APPENDIX 3-B: Study 2 - UMASS Study of Coherence

To provide preliminary evidence to examine the intended connection between the knowledge and skills targeted for assessment and those meant to drive instruction, we first describe the results of the study conducted in fall 2013 by researchers from the University of Massachusetts – Amherst (UMASS). This work was supervised by Dr. Stephen Sireci and led by Louise Bahry, an advanced graduate student with expertise and extensive experience in assessment, evaluation, and research. This study examined the links between the expectations NCSC has described as end of year learning targets by grade and content area (Student Learning Expectations) and expectations for the knowledge and skills students show through the NCSC AA-AAS [Measurement Expectations and focused Measurement Targets (focal knowledge, skills, and abilities (focal KSAs)].

To support the validity of the NCSC system as a coherent assessment system, the NCSC partnership collected evidence to evaluate the quality of alignment among the instructional and assessment contexts of the system. Researchers from UMASS and NCSC content and measurement experts designed the Study of Coherence to provide evidence in support of system coherence, with a specific focus on:

(a) understanding the degree of coherence across the learning outcomes and measurement targets of the NCSC system as defined for the spring 2015 operational administration of the NCSC AA-AAS,

(b) identifying 'gaps' or areas in need of further clarification, and

(c) connecting the results of this study to related project development such as development of grade-level performance level descriptors.

The demonstration of system coherence supports teachers in creating opportunities for students to learn academic content that match the rigor of the college and career ready standards and prepare students with the most significant cognitive disabilities for the NCSC AA-AAS.

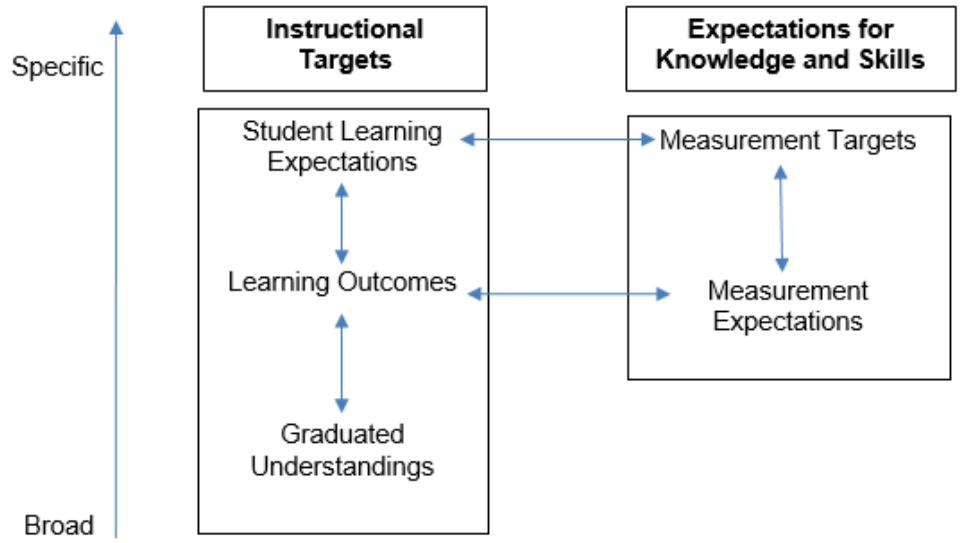
This report is based on the tables and preliminary summary information provided by researchers at UMASS as a result of their independent review of the NCSC's Graduated Understandings, learning outcomes, student learning expectations, measurement expectations, and measurement targets (see Appendices A and B).

Methodology

UMASS researchers collaborated with NCSC content and measurement experts to design the Study of Coherence to ensure that the instruction and assessment components of the system complement each other and support a unified and coherent system. Specifically, researchers wanted to understand the degree of coherence among key components (Graduated Understandings, learning outcomes, student learning expectations, measurement expectations, and measurement targets) of the NCSC assessment system and to identify gaps, redundancies, and areas in need of further clarification. A secondary focus was to connect the results of this study to related project

development such as the grade-level performance level descriptions (PLDs). To accomplish this, we created a process for evaluating coherence among these system components and UMASS researchers completed tables documenting the connections among the specified components (see Figure 2 for a visual of the connections investigated).

Figure 1. Evaluation of Coherence among System Components



Note: Arrows indicate links among system components that UMASS investigated.

To determine the coherence of the NCSC system, UMASS researchers focused on five sets of research questions for mathematics and English language arts (ELA) reading and writing.

Research Question Set 1: Do the learning outcomes (by grade and content area) represent the big ideas students are expected to demonstrate by the end of a particular academic grade?

- Are the big ideas accurately represented in the Graduated Understandings?
- Are any of the learning outcomes at a smaller grain size (more specific) than the Graduated Understandings?

To answer the first set of related research questions, researchers evaluated if (a) the learning outcomes in a content area at a particular grade represented the big ideas students are expected to demonstrate by the end of an academic grade, and (b) the learning outcomes represented the essential skills that prepare a student to make progress toward the next grade. This evaluative process included a comparison of the Graduated Understandings with the learning outcomes to ensure that the “big ideas” represented in the Graduated Understandings were also in the learning outcomes, and that none of the learning outcomes were at a smaller grain size (i.e. more specific) than

the associated Graduated Understandings. Researchers used the instructional families in the Graduated Understanding and the learning outcome to ensure that the big ideas represented in the Graduated Understanding were present in the learning outcome. They then determined if (a) there were any big ideas across instructional families not addressed in the learning outcomes and (b) if there were learning outcomes that represented a smaller grain size than the big ideas (the Graduated Understanding).

Research Question Set 2: Are the student learning expectations aligned with the learning outcomes for each grade assessed?

- Are the learning outcomes reflected in the student learning expectation?
- Are the student learning expectations for a grade based on the learning outcomes for that grade?

To answer the second set of related research questions, researchers evaluated the alignment and accuracy of the student learning expectations against the end of grade learning outcomes to ensure the student learning expectations for a particular grade were based on the learning outcomes for that grade. Researchers used the learning outcomes to evaluate the content and focus of the student learning expectations. They noted any learning outcomes not adequately reflected in the student learning expectations. Researchers also identified information in the student learning expectations not based on a learning outcome for that grade. Researchers did not expect a 1:1 correspondence on all aspects of the learning outcomes given that the student learning expectations are a summary of end-of-grade learning outcomes.

Research Question Set 3: Are the measurement targets accurate and representative of the learning outcomes, the measurement expectations, and the student learning expectations?

- Are there any measurement expectations not addressed by one or more learning outcomes?
- Are all measurement expectations addressed by at least one of the measurement targets?
- Are all measurement targets aligned to one or more measurement expectations?
- Are all measurement targets associated with student learning expectations?

To address the third related set of research questions, researchers evaluated the accuracy and representativeness of the measurement targets by comparing the measurement expectations to the learning outcomes, the measurement targets to the measurement expectations, and the measurement targets to the student learning expectations. When comparing the measurement expectations to the learning outcomes, researchers noted any measurement expectation not addressed by one or more of the learning outcomes. When comparing the measurement targets to the measurement expectations, researchers noted any measurement expectation not addressed by the measurement target. They also noted any measurement target not aligned with one or more of the measurement expectations. Finally, when comparing

the measurement target and the student learning expectation, researchers determined the aspects of the measurement target that are associated with the student learning expectations.

Research Question 4: Are any student learning expectations within a grade missing from the measurement targets for that grade?

To address the fourth research question, researchers compared the student learning expectations to the measurement targets to evaluate whether or not any aspect of the student learning expectation at a grade was missing from the respective measurement target. Given the narrowed focus of the measurement targets with respect to the prioritized grade-level academic content described in the measurement expectations, researchers did not expect all aspects of the learning expectations to be represented in the measurement targets for the current tests.

Research Question 5: Are there gaps or redundancies in the student learning expectations and in the measurement targets across adjacent grades?

To determine the evidence for the fifth research question, researchers documented gaps and redundancies across grades in the student learning expectations and in the measurement targets. They searched for gaps and redundancies across grades in each content area by comparing adjacent testing grades (grades 3-4; grades 4-5; grades 5-6; grades 6-7; grades 7-8; and grades 8 and11) and documenting any gaps or redundancies across grade levels. Researchers noted gaps in student learning expectations and gaps in the measurement targets. They also noted redundancies across grades by identifying redundancies in the student learning expectations and the measurement targets. Researchers checked and documented the degree to which the expectations exhibited vertical coherence.

NCSC collaborated with the UMASS researchers to complete an independent review and comparison of the components of the NCSC system identified above. UMASS researchers drafted and shared process documentation and tables of results, which NCSC researchers used to document findings in this report.

Appendix A. Term Definitions from the Study of Coherence

Core Content Connectors

To support the coordinated development of all system components, NCSC developed the Core Content Connectors (CCCs) to represent grade-level academic content targets for each grade and content area. The CCCs are not extensions of college and career ready standards; rather, they "pinpoint the primary content of the college and career ready standards and organize them in the conceptual model of the Learning Progressions Framework" (NCSC, 2013, p. 8). The Learning Progressions Frameworks (Hess, 2010; Hess, 2011) aligns curriculum resources and assessments with a common, research-based representation of the learning pathways and building blocks that support students' acquisition of the focal knowledge, skills, and abilities (focal KSAs) defined in college and career ready standards. The CCCs clarify concepts in these standards by "deconstructing the progress indicators in the Learning Progressions Framework . . . into teachable and assessable segments of content" (NCSC, 2011, p. 1). Developers designed the CCCs to frame instruction for assessing students with the most significant cognitive disabilities while retaining the grade level content focus of the college and career ready standards and ensuring students are prepared for college, career, and community options.

NCSC partner states used an iterative process and worked with content experts and significant disabilities experts to select a subset of CCCs as priorities for assessment (measurement expectations). They based selection decisions on the importance of the content assessed, with reference to the distribution of strands in the college and career ready standards at the appropriate grade-level. Project partners prioritized up to 10 CCCs per grade and content area in grades 3-8 and 11 for the operational assessment scheduled for spring 2015.

The prioritized content targets contribute to a fully aligned system of content, instruction, and assessment that focuses on the core content, knowledge, and skills needed at each grade to ensure success at the next. They serve as the measurement expectations and link the college and career ready standards to the model of domain-specific knowledge acquisition that guides academic instruction for students with the most significant cognitive disabilities. The measurement expectations support the NCSC content claims.

Graduated Understandings

NCSC partners developed Graduated Understandings in mathematics and English language arts (ELA) to support teachers in providing opportunities for students with significant cognitive disabilities to learn academic content. The Graduated Understandings articulate the big ideas, learning targets, and related instructional content within and across grades and help teachers conceptualize the progression of knowledge and skills students need to meet the rigor of the academic expectations expressed through the college and career ready standards. In addition, the Graduated Understandings promote the use of a common language to describe how students with the most significant cognitive disabilities learn and interact with academic content.

Developers created instructional families to structure the Graduated Understandings and to design visual representations for teachers to understand the areas of curricular emphasis within and across grades. Instructional families address the main strands noted within the CCSS in mathematics and ELA.

Learning Outcomes

Based on the Graduated Understandings, NCSC partners distilled the big ideas from each instructional family into student learning outcomes for each content area and grade. The learning outcomes represent the “big ideas” and essential skills that students are expected to demonstrate by the end of a particular academic grade. NCSC partners wrote the learning outcomes to group together related indicators in a logical manner, help guide the development of lessons (which include key learning components), and tie the learning expectations to classroom instruction.

Student Learning Expectations

NCSC partners wrote student learning expectations as overarching descriptions of the learning outcomes within a content area at a particular grade. The student learning expectations integrate content knowledge and skills to describe student learning expectations by the end of each grade. Developers structured the student learning expectations to demonstrate the increasingly more sophisticated learning outcomes as students progress through the grades and provide a clear picture of end of year expectations for student learning.

Developers designed the student learning expectations to: (a) connect instruction to assessment, (b) provide a context for ensuring assessment results are meaningful and actionable at the classroom level, and (c) support the paradigm shift in expectations for the teaching and learning of students with significant cognitive disabilities by emphasizing year to year expectations that establish a continuum of sophistication for a particular area of knowledge and skill.

Measurement Expectations

Measurement expectations are the prioritized content for assessment. The grade specific skills are intended to provide evidence to support the NCSC content claims with consideration of appropriate and practical content for a summative assessment, and congruency with the range of complexity reflected in the college and career ready standards. The measurement expectations are organized in groups according to content by the domains (mathematics) or strands (ELA) in the college and career ready standards.

Measurement Targets

Measurement targets are narrative descriptions that integrate the selected assessment focal knowledge, skills, and abilities (focal KSA) of the measurement expectations. The organization of the focal KSAs in the measurement targets enabled NCSC to systematically organize the kinds of observations that would provide evidence of skill acquisition, relevant content, context, and features of task situations that allow students to provide the evidence associated with the prioritized content for each grade. They

provide a clear picture of the assessment content that will indicate whether students have mastered the learning expectations. In other words, a student meeting the expectations outlined in these targets is well prepared for the grade-level NCSC AA-AAS.

Appendix B. Study of Coherence Findings

Research Question	Mathematics
Do the learning outcomes represent the big ideas students are expected to demonstrate by the end of a particular academic grade?	• Grade 8 big ideas were clearly addressed by the learning outcomes • In grades 3 and 5-7, one big idea was not clearly addressed in the learning outcomes • In grade 4, two big ideas were not clearly addressed in the learning outcomes • Only grades 3, 5, and 7 had one learning outcome flagged as a smaller grain size than the Graduating Understanding
Are the student learning expectations aligned with the learning outcomes for each grade assessed	• Grades 3 and 7 had two learning outcomes not clearly addressed by the student learning expectations; grades 5 and 6 had three; grade 4 had four; and grade 11 had seven
Are the measurement targets accurate and representative of the learning outcomes, the measurement expectations, and the student learning expectations?	• Grades 5 had one instance where some aspect of the measurement expectation was not directly stated in the learning outcome; grades 4 and 8 had two; grade 3 had three • In each grade, between one and three measurement expectations included specific terms and language not explicitly addressed by the measurement target • In grades 4, 6, and 7, researchers found one measurement target indirectly aligned with the measurement expectation; grades 8 and 11 each had two; grade 3 had four; grade 5 had zero • Only grades 3, 5, and 7 student learning expectations contained skills aligned with the measurement target but not the measurement expectation
Are any student learning expectations within a grade missing from the measurement targets for that grade?	• In each grade, some aspects of the student learning expectation were not explicitly addressed by the measurement target
Are there gaps and redundancies in the student learning expectations and in the measurement targets across adjacent grades?	• In grades 6-7 and 8-11, researchers did not find gaps between adjacent grade level student learning expectations; in grades 3-4, 4-5, and 7-8, researchers found one gap; at grades 5-6, researchers found two • Researchers found two redundancies in student learning expectations at grades 4-5, and four redundancies at grades 8-11; researchers found only one redundancy in measurement targets (grades 3-4) • Researchers found only one gap in the measurement targets (grades 5-6)

Research Question	Reading
Do the learning outcomes represent the big ideas students are expected to demonstrate by the end of a particular academic grade?	• In grade 7, two big ideas were not clearly addressed by the learning outcomes; grade 11 had three; grade 8 had four • Grades 5-6 contained five big ideas not clearly addressed by the learning outcomes; grade 4 had six; and grade 3 had nine • Grade 11 had one learning outcome flagged as a smaller grain size than the Graduated Understanding; grades 3, 5, 7, and 8 had two; grade 4 had three; and grade 6 had four
Are the student learning expectations aligned with the learning outcomes for each grade assessed	• Grade 6 did not have any learning outcomes not addressed by the student learning expectations; grades 3-5 and 7 had two; grade 8 had three; and grade 11 had six
Are the measurement targets accurate and representative of the learning outcomes, the measurement expectations, and the student learning expectations?	• Grades 4 and 8 each contained one instance where some aspect of the measurement expectation was not directly stated in the learning outcomes; grade 3 had two; grade 6 had three • Only grade 11 contained a measurement expectation that included language indirectly aligned with the language and terms used in the measurement target • Only the grade 11 student learning expectation contained skills found in the measurement expectation but not the measurement target
Are any student learning expectations within a grade missing from the measurement targets for that grade?	• In each grade, some aspects of the student learning expectation were not explicitly addressed by the measurement target
Are there gaps and redundancies in the student learning expectations and in the measurement targets across adjacent grades?	• In grades 5-6 and 6-7, researchers did not find any gap between adjacent grade level student learning expectations; in grades 4-5, researchers found one gap; in grades 3-4 and 7-8, researchers found two; in grades 8-11, researchers found three • Researchers found only one redundancy in student learning expectations at grades 3-4 and 6-7, and two redundancies at grades 7-8; researchers found no redundancies at other grades • Researchers found one gap each in the measurement targets at grades 3-4, 4-5, 5-6, and 6-7; researchers found two gaps at grades 8-11 and no gaps in grades 7-8 • Researchers found only one redundancy in measurement targets at grades 6-7 and 8-11, and two redundancies at grades 7-8; researchers found no redundancies at other grades

Research Question	Writing
Do the learning outcomes represent the big ideas students are expected to demonstrate by the end of a particular academic grade?	• Complexity of writing assessment prohibited more detail analysis but in general, the big ideas were reflected in the learning outcomes and the Graduated Understandings were the appropriate grain size
Are the student learning expectations aligned with the learning outcomes for each grade assessed	• Only one or two learning outcomes were not addressed in the student learning expectations at the lower grades, both of which related to keyboarding skills
Are the measurement targets accurate and representative of the learning outcomes, the measurement expectations, and the student learning expectations?	• One measurement expectation each in grades 3 and 4 was not addressed by a learning outcome; measurement expectations at all other grades were addressed • Only one measurement expectation was not addressed by the measurement target (grade 3) • At grade 8, researchers did not find any measurement target not directly aligned with the measurement expectation; at grade 11, there was one; at grades 4-6 there were two; at grades 3 and 7 there were three • Only at grade 3 were the student learning expectations aligned with the measurement target but not the measurement expectation
Are any student learning expectations within a grade missing from the measurement targets for that grade?	• In each grade, some aspects of the student learning expectation were not explicitly addressed by the measurement target
Are there gaps and redundancies in the student learning expectations and in the measurement targets across adjacent grades?	• In grades 7-8, researchers found one gap between adjacent grade level student learning expectations; grades 3-4, 4-5, 5-6, and 6-7 had two; grades 8-11 had three • In grades 4-5 researchers did not find a redundancy in student learning expectations; in grades 7-8, researchers found one; at grades 3-4, 5-6, 6-7, and 8-11 researchers found two • Researchers found only two gaps in measurement targets – one each at grades 4-5 and 5-6 • At grades 3-4, 5-6, 6-7, and 7-8, researchers found only one redundancy in measurement targets; at grades 4-5 and 8-11, researchers found two