the level of abstraction required Use multiple representations Read language and symbols aloud Provide alternative syntactic levels	.	
Socio-linguistic	Embed support for vocabulary and symbols Highlight essential elements, words, or phrases		

Table A7. Ethan's SLP, concluded

UDL Categories of Support	Receptive (representation)	Expressive (expression)	Engagement
Emotional	Cover up part of the text so he is not overwhelmed	Use consistent signals/cues	Provide supports to reduce his frustration Provide verbal/gestural prompts Provide feedback to support engagement Prompt him to engage/re-engage Use his typical reward system Provide optimal positioning Administer the assessment at the optimal time of day for his engagement
Executive functioning/ Executive processes	Reread the question/stimulus Provide guides, checklists, graphic organizers, and/or templates	Provide prompts, scaffolds, and questions for monitoring progress and encouraging "stop and think"	

Note. Supports provided to address student needs should not alter the targeted construct.

SLM: Ethan

Table A8 shows where Ethan would enter the learning progression for this target construct and also indicates some of the individualized UDL features that he may need to demonstrate his knowledge of the construct. The first step entails identifying where he is in the learning progression. From Ethan's profile, we know that he likes reading simplified fiction and nonfiction books (2nd grade level) and also enjoys listening to audio books. We know that Ethan shows growing understanding of characters and understands common emotions in others. Ethan can paraphrase simple paragraphs and understands cause and effect. We also know that he has had a lot of opportunities to demonstrate knowledge that elements of a story or drama interact with each other, but fewer opportunities to demonstrate his ability to identify how a story's plot unfolds in a series of episodes. Therefore, we can place Ethan above "off target" and below "unconventional features." This placement is based on his development of an understanding of characters, his knowledge of the structural and character elements of narrative text, and the opportunities he has had to demonstrate both how elements interact with other and how plot unfolds. Ethan's previous experiences will determine the cognitive background supports to be provided. For example, we will provide a *reminder* to Ethan that elements of a story interact with each other because he has had numerous opportunities to demonstrate this skill, and we will also provide a graphic organizer to help Ethan identify how the plot unfolds in a series of episodes because he is less experienced with this skill.

In the assessment to elicit the observations and work products that provide the evidence that Ethan can demonstrate the focal skills and knowledge required by the target construct, we would provide the content area cognitive background scaffolds and supports listed after the stage where Ethan enters the learning progression. For example we would:

- Provide the definitions of the elements of plot
- Remind him of the structural elements of narrative text
- Remind him of the definition of "character traits"
- Provide him with a character map (name, thoughts, actions, traits, quotes)
- Remind him that elements of a story interact
- Provide him with a graphic organizer to sequence events in the story

In addition, during the administration of the assessment task or tasks, we would provide the UDL scaffolds and supports in the of sensory, physical, linguistic, socio-linguistic, emotional, and executive functioning/executive processes categories.

Table A8: SLM: Ethan

Ethan's Current Knowledge		To advance Ethan needs:	UDL supports/scaffolds/variable features
Unknown He leaves the response blank.		To respond to the question.	
Awareness of story He does not attend to the structural and character elements of narrative text.		To identify the structural and character elements of the narrative: theme, setting, characters, point of view, characterization, and plot	
Ethan demonstrates a growing understanding of characters and understands common emotions in others. He can paraphrase simple paragraphs and understands cause and effect. He knows that elements of a story or drama (setting, characters, plot) interact with each other.			
Some knowledge of elements of narrative text He focuses on different elements of narrative text (e.g., setting, theme) and not on characters' actions and plot.		To correctly identify the elements of narrative text involved: main characters, characterization, and points of view and the components of the plot (exposition statement, rising action, conflict, climax, falling action, resolution).	**Cognitive Background knowledge** Control explicitness of elements in the text Provide him with a blank graphic organizer to map the story to show how the plot of the story advances in response to characters' actions Remind him of prior experiences with target construct Read the passage aloud
Plot He can identify how a story's plot unfolds in a series of episodes.	**Characters** He can identify the main characters, characterization, and points of view	To know that elements of a story or drama (characters, plot) interact with each other.	**Cognitive Background knowledge** **VF3: Remind him of the definition of "character traits"** Provide him with a character map (name, thoughts, actions, traits, quotes) Remind him that elements of a story interact Provide him with a graphic organizer to sequence events in the story
Plot advancement and characters' actions			**Cognitive Background knowledge** Control explicitness of elements in the text Provide him with a blank graphic organizer to map the story to show how the plot of the story advances in response to characters' actions Remind him of prior experiences with target construct Read the passage aloud

Appendix B: Linkage Between Additional KSAs and VFs

Additional KSAs	Linked to:	Variable Features
Perceptual (Receptive)		
• AP1. Ability to perceive the linguistic components of the stimulus material and question (e.g., through print, objects, audio, Braille)	(P1, P2, P3)	• P1. Delivery mechanisms for use in perceiving the question (e.g., read aloud verbatim/read aloud paraphrase, pictures, large print, printed text, Braille, text, symbols, concrete objects, description of objects or images, text to speech, signing, auditory amplification, close circuit TV [CCTV], increased font size, variable contrast)
• AP2. Ability to perceive images in the stimulus material and question (e.g., through print, objects, holistic description, Braille)	(P1, P2, P3)	• P2. Supports for the use of equipment required for the task (e.g., communication board, CD player) • P3. Delivery parameters for orally presenting material (e.g., speed of reading, volume, amount of expression used, student's ability to pause, stop, and/or repeat information read aloud)
• AP3. Ability to perceive physical objects required for the task (e.g., to see physical objects and manipulatives)	(P1, P2)	
Skill and Fluency (Expressive)		
• AS1. Ability to communicate responses (e.g., respond verbally, use pictures, make a selection from a group)	(S1, S2, S3, S4, S5, S6)	• S1. Response mode options (e.g., pointing, speech and verbalization, writing, signing, switch or other assistive device/augmentative communication device, gaze); for lowest functioning students (e.g., predictable behavioral response); tolerate assistance (e.g., hand over hand)
• AS2. Ability to compose or express a response in text (e.g., in writing, in Braille)	(S1, S2, S3, S4, S5, S6)	• S2. Supports for composing a response in text (e.g., speech to text, written by teacher, keyboarding) • S3. Supports for manipulating physical materials (e.g., use of Velcro, materials of different sizes, teacher manipulation of materials)
• AS3. Ability to manipulate physical materials (e.g., dexterity, strength, mobility)	(S1, S2, S3, S4, S5, S6)	• S4. Supports for manipulating digital/electronic equipment (e.g., pointers, teacher manipulation of equipment, spoken commands, stylus for input, larger keyboard/buttons, adaptive mouse)
• AS4. Ability to manipulate digital/electronic equipment	(S1, S4, S5, S6)	• S5. Practice tutorials with unfamiliar physical materials or digital/electronic equipment
• AS5. Knowledge of how to use physical materials or digital/electronic equipment (e.g., familiarity)	(S5, S6)	• S6. Practice with familiar equipment

Additional KSAs	Linked to:	Variable Features
Language and Symbols		
• AL1. Ability to recognize text, symbols, or images	(L2, L4, L5, L8, L9, L10, L11)	• L1. Level of abstraction required of the student (e.g., concrete objects, images, text)
• AL2. Ability to decode text, symbols, or images	(L1, L2, L3, L4, L5, L8, L9, L10, L11)	• L2. New vs. pretaught vocabulary and knowledge of symbols • L3. Embedded support for vocabulary and symbols (e.g., technical and nontechnical glossary, hyperlinks to/footnotes for definitions, illustrations, background knowledge)
• AL3. Ability to comprehend text, symbols, or images	(L1, L2, L3, L4, L5, L6, L7, L8)	• L4. Availability of all key information in the dominant language (e.g., English) and in the prevalent first languages (e.g., Spanish)
• AL4. Ability to understand English vocabulary and syntax	(L2, L3, L4, L5, L7, L8)	• L5. All key information in sign language for students who use that mode of communication • L6. Use of multiple representations (e.g., physical models, demonstrations, acting-out scenarios) • L7. Alternative syntactic levels (simplified text) • L8. Highlighting of essential elements, words, or phrases • L9. Digital text with automatic text to speech • L10. Digital Braille with automatic Braille to speech • L11. Language and symbols read aloud
Cognitive		
• AC1. Ability to attend to stimuli (DOK level 1)	(C37, C38, C39, C40, C41, C42, C43, C44, C45, C46)	• C1. Determine the depth of knowledge of the content –C2. Determine content complexity (e.g., length of the scenario, number of supporting details included, richness of context) –C3. Provide item/task format (selected response vs. constructed response, performance, etc.)
• AC2. Ability to recall related knowledge (DOK level 2)	(C5, C6, C7, C8, C9, C10, C11, C12)	• C4. Provide adjustable levels of challenge (by the teacher)
• AC3. Ability to perform (e.g., answer questions, solve simple problems, measure DOK level 3)	(C11, C12, C13, C19, C20, C29, C30, C33)	• Options for supporting background knowledge: – C5. Preteach background content (preteach definitions of unfamiliar words or concepts unrelated to the standard. "Preteaching" consists of teaching a
• AC4. Ability to comprehend (e.g., explain, sort, extend a pattern) (DOK level 4)	(C5, C6, C7, C8, C9, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19)	student for the first time the definition of a word or concept that is included in the narrative of a test item but not part of the construct being measured) – C6. Provide analogies and examples
• AC5. Ability to apply information (e.g., organize, collect, solve complex problems) (DOK level 5)	(C13, C14, C15, C16, C17, C18, C19, C20, C21)	– C7. Provide hyperlinks to multi-media – C8. Provide links to related information

Additional KSAs	Linked to:	Variable Features
Cognitive (continued)		
• AC6. Ability to analyze, synthesize, or evaluate information (compare, contrast, interpret data) (DOK level 6)	(C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25, C26, C27, C28, C29, C30, C31)	• Options for supporting background knowledge (concluded): – C9. Provide links to familiar materials – C10. Provide concept maps – C11. Remind the student of prior experiences – C12. Remind the student of materials or activities used to teach foundational ELA skills • Options for supporting critical features, big ideas, and relations:
• AC7. Ability to understand the meaning of an example	(C16, C24)	– C13. Provide graphic organizers – C14. Outline information
• AC8. Ability to process multistep problems	(C13, C14, C15, C20, C22, C23, C24, C25, C26, C27, C28, C31, C32, C34, C35)	– C15. Highlight information – C16. Provide alternative forms of key concepts – C17. Provide multimedia glossaries – C18. Provide translation tools – C19. Provide modeled prompts (on nonconstruct relevant content) – C20. Provide a response template
• AC9. Ability to recall and use information presented in a task/item (working memory)	(C32, C33, C34, C35, C36)	– C21. Remind the student of the function of tools/features designed to aid comprehension and processing of information (e.g., highlighting, graphic organizers, captions, and headings)
• AC10. Ability to understand the structure of the "organizers" used to present information or to scaffold responses (e.g., understand meaning of table headings, labeling of axis,)	(C11, C21, C24, C29, C30)	• Options for guiding exploration and information processing: – C22. Provide multiple entry points – C23. Allow viewing of stimuli from previous stages and parts – C24. Use familiar materials – C25. Use consistent signals/cues – C26. Provide sequential highlighting
• AC11. Ability to understand the purpose of highlighted features in text or illustrations	(C21, C25)	– C27. Chunk information into smaller elements – C28. Mask part of the information – C29. Provide modeled prompts (on non- construct relevant content) – C30. Provide a practice item or task – C31. Provide a guide or checklist for prioritization of steps in multi-step problems Options for supporting memory and transfer: – C32. Note-taking – C33. Mnemonic aids – C34. Locate items near relevant text – C35. Reread question/stimulus

Additional KSAs	Linked to:	Variable Features
Cognitive (concluded)		

		– C36. Present items as a discrete unit or embed in a scenario
		• Teacher options for providing supports for attention:
		  – C37. Cover up part of text so the student is not overwhelmed
		  – C38. Prompt student to engage/re-engage
		  – C39. Provide verbal/gestural prompts
		  – C40. Provide feedback to support attention
		  – C41. Provide supports to reduce student frustration (e.g., noise reduction, extended test taking time, contingencies, number of items administered at one time)
		  – C42. Provide optimal student postural positioning (positions that encourage alertness, not recumbence)
		  – C43. Administer assessment at an optimal time of day for student engagement
		• Task options to support student attention (i.e., assessment items, scenario, and materials):
		  – C44. Enhance relevance, value, and authenticity of tasks
		  – C45. Heighten salience
		  – C46. Provide a variety of stimuli

Executive		
• AE1. Ability to set goals and expectations	(E1, E4, E5)	• E1. Provide prompts and scaffolds to estimate effort, resources, and difficulty • E2. Provide prompts, scaffolds, and questions for monitoring progress, encouraging "stop and think", and categorizing and systematizing • E3. Provide representations of progress (e.g., before and after photos, graphs and charts) • E4. Provide guides, checklists, graphic organizers, and/or templates for goal setting, prioritizing, breaking long-term objectives into reachable, short-term goals, self-reflection, and self-assessment • E5. Adjust levels of challenge and support (e.g., adjustable leveling and embedded support, alternative levels of difficulty, alternative points of entry)
• AE2. Ability to monitor goals and progress	(E1, E2, E3, E4, E5)	
• AE3. Ability to plan and sequence	(E1, E4, E5)	
• AE4. Ability to self-regulate and reflect during problem solving	(E1, E2, E3, E4, E5)	

Additional KSAs	Linked to:	Variable Features
Affective		

• AA1. Ability to engage (e.g., task-specific motivation)	(A1, A2, A3, A4, A5, A6, A7, A8, A11, A12, A13, A14, A15)	• Teacher options for providing supports for attention and engagement:
		  – A1. Cover up part of text so that the student is not overwhelmed
		  – A2. Prompt the student to engage/re-engage
		  – A3. Provide verbal/gestural prompts
		  – A4. Provide feedback to support engagement
		  – A5. Provide supports to reduce student frustration (e.g., noise reduction, extended test taking time, contingencies, number of items administered at one time)
		  – A6. Provide varied levels of challenge and support

• AA2. Ability to persist and sustain effort	(A1, A2, A3, A4, A5, A6, A7, A8, A11, A12, A13, A14, A15)	– A7. Provide optimal student postural positioning (positions which encourage alertness, not recumbence)
		  – A8. Administer assessment at optimal time of day for student engagement
		• Task options for engagement (task refers to the assessment items, scenario, and materials):
		  – A9. Provide students with choices for personal control of age-appropriate content when the construct is not affected (e.g., choice of topic or theme; may not be applicable for high stakes assessments)
		  – A10. Provide students with choices for personal control of task context when the construct is not affected ; may not be applicable for high stakes assessments)
		  – A11. Enhance relevance, value, and authenticity of tasks
		  – A12. Heighten salience
		  – A13. Provide a variety of stimuli
		  – A14. Vary the amount of context supporting tasks (e.g., discrete tasks vs. scenarios)
		• A15. Provide an item/task format (selected response vs. constructed response, performance, etc.)