National Center and State Collaborative

Appendix 3-B: Study 5
NCSC GSEG Research Report:
Vertical Coherence Study

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National Center and State Collaborative

NCSC GSEG Research Report: Vertical Coherence Study

September 2015

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National Center and State Collaborative

The National Center and State Collaborative (NCSC) is applying the lessons learned from the past decade of research on alternate assessments based on alternate achievement standards (AA-AAS) to develop a multi-state comprehensive assessment system for students with significant cognitive disabilities.

NCSC is a collaborative of 24 states and five organizations. The NCSC states participating in the Spring 2015 NCSC operational assessment are: Arizona, Arkansas, Connecticut, District of Columbia, Idaho, Indiana, Pacific Assessment Consortium (PAC-6)[1], Maine, Montana, New Mexico, Rhode Island, South Carolina, South Dakota, and US Virgin Islands. As of Spring 2015, additional states are members of the NCSC Consortium, representing varying levels of participation. They are: California, Delaware, Florida, Louisiana, Maryland, New York, Oregon, Pennsylvania, Tennessee, and Wyoming.

The five NCSC partner organizations include: National Center on Educational Outcomes (NCEO) at the University of Minnesota, National Center for the Improvement of Educational Assessment (Center for Assessment), University of North Carolina at Charlotte, University of Kentucky, and edCount, LLC.

IDEAs that Work
U.S. Office of Special Education Programs

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This document is available in alternative formats upon request.

[1] The Pacific Assessment Consortium (including the entities of American Samoa, Commonwealth of the Northern Mariana Islands, Federated States of Micronesia, Guam, Republic of Palau, and Republic of the Marshall Islands) partner with NCSC as one state, led by the University of Guam Center for Excellence in Developmental Disabilities Education, Research, and Service (CEDDERS).

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Executive Summary

Introduction

To serve students with the most significant cognitive disabilities, the National Center and State Collaborative (NCSC) is designing an alternate assessment based on alternate achievement standards (AA-AAS) as part of a system that includes curriculum, instruction, and professional development resources, all aligned to college and career-ready standards. NCSC is committed to developing an assessment that allows all students to demonstrate what they know and can do in mathematics, reading, and writing and that aligns to academic grade-level content standards. As part of this development process, NCSC investigated the links between the measurement model, the instructional model, and the content claims through the Vertical Coherence Study conducted in 2015. The purpose of the study was to collect evidence regarding system coherence by analyzing the following:

- The focal knowledge, skills, and abilities (focal KSAs) and Essential Understandings in relation to the content claims, and
- The student learning expectations in relation to the content claims.

Researchers first sought to determine if the focal KSAs/Essential Understandings and student learning expectations at each grade-level (3-8 and 11) supported NCSC's overarching content claims, and then to determine if the student learning expectations and focal KSAs reflected vertical coherence in building toward the content claims across grades. Thus, the goal of the study was twofold:

- To establish that support of the content claims exists within grades through both the focal KSAs/Essential Understandings and student learning expectations, and
- To establish that as the grade level increases, the relationship of the focal KSAs, Essential Understandings, and student learning expectations to the content claims is consistent and supports exit outcomes for college, career, and community readiness as expressed through grade-level expectations.

This executive summary highlights the results from the study.

Research Questions

Researchers addressed the following research questions for mathematics and English language arts (ELA)/reading and writing:

1. Do the grade-specific focal KSAs/Essential Understandings and student learning expectations support the content claims? Are there any claims not supported? Are there any focal KSAs/Essential Understandings and student learning expectations that do not link to the content claims?

2. Across all grades, do the focal KSAs/Essential Understandings and student learning expectations represent vertical coherence by building toward the exit expectations manifested through the content claims? Are there areas where the focal KSAs/Essential Understandings or student learning expectations at a particular grade level do not represent a more complex version of a claim made in the previous grade?

Methodology

Participants

Researchers recruited three content and/or special education experts for each of the three content areas—mathematics, ELA/reading, and ELA/writing (*N* = 9)—using convenience sampling (see Appendix A: Vertical Coherence Recruitment Email). Panelists' expertise was key to applying the criteria used throughout the study. Researchers determined panelist eligibility based on two criteria: (a) panelists had not assisted in the development of the learning expectations or expectations for the AA-AAS; and (b) panelists had familiarity with the NCSC project, the goals of the NCSC system, and the Common Core State Standards (CCSS). Some of the panelists included NCSC state representatives who were not part of the development process and who met the criteria.

Researchers asked panelists to complete a questionnaire detailing their experience (see Appendix B: Participant Questionnaire). Across all three content areas, one panelist held a bachelor's degree, five panelists held master's degrees, one panelist held a doctoral degree, and two were pursuing a doctoral degree. All but one panelist held a leadership role in developing curriculum in their state, and all but one had received specialized training to work with students with disabilities. Panelists had an average of 20.6 years of experience in education, and a median of 20.0 years.

Procedures

Panelists participated in a training session to ensure that they understood (a) the purpose of the study; (b) the NCSC AA-AAS development process; (c) the development and main purpose of the student learning expectations, focal KSAs/Essential Understandings, and content claims; and (d) the correct use of rating forms (see Appendix C: Training Slides). The researchers who provided the training emphasized the importance of consensus and gave participants instructions on providing feedback. Panelists first recorded their individual ratings on panelist rating sheets, which researchers collected at the end of the study. Each content group had a NCSC content expert serving as facilitator. The facilitator led the consensus discussion and recorded the consensus ratings on an electronic form. Each content group provided ratings by grade level, across grade spans, and overall.

Grade Level Ratings

To address the first research question, panelists indicated:

- whether each grade-level student learning expectation description supported the overall claims of a content area;
- whether the set of focal KSAs/Essential Understandings supported the overall claims of a content area;
- whether the student learning expectations addressed any content not present in the claims;
- whether focal KSAs/Essential Understandings addressed any content not present in the claims; and
- whether any of the claims were not addressed by the student learning expectations or focal KSAs/Essential Understandings.

Grade Span Ratings

To address the second research question, participants reviewed the student learning expectations and focal KSAs/Essential Understandings for vertical coherence across grades. Specifically, participants rated the gradation from one grade to the next, identifying whether a gradation in complexity existed for the student learning expectations and, separately, for the focal KSAs/Essential Understandings.

Overall Rating

To address the second part of the second research question, panelists provided an individual holistic judgment of whether the student learning expectations and, separately, the focal KSAs/Essential Understandings build toward the exit expectations described in the content claims. Panelists also provided a rationale for their ratings.

Facilitators

One researcher facilitated each content area group. The faciliator's role was to clarify concepts and ask probing questions whenever groups had difficulty reaching consensus. Facilitators took detailed notes of the group's conversations and tracked consensus through a group-level rating sheet. Facilitators did not participate in the rating process. If a group did not reach consensus about a particular rating, the facilitator used the individualized ratings sheets to further explain areas of division.

Rating Rubrics

Panelists completed three sets of ratings—one rating set addressed the first research question, and two rating sets addressed the second research question. The three sets of ratings supported the analysis of the degree of coherence and vertical coherence of the focal KSAs/Essential Understandings and the student learning expectations in relation to the content claims. Researchers developed rating sheets, described in the following sections, to collect panelists' ratings.

Degree of Coherence

Panelists reviewed and completed ratings of the degree of coherence between the focal KSAs/Essential Understandings or the student learning expectations and content

claims. Researchers established a rubric for both the focal KSA/Essential Understandings ratings and the student learning expectations ratings (see Exhibit 1).

Exhibit 1. Degree of Coherence: Focal KSA/Essential Understanding and Student Learning Expectations Rating Scale

Rating	Description
0	These focal KSAs/Essential Understandings or student learning expectations provide little to no evidence in support of the claim(s)
1	These focal KSAs/Essential Understandings or student learning expectations provide some evidence in support of the claim(s), but there are notable gaps in the evidence provided
2	These focal KSAs/Essential Understandings or student learning expectations provide some evidence in support of the claim(s) in general, with small gaps in the evidence provided
3	These focal KSAs/Essential Understandings or student learning expectations provide full evidence in support of the claim(s)

Vertical Coherence

For the second research question, researchers developed a vertical coherence form to collect panelists' ratings of the focal KSAs/Essential Understandings and, separately, the student learning expectations across grade spans. Researchers wanted to determine whether the focal KSAs/Essential Understandings and student learning expectations reflected changing expectations across grades. For example, the focal KSAs at grade 5 might assess the same skills the focal KSAs at grade 4 assessed, but in greater depth. The vertical relationship of skills should demonstrate that each grade builds upon skills taught and learned at the previous grade to help students reach the next grade and ultimately reach the exit expectations. Using definitions based on Webb (2005; see Exhibit 2), panelists provided holistic assessments of the degree to which the focal KSAs/Essential Understandings and student learning expectations demonstrated vertical coherence.

Exhibit 2. Vertical Coherence

Vertical Relationship	Description
Broader	The focal KSAs/Essential Understandings or student learning expectations cover more content than the previous grade span
Deeper	The focal KSAs/Essential Understandings or student learning expectations include more complex content than the previous grade span
Prerequisite	The focal KSAs/Essential Understandings or student learning expectations in the previous grade span included the prerequisite skills
New	The focal KSAs/Essential Understandings or student learning expectations introduce content not included in the previous grade span
Identical	The same skills are included in all grades

Holistic Judgment

Panelists provided holistic judgments on the progression of focal KSAs/Essential Understandings and, separately, on student learning expectations across grades by indicating their disagreement or agreement on a 4-point scale (*strongly disagree*, *disagree*, *agree*, and *strongly agree*) with the following statements:

- The evaluation of the focal KSAs/Essential Understandings within and across grades 3-8 and 11 showed evidence of strong coherence between the measurement model and NCSC's long-term outcome of college, career, and community readiness as expressed in the content claims.
- The evaluation of the student learning expectations within and across grades 3-8 and 11 showed evidence of strong coherence between the measurement model and NCSC's long-term outcome of college, career, and community readiness as expressed in the content claims.

In addition to providing their holistic judgment ratings, panelists provided rationales for their ratings.

Data Analysis

Given the qualitative nature of the data, researchers primarily conducted qualitative analyses of the data and summarized results. For ratings on a 0–3 scale (with *0* indicating little to no evidence and *3* indicating full evidence), researchers first calculated interrater agreement among the individual ratings made prior to achieving consensus ratings. For the consensus ratings, researchers noted at which grades panelists gave ratings of less than *3* and used the rationales these panelists provided to

develop a narrative summary and a table based on this evidence. If the panelists indicated that the focal KSAs/Essential Understandings or student learning expectations contained additional evidence not present in the content claims, researchers provided a narrative summary and table of evidence.

Researchers listed in a table the consensus data from the Vertical Coherence Form and described the trends across grade spans. Researchers made general comparisons across the grade spans and noted areas where panelists indicated a greater or lesser degree of vertical relationship.

Using the Holistic Judgment Form, researchers computed the average level of agreement with the two holistic judgment statements for each of the content areas. Researchers also coded the open-ended responses to describe major rationales that supported panelists' level of agreement.

Results

Research Question 1: Do the grade-specific focal KSAs/Essential Understandings and student learning expectations support the content claims? Are there any claims not supported? Are there any SLEs and focal KSAs that do not link to the content claims?

Focal KSAs/Essential Understandings and the Content Claims

In mathematics, panelists rated most grade-level focal KSAs and Essential Understandings as providing full evidence in support of the content claims. Panelists reported that grades 5, 7, and 8 provided less than full evidence, but panelists still provided a rating of *2* (some evidence for the claims) for these grades. In reading, panelists indicated that the focal KSAs and Essential Understandings at each grade provided full evidence in support of the claims. In writing, panelists at all grades except grades 3-5 rated the focal KSAs and Essential Understandings as providing full evidence in support of the claims. At these grades, panelists stated that the content claims covered all genres of writing, although some of the focal KSAs/Essential Understandings focused on narrative writing.

Overall, panelists' ratings indicated that the focal KSAs and Essential Understandings provided full evidence in support of the claims.

In rating whether the focal KSAs and Essential Understandings provided content not present in the claims, panelists indicated that the mathematics focal KSAs and Essential Understandings did not provide content not found in the claims. However, in reading grades 5-8 and 11, panelists identified content in the focal KSAs and Essential Understandings that was not present in the claim. In grades 7, 8, and 11, panelists indicated that "analyzing" was not present in the claim but was present in the focal KSAs and Essential Understandings. In writing, panelists identified that the focal KSAs and Essential Understandings provided content not present in the claims in grades 3, 4,

and 5. They stated that that the focal KSAs and Essential Understandings referenced ‘dialogue,’ which was not present in the claim.

Student Learning Expectations and the Content Claims

Ratings also indicated the student learning expectations provide full evidence in support of the claims. In mathematics, panelists rated all but two grades as a *3*, indicating that the student learning expectations provided full evidence in support of the claim. At grades 3 and 4, panelists provided a rating of *2*, indicating that the student learning expectations provided some evidence in support of the claim, but that there were some gaps. Within reading and writing, panelists provided a rating of *3* at every grade, indicating that the student learning expectations provided full evidence in support of the claims.

In rating whether the student learning expectations provided content not present in the claims, mathematics panelists identified that the student learning expectations for grades 3–5 contained content not found in the claims. They cited estimation and classification in grade 3 as content not found in the claims. In reading and writing, panelists reported that in each grade, the student learning expectations provided content not found in the claims. In reading, panelists cited skills such as integration of information and analysis and development as examples of additional content not found in the claim. For all grades in writing, panelists stated that keyboarding skills were present in the student learning expectations but not in the content claim.

Research Question 2: Across all grades, do the focal KSAs/Essential Understandings and student learning expectations represent vertical coherence by building toward the exit expectations manifested in the content claims? Are there areas where the focal KSAs/Essential Understandings or student learning expectations at a particular grade level do not represent a more complex version of the a claim made in the previous grade?

Focal KSAs/Essential Understandings

Overall, panelists in the three content areas indicated that the focal KSAs/Essential Understandings exhibited vertical coherence in the five vertical relationships, demonstrating that the grades built upon one another toward the exit expectations.

Mathematics panelists indicated that across all grades, the focal KSAs and Essential Understandings were *broader*, *deeper*, required *prerequisite* skills, and introduced *new* content at the higher grade levels. Across all grades, panelists indicated that there were few *identical* mathematics skills.

Similar to mathematics panelists, reading panelists indicated that overall, the focal KSAs and Essential Understandings were *broader*, *deeper*, required *prerequisite* skills at the higher grade levels, and introduced *new* content at the higher grade levels.

Reading panelists also indicated that the reading focal KSAs and Essential Understandings did not present *identical* skills at the higher grade levels

Across the three grade spans, writing panelists indicated that 50%–75% of the focal KSAs and Essential Understandings across grades were broader, and 50% of the focal KSAs and Essential Understandings were deeper. Panelists indicated that the higher grades in grade span 3–6 required more prerequisite skills than the higher grades in grade span 7–11, a result that panelists attributed to the gap between grades 8 and 11. Panelists indicated that grades 3–6 introduced less new content than grades 7–11, a result that panelists attributed to the introduction of argumentative writing in grade 11. Finally, panelists indicated that grades 3–11 all had similar writing expectations but that expectations across the grades varied by breadth and depth.

Student Learning Expectations

Overall, panelists in the three content areas indicated that the student learning expectations exhibited vertical coherence within the five vertical relationships, demonstrating that the student learning expectations built upon one another toward the exit expectations for students.

Across all grade spans, mathematics panelists indicated that the student learning expectations were *deeper* in the higher grades; they cited expectations such as calculations involving fractions and applications of world problems as examples. Panelists also indicated that 50%–75% of the student learning expectations expanded upon the skills introduced in each previous grade and the previous grade span.

Across all grade spans, reading panelists indicated that 50% of the student learning expectations were both *broader* and *deeper* and that 75% of the student learning expectations in the higher grades required *prerequisite* skills developed in lower grades. Panelists also indicated that the higher grades required some *new* skills, and they reported that the student learning expectations did not have *identical* skills across the grade spans.

Writing panelists reported that the higher grades within each grade span had *broader* and *deeper* student learning expectations, and that the higher grades required *prerequisite* skills found in the student learning expectations; however, panelists indicated that there were fewer *new* expectations.

Holistic Judgment

As indicated by their ratings and the themes generated from their rationales, all panelists either agreed or strongly agreed that across content areas, vertical coherence of the focal KSAs, Essential Understandings, or student learning expectations to the content claims was very strong.

Conclusions

The purpose of this vertical coherence study was to assess the links between the focal KSAs/Essential Understandings and the content claims, and the links between the student learning expectations and the content claims. Researchers conducted the study to provide evidence of coherence within the NCSC assessment system, specifically between instruction and measurement models.

In addressing the first of two research questions, researchers found that the focal KSAs/Essential Understandings across content areas and grades provided evidence in support of the content claims. Although mathematics panelists did not rate the focal KSAs/Essential Understandings as providing full evidence in support of the content claims, they reported that the focal KSAs/Essential Understandings provided full support for some, but not for all four mathematics claims. The reading panelists reported that the focal KSAs/Essential Understandings provided full support of the reading claim, and writing panelists indicated that the focal KSAs/Essential Understandings provided some evidence of the writing claim but fell short of providing full evidence in support of it.

In general, panelists also agreed that the student learning expectations provided full evidence in support of the content claims. Mathematics panelists agreed that the student learning expectations at all but two grades provided full evidence in support of the content claims. At grades 3 and 4, panelists reported that the student learning expectations provided full evidence for most of the claims but not for all four claims. Both reading and writing panelists indicated that the student learning expectations across grades provided full evidence in support of the claims.

To answer the second research question, panelists investigated the vertical coherence of the focal KSAs/Essential Understandings and the student learning expectations. Researchers also asked panelists to judge whether the focal KSAs/Essential Understandings and, separately, the student learning expectations provided evidence of strong coherence of the instructional or measurement model and NCSC's long-term outcome of college, career, and community readiness as expressed in the content claims.

Panelists indicated that the focal KSAs/Essential Understandings in all three content areas represented vertical coherence across the five vertical relationships (*broader*, *deeper*, *prerequisite*, *new*, and *identical*). In the higher grades, panelists reported some gaps in the focal KSAs/Essential Understandings, which they found reasonable given the gap between grades 8 and 11. Panelists also reported few instances of new content. (Researchers had expected this finding, given the broad nature of focal KSAs/Essential Understandings in comparison with narrower targets such as items.) Only writing panelists indicated that many of the focal KSAs/Essential understandings at higher grades represented skills identical to those at the lower grades.

Panelists also indicated that the student learning expectations in all three content areas represented vertical coherence across the five vertical relationships. Unlike panelists' focal KSAs/Essential Understandings ratings, panelists' SLE ratings indicated that there were no gaps across grade spans in the student learning expectations. As expected, panelists reported fewer new or identical student learning expectations across grades;

the evidence panelists provided suggested that the student learning expectations grew primarily in terms of breadth and depth rather than in terms of introducing new expectations.

In their holistic judgment ratings, panelists across content areas agreed or strongly agreed that the focal KSAs/Essential Understandings within and across grades provided evidence of strong coherence between the measurement model and NCSC's long-term outcome of college, career, and community readiness as expressed in the content claims. Panelists also agreed or strongly agreed that the student learning expectations within and across grades provided evidence of strong coherence between the instructional model and NCSC's long-term outcome of college, career, and community readiness as expressed in the content claims.

In moving forward, NCSC state partners may consider evaluating and revising some of the focal KSAs/Essential Understandings in mathematics and reading to provide more comprehensive evidence of the content claims, thus establishing a tighter connection between the measurement model and the content claims.

Vertical Coherence Study

Introduction

This report summarizes the results of the vertical coherence study completed as part of the development of the National Center and State Collaborative (NCSC) Alternate Assessment based on Alternate Achievement Standards (AA-AAS) for students with the most significant cognitive disabilities. The Office of Special Education Programs at the U.S. Department of Education funds NCSC through a General Supervision Enhancement Grant (GSEG). NCSC's purpose is to create a system of high-quality supports and resources for educators who work with students with the most significant cognitive disabilities. Part of NCSC's system of supports is an AA-AAS, which allows students with the most significant cognitive disabilities to demonstrate what they know and can do in relation to college and career-ready standards (CCR). The purpose of the present study was to collect evidence regarding system coherence by analyzing the following:

- The focal knowledge, skills, and abilities (focal KSAs) and Essential Understandings in relation to the content claims, and
- The student learning expectations in relation to the content claims.

Vertical Coherence Study

In July 2015, NCSC conducted the Vertical Coherence Study to confirm the links between the measurement model, the instructional model, and the content claims. Researchers first determined if the student learning expectations and focal KSAs supported the content claims in each grade, and then if the student learning expectations and focal KSAs reflected a coherence with a vertical progression of the content claims across grades. Thus, the goal of the study was twofold:

- To establish that support of the content claims exists within grades through both the focal KSAs/Essential Understandings and student learning expectations , and
- To establish that as the grade level increases, the relationship of the focal KSAs/Essential Understandings and student learning expectations across grades and the content claims consistently builds toward exit outcomes for college, career, and community readiness as expressed through grade-level expectations.

To accomplish these goals, researchers addressed the following research questions for mathematics and English language arts (ELA)/reading and writing:

1. Do the grade-specific focal KSAs/Essential Understandings and student learning expectations support the content claims? Are there any claims not supported? Are there any focal KSAs/Essential Understandings and student learning expectations that do not link to the content claims?

2. Across all grades, do the focal KSAs/Essential Understandings and student learning expectations represent vertical coherence by building toward the exit expectations manifested through the content claims? Are there areas where the focal KSAs/Essential Understandings or student learning expectations at a particular grade level do not represent a more complex version of a claim made in the previous grade?

The Content Claims

As outlined in the Standards for Educational and Psychological Testing (AERA, APA, & NCME, 2014), “the first step in developing test specifications is to extend the original statement of purpose(s), and the construct or content domain being considered, into a framework for the test that describes the extent of the domain, or the scope of the construct to be measured” (p. 76). Content claims define what constitutes student proficiency in a content area. Specifically, a claim is a concise description of the overarching skills that a student needs to be college, career, and community ready. In combination with the assessment evidence, content claims clarify what abilities students should develop and how to understand what students understand and can do. Content claims clarify and serve the following purposes:

- frame a manageable number of learning goals around which instruction can be organized;
- guide our thinking about what it means to be proficient;
- guide the specification of appropriate assessment evidence; and
- provide a basis for meaningful reporting to different interested audiences.

NCSC articulated the content claims by content area as follows:

Mathematics

In mathematics, NCSC articulated four claims to support the assessment content. The claims are as follows:

Claim 1: Students can perform mathematical procedures with accuracy.

Claim 2: Students can demonstrate or explain the application of mathematical concepts.

Claim 3: Students can interpret or represent quantitative relationships using mathematical tools, such as manipulatives, models, rules, or symbols.

Claim 4: Students can make sense of problems based on real-world scenarios, choose an appropriate strategy, and apply mathematics to find a solution.

English Language Arts—Reading

NCSC articulated one claim in ELA-reading.

Claim: Students can comprehend a variety of complex texts and text types, including both literary and informational texts.

English Language Arts—Writing

NCSC articulated one claim in ELA-writing.

Claim: The student can write effectively by generating a permanent product to represent and organize ideas, drawing evidence from literary or informational text or other media sources across genre types applying grammatical strategies and conventions of Standard English.

Student Learning Expectations

The NCSC project worked in collaboration with organizational partners to develop brief, one-page content elaborations for ELA and mathematics for each grade; these elaborations are referred to as the Learning Outcomes. The Learning Outcomes (in a content area at a grade) represent the essential skills that prepare a student to make progress toward the next grade.

From the Learning Outcomes, NCSC derived the Learning Expectations to provide a clear picture of what student learning expectations look like within the academic year and to connect instruction to assessment. Based on the grade-level academic content targets, Learning Expectations demonstrate how the Learning Outcomes become more sophisticated as students move up through the grades. Learning Expectations frame the key knowledge and skills for each grade-level (3-8 and 11) in mathematics and English language arts as brief narrative descriptions that integrate content knowledge and skills to more clearly describe expectations for student learning at each grade.

The NCSC project intended that the student learning expectations support the shift in expectations for the teaching and learning environment for students with significant cognitive disabilities by emphasizing year-to-year goals that establish ongoing targets for learning and growth. The student learning expectations reflect what a student should know and be able to do at the end of each grade to reach the exit expectations; these are the end-of-year targets for learning and demonstrate the increasingly more sophisticated learning outcomes as students progress through the grades.

Focal Knowledge, Skills, and Abilities and Essential Understandings

Focal KSAs

The focal KSAs are the primary knowledge, skills, and abilities or constructs of interest targeted for the NCSC AA-AAS. NCSC item developers used the focal KSAs as a framework to write items for the AA-AAS.

Essential Understandings

Essential Understandings refer to the necessary and fundamental knowledge and skills required to address successfully the content identified in the CCSS and the academic grade-level content targets. For example, in mathematics, an essential understanding is broken down into the fundamental or concrete concepts and skills needed to address the content *and* the specific symbols or referents related to the learning and application of mathematics concepts and skills (e.g., mathematical operations of addition, subtraction, multiplication, division, problem-solving, and solving equations). Item developers wrote entry-level items on the AA-AAS to the Essential Understandings.

Methodology

Participants

Researchers recruited three content and/or special education experts for each of the three content areas (mathematics, ELA/reading, and ELA/writing; $N = 9$) using convenience sampling (see Appendix A: Vertical Coherence Recruitment Email). Researchers intended that content experts provide feedback from a content perspective and that special education experts provide expertise from an alternate assessment perspective. Researchers determined panelist eligibility based on two criteria: (a) panelists could not have assisted in the development of the learning expectations or expectations for the AA-AAS; and (b) panelists should have familiarity with the NCSC project, the goals of the NCSC system, and the Common Core State Standards (CCSS). Some of the panelists included NCSC state representatives who were not part of the development process.

Researchers asked panelists to complete a questionnaire detailing their experience (see Appendix B: Participant Questionnaire). Across all three content areas, one panelist held a bachelor's degree, five panelists held master's degrees, one panelist held a doctoral degree, and two were pursuing a doctoral degree. All but one panelist held a leadership role in developing curriculum in their state, and all but one had received specialized training to work with students with disabilities. Panelists had an average of 20.6 years of experience in education, and a median of 20 years.

Procedures

Prior to beginning ratings on the first day of the study, researchers provided a training to orient panelists to the study tasks (see Appendix C: Training Slides). During the training, researchers reviewed the purpose of the study; provided an overview of the NCSC AA-AAS development process and the development and roles of the student learning expectations, focal KSAs/Essential Understandings, and content claims; and provided examples of how to use the rating forms. Furthermore, researchers described the importance of consensus ratings and gave participants instructions on providing feedback. Although the groups rated together, panelists tracked personal ratings on individual sheets, which they returned to research staff upon completion of the study.

Grade Level Ratings

Researchers provided each participant with a binder that included the training slides, the content area student learning expectations, focal KSAs/Essential Understandings, content claims, and rating forms. Each group first rated whether the student learning expectations and focal KSAs/Essential Understandings at each grade level represented the content claims. Participants began with the lowest grade and moved through the grades until they finished. At each grade, panelists indicated whether each of the grade-level student learning expectations and focal KSAs/Essential Understandings addressed the claims; whether the student learning expectations and focal KSAs/Essential Understandings addressed any content not present in the claims, and if any of the claims were not addressed by the student learning expectations or focal KSAs/Essential Understandings.

Grade Span Ratings

Participant groups then reviewed the student learning expectations and focal KSAs/Essential Understandings across grade spans to ascertain whether they manifested a vertical coherence by building toward the exit expectations expressed in the content claims. Specifically, participants investigated the gradation from one grade to the next, identifying whether a gradation in the complexity of the student learning expectations and focal KSAs/Essential Understandings existed. Once participants finalized all ratings, the content area groups convened to achieve consensus ratings and to review any general areas of concern.

Overall Rating

Finally, panelists provided a holistic judgment, or rated their individual level of agreement, about whether the student learning expectations and focal KSAs/Essential Understandings built toward the exit expectations. In addition to providing their level of agreement, they also provided a rationale for their ratings.

Facilitators

Throughout the process, one researcher facilitated each content area group. A facilitator’s role was to clarify concepts and ask probing questions whenever groups had difficulty reaching consensus. Facilitators took detailed notes of a group’s conversations and tracked consensus through a group-level rating sheet, but they never participated in the rating process. If groups did not reach consensus, facilitators used the individualized ratings sheets to further explain areas of division.

Rating Rubrics

Panelists completed three sets of ratings to support the evaluation of the degree of coherence and vertical coherence of the focal KSAs/Essential Understandings and the student learning expectations in relation to the content claims. Researchers developed rating sheets, described in the following sections, to collect panelists’ ratings.

Degree of Coherence

Panelists reviewed and completed ratings of the degree of coherence between the focal KSAs/Essential Understandings or the student learning expectations and the content claims. Researchers established a rubric for both the focal KSAs/Essential Understandings ratings and the student learning expectations ratings (see Exhibit 1). Possible ratings range from 0, indicating that the focal KSAs/Essential Understandings or student learning expectations provide little to no evidence in support of the claim(s), to 3, indicating that the focal KSAs/Essential Understandings or student learning expectations provide full evidence in support of the claim(s).

Exhibit 1. Degree of Coherence: Focal KSAs/Essential Understandings and Student Learning Expectations Rating Scale

Rating	Description
0	These focal KSAs/Essential Understandings or student learning expectations provide little to no evidence in support of the claim(s)
1	These focal KSAs/Essential Understandings or student learning expectations provide some evidence in support of the claim(s), but there are notable gaps in the evidence provided
2	These focal KSAs/Essential Understandings or student learning expectations provide some evidence in support of the claim(s) in general, with small gaps in the evidence provided
3	These focal KSAs/Essential Understandings or student learning expectations provide full evidence in support of the claim(s)

Vertical Coherence

Researchers developed a vertical coherence form to collect panelists' ratings of the focal KSAs/Essential Understandings and student learning expectations across grade spans. Researchers wanted to determine whether the focal KSAs/Essential Understandings and student learning expectations manifested changing expectations across grades. For example, the focal KSAs at grade 5 might assess the same skills the focal KSAs at grade 4 assess, but at greater depth. The vertical relationship of skills should demonstrate that each grade builds upon skills taught and learned at the previous grade to help students reach the next grade and ultimately reach the exit expectations. Using definitions based on Webb (2005; see Exhibit 2), panelists provided holistic assessments for the degree to which the focal KSAs/Essential Understandings demonstrated vertical coherence.

Exhibit 2. Vertical Coherence

Vertical Relationship	Description
Broader	The focal KSAs/Essential Understandings or student learning expectations cover more content than the previous grade span
Deeper	The focal KSAs/Essential Understandings or student learning expectations include more complex content than the previous grade span
Prerequisite	The focal KSAs/Essential Understandings or student learning expectations in the previous grade span include prerequisite skills
New	The focal KSAs/Essential Understandings or student learning expectations introduce content not included in the previous grade span
Identical	The same skills are included in all grades

Holistic Judgment

Lastly, researchers asked panelists to provide their holistic judgments on the progression of focal KSAs/Essential Understandings and student learning expectations across grades. Specifically, panelists indicated their disagreement or agreement on a 4-point scale (*strongly disagree*, *disagree*, *agree*, and *strongly agree*) with the following statements:

- The evaluation of the focal KSA/Essential Understandings within and across grades 3–8 and 11 showed evidence of strong coherence between the measurement model and NCSC's long-term outcome of college, career, and community readiness as expressed in the content claims.
- The evaluation of the student learning expectations within and across grades 3-8 and 11 showed evidence of strong coherence between the measurement model and NCSC's long-term outcome of college, career, and community readiness as expressed in the content claims.

Each panelist individually provided his or her holistic judgment rating and rationale for that rating (see Appendix F: Holistic Judgment).

Data Analysis

Given the qualitative nature of the data, researchers primarily conducted qualitative analyses and summarized results. For ratings on a 0–3 scale (with *0* indicating little to no evidence and *3* indicating full evidence), researchers first calculated interrater agreement among the individual ratings made prior to achieving consensus ratings. For the consensus ratings, researchers noted at which grades panelist groups gave a rating

(or ratings) of less than *3* and provided a consensus narrative summary and a table of the rationales panelists gave for these ratings. If the panelists indicated that the focal KSAs/Essential Understandings or student learning expectations contained additional content not present in the content claims, researchers provided a narrative summary and table of evidence.

Researchers made a table of the consensus data from the Vertical Coherence Form and described the trends across grade spans using narrative. Researchers made general comparisons across the grade spans and noted areas where panelists indicated a larger or small vertical relationship.

Using the Holistic Judgment Form, researchers calculated the average level of agreement with the two holistic judgment statements for each of the content areas. Researchers also used coding to summarize the open-ended responses to describe major rationales that supported panelists' level of agreement.

Results

Researchers organized findings by research question.

Research Question 1: Do the grade-specific student learning expectations and focal KSAs/Essential Understandings support the content claims? Are there any claims not supported? Are there any student learning expectations and focal KSAs/Essential Understandings that do not link to the content claims?

Panelists provided individual ratings of the degree of coherence between the grade-level focal KSAs/Essential Understandings and the content claims and the student learning expectations and the content claims. Content area groups then worked together to form consensus ratings by content area and grade combination. Panelists also provided their rationale for the ratings; researchers included the panelists' rationales in the form of quotations in the following exhibits.

Across the three content areas, researchers found high levels of interrater agreement for both the focal KSAs/Essential Understandings 0–3 scale ratings (interrater agreement = 0.81) and the student learning expectations 0–3 scale ratings (interrater agreement = 0.91).

Focal KSAs/Essential Understandings

In mathematics, panelists rated most grade-level focal KSAs and Essential Understandings as providing full evidence in support of the content claims but reported that focal KSAs and Essential Understandings at grades 5, 7, and 8 provided less than full evidence (see Exhibit 3 for panelist rationales). Reading panelists indicated that the focal KSAs and Essential Understandings at each grade provided full evidence in support of the claims. For writing, the majority of consensus ratings were a *3*, with the exception of ratings of KSAs and Essential Understandings at grades 3–5. Overall, most

ratings indicated that the focal KSAs and Essential Understandings provided full evidence in support of the claims.

Exhibit 3. Focal KSAs/Essential Understandings: Degree of Coherence with Content Claims: Ratings Less Than 3

Content area	Grade	Degree of coherence	Rationale
Mathematics	5	2	Too many new skills for the student to be able to attain the claims. The overall coverage of Claim 4 is much too thin. Very little application. Strange that the SLEs are so heavy in support of Claim 4. Not so much that there is new material, but more like a step up from grade 4 skills. A lot on Claim 2.
	7	2	Focal KSA/EU did not address Claim 2 adequately. More procedural skills; not enough real-world applications. Each of the focal KSA/EU sets can be applied to multiple claims. A lot of new concepts. Uneven distribution of evidence to adequately support all claims.
	8	2	Very focused on Claims 1, 2, and 3. Very little related to Claim 4.
Writing	3	2	The “Production and Distribution of Writing and Defined Expectations of Writing Performance” focused on narrative, while the content claim addresses all genres. Some of the skills could cross over to other writing genres.
	4	2	None.
	5	2	The “Text Types and Purposes” section is supported by the claim, but not enough by itself. The “Defined Expectations for Writing Performance” focuses on narrative writing, and the content claim addresses all genres.

Panelists also indicated whether the focal KSAs and Essential Understandings provided content not present in the claims (see Exhibit 4). Panelists indicated that the mathematics focal KSAs and Essential Understandings did not provide additional content. In reading, panelists identified additional content in the focal KSAs and Essential Understandings at the higher grades, specifically, grades 5, 6, 7, 8, and 11. In

writing, panelists identified additional content in the focal KSAs and Essential Understandings at grades 3, 4, and 5**.**

Exhibit 4. Additional Evidence Contained in the Focal KSAs/Essential Understandings not Present in the Content Claims

Content area	Grade	Additional evidence
Reading	5	Compare and contrast is a skill that exceeds basic comprehension.
	6	Ability to summarize information from a variety of sources is a higher-level skill; integration of information.
	7	Analyze the development. Analyze is above comprehending; analyze interactions of characters.
	8	Use of the term "analyze"; analyze the development of something; how the information contributes to the development of ideas; identify where the texts disagree.
	11	Analyze, evaluate and integrate; how structure of specific parts contribute to the overall structure; why an author made a specific word choice
Writing	3	The inclusion of temporal words and dialogue exceed the writing claim.
	4	The dialogue and sensory details are additional.
	5	It is difficult to connect quotations, dialogue, and sensory details to the writing claim; they seem additional.

Student Learning Expectations

In mathematics, panelists rated all but two grades as a *3*, indicating that the student learning expectations provided full evidence in support of the claim. At grades 3 and 4, panelists provided a rating of *2*, indicating that the student learning expectations provided some evidence in support of the claim, but that there were some gaps. Panelists provided the following feedback:

- *Grade 3*: The student learning expectations lay out a lot of groundwork at this grade. Claim #4 seems a bit thin at this grade, because we seem to assume the skills at grade 3 are carried forward. It seems like a lot of skills that are not targeted for measurement are included in the student learning expectations. The skills introduced in grade 4 seem to go beyond the content claims that grade 4 is attempting to make. Claim #4 is heavily demonstrated; claim #1 is thin.
- *Grade 4*: The student learning expectations seem to be overloaded on claim #4, but too light on the other claims.

Within reading and writing, panelists rated every grade a *3*, indicating the student learning expectations provided full evidence in support of the claims. In general, the student learning expectations across content areas and grades provided full evidence in support of the claims.

Panelists indicated whether the student learning expectations provided additional content not included in the claims; panelists documented their comments by content area and grade (see Exhibit 5 for panelists' comments). In mathematics, panelists identified additional content in the student learning expectations for grades 3–5. In writing and reading, panelists reported that in each grade, the student learning expectations provided additional content not found in the claims.

Exhibit 5. Additional Evidence Contained in the Student Learning Expectations not Included in the Content Claims

Content area	Grade	Additional evidence
Mathematics	3	Nothing about estimation and classifying is explicit in the claims. Classifying seems more foundational. Estimation would be necessary for finding area and perimeter. In other words, estimation helps students "make sense of," "interpret," and use a "mathematical tool." "Classifying shapes using attributes" is outside the realm of the mathematics content claim. Recommendation: replace the word "classify" with the word "identify."
	4	Many new concepts introduced. There is so much there, it may become overwhelming for teachers. Perhaps "soften" it by using ideas such as "introduce the concept of." The language may be too challenging for students and teachers. The gap in the additional skills [occurs in] claim 1.
	5	[The student learning expectations cover the content in] the claims, but [there are] too many new skills to perform up to the expectations of the claims.
Reading	3	Skills address integration of information and go beyond comprehension; students compare two texts, which is a high-level comprehension skill. Also, there is additional evidence of word work and decoding words—word analysis skills are not fully represented in the claim.
	4	Development of word work and teaching self-monitoring strategies; using information to compare and contrast is a higher comprehension skill; a higher-level critical thinking skill; explaining how information contributes to comprehension; identifying how structures are different across literary texts; using text features and tools.

Content area	Grade	Additional evidence
	5	Integration of information exceeds [content claim].
	6	Some skills are above "comprehend"; it is not clear that the student is developing new strategies.
	7	None
	8	Analyze and develop throughout; use of multiple strategies; explain the use of literary techniques within in the text.
	11	Determine which pieces of evidence provide the strongest support (evaluation piece); analyze the impact.
Writing	3	Keyboarding skills included in the student learning expectations are good, but exceed the claim. Temporal words and a short research project also exceed the claim.
	4	Keyboarding skills included in the student learning expectations are good, but exceed the claim. A short research project and precise language also exceed the claim.
	5	Keyboarding, publishing, and consulting resources as needed are additional.
	6	Keyboarding and publishing are additional.
	7	Keyboarding and publishing are additional.
	8	Keyboarding and publishing are additional.
	11	The style manuals were additional.

Research Question 2: Across all grades, do the student learning expectations and focal KSAs represent vertical coherence by building toward the exit expectations manifested in the content claims? Are there areas where the student learning expectations or focal KSAs at a particular grade level do not represent a more complex version of a claim made in the previous grade?

Panelists provided ratings for each content area to investigate the vertical coherence of the focal KSAs/Essential Understandings and student learning expectations at the grade span level. In addition to their ratings, panelists also provided examples of skills or content to support their ratings. This investigation included an appraisal of the extent to which the focal KSAs/Essential Understandings and student learning expectations differ within grade spans (3–6, 7–11, and 3–11) on the five vertical relationships: *breadth*, *depth*, the introduction of *new* content, *prerequisite* skills, and *identical* content. Researchers provided the ratings, as well as panelists' quotations of examples, in the following exhibits.

Focal KSAs/Essential Understandings

Overall, panelists in the three content areas indicated that the focal KSAs/Essential Understandings exhibited vertical coherence, demonstrating that the grades built upon one another toward the exit expectations.

In mathematics, panelists determined ratings of the focal KSAs and Essential Understandings within grade spans for the five vertical relationships (see Exhibit 6). Panelists indicated that across all grades, the focal KSAs and Essential Understandings were broader, deeper, required prerequisite skills at the higher-grade levels, and introduced new content at the higher-grade levels. Across all grades, panelists indicated that there were very few identical mathematics skills. Given the fact that panelists rated the other vertical relationships at 50% or 75%, the lack of identical skills is reasonable. Overall, the mathematics focal KSAs and Essential Understandings exhibited a vertical coherence across the grade spans.

In reading, panelists determined ratings of the focal KSAs and Essential Understandings within grade spans across five vertical relationships (see Exhibit 7). Similar to mathematics panelists, reading panelists indicated that overall, the focal KSAs and Essential Understandings at the higher grade levels were broader, deeper, and required prerequisite skills. Similar to mathematics focal KSAs and Essential Understandings, the reading focal KSAs and Essential Understandings did not present identical skills at the higher grade levels. Reading panelists provided fewer examples to accompany their ratings, but indicated that at grades 3–6, summarizing text was broader at the higher grade levels and that a broader relationship across grades 7–11 was more salient in informational texts.

In writing, panelists determined ratings of the focal KSAs and Essential Understandings within grade spans across the five vertical relationships (see Exhibit 8). Across the three grade spans, panelists indicated that 50% to 75% of the focal KSAs and Essential Understandings across grades were broader and that 50% of the focal KSAs and Essential Understandings were deeper as the grades increased. Panelists indicated that the higher grades in grade span 3–6 required more prerequisite skills than the higher grades in grade span 7–11, and panelists attributed this discrepancy to the gap between grades 8 and 11. Across grades 3–6 and 3–11, panelists indicated that higher grades introduced less new content than across grades 7–11. Finally, panelists indicated that grades 3–11 had much of the same content. Panelists indicated that grades 3–11 had much of the same content in that the writing expectations and productions were similar, though the breadth and depth could vary.

Exhibit 6. Mathematics Focal KSAs and Essential Understandings: Vertical Coherence Consensus Ratings

Vertical relationship	3–6	Examples	7–11	Examples	3–11	Examples
Broader	50%	Increase in the magnitude of the numbers, number of steps in problem solving, and coverage of mathematics skills; positive/negative integers on a number line; operations using decimals; introduce the concept of ratios from understanding relationships; solving equations.	50%	Many skills from previous grades expanded upon; proportional relationships, data and graphing, word problems, simplify expressions, linear models, predicting, and solving equations.	75%	Number sense broadens from lower grades; using equations is found throughout all grades and leads to algebra; increase in visual representation information (graphs).
Deeper	50%	Higher order thinking skills required to solve problems; more “application” in real world context; classifying 2-D shapes; many skills built upon across the band; understanding and application of proportions; working with data.	75%	Expansion on proportion, ratio, and equation; geometry became the application to other areas; comparing shapes leads to similarity and congruency; using variables leads to “algebra” skills; real numbers, analyzing graphs, using formulas and recognizing functional relationships.	75%	Real numbers, more data analysis and graphing, interpreting and predicting, understanding/recognizing relationships, and higher values and higher order thinking skills.

Vertical relationship	3–6	Examples	7–11	Examples	3–11	Examples
Prerequisite	75 %	Understanding of operations; using picture graphs to introduce data analysis skills; representations of fractions and models of relationships; understanding shapes; rounding values, and number sense.	75%	Many skills built upon at previous grades; to be successful at [grade 11], nearly every skill must be taught and learned. However, there are [fewer] prerequisite skills between 7 and 8th grades; solving for area, volume, ratios, proportions	75%	All skills progress and ultimately lead to grade 11; skills support deeper knowledge in all domains.
New	25 %	Integers and percentages are introduced in higher end of the band; integers, percent, and linear equations; quadrilaterals, ratios/unit rate, and use of variables/unknowns in problem solving.	50%	Analyze graphs; Pythagorean theorem, scatter plots, dilations, rotations, reflections; slope is a new connection to rates of change because the “language” is changed; exponents; circles, proportional relationships, volume, irrational numbers more mathematical terms are introduced (e.g. Scatte plots).	50%	New skills seen in upper grades; new skills are introduced, but most skills are built upon and extended.
Identical	0%	Decomposition of numbers; area of rectangles; solving word problems; one-step problem solving.	0%	Variables in equations, word problems.	0%	Hardly any.

Note. Examples were provided by panelists.

Exhibit 7: Reading Focal KSAs and Essential Understandings: Vertical Coherence Consensus Ratings

Vertical relationship	3–6	Examples	7–11	Examples	3–11	Examples
Broader	50%	Grade 3, determining central idea; grade 4, determining the theme; grade 5, summarizing a text; grade 6, beginning to end (clear pathway across the grades).	50%	Most prevalent in informational [texts]; in literary [texts], plot, relationship, and author's choice is broader; identify arguments.	50%	None.
Deeper	50%	Referring to support to explaining; determine central ideas and using details to support.	50%	Reading at the word level is deeper; identifying argument to identifying point of view; analyzing interactions to how information develops the central idea; using two pieces of evidence..	50%	None.
Prerequisite	75%	None	75%	In grade 11, why the author uses specific word is not a prerequisite.	75%	None.

Vertical relationship	3–6	Examples	7–11	Examples	3–11	Examples
New	25%	Grade 4, use of general academic words and phrases; how information contributes; grade 5, compare and contrast two or more texts; summarizing without personal opinion from a variety of texts; grade 6, use of domain-specific words.	50%	There are new skills in all three strands; new skills with respect to inference, conclusion, and summaries; relationship to other story element.	50%	None.
Identical	0%	Ability to refer to details; context for multiple meaning; ability to use information presented visually.	0%	Ability to use context and grade-appropriate phrases to determine meaning of the phrase; evidence to support.	0%	None.

Note. Examples were provided by panelists.

Exhibit 8. Writing Focal KSAs and Essential Understandings: Vertical Coherence Consensus Ratings

Vertical relationship	3–6	Examples	7–11	Examples	3–11	Examples
Broader	50%	Expectations for writing performance include a broad range of skills (e.g., evidence, sequencing, and conclusion); writing expectations range from writing to entertain to writing to inform, including the details to entertain and then to inform.	75%	The text type and purposes covers four different targets (relevant details, organization, describing, and conclusions). The progression within text types [goes] from narrative to informative to explanatory.	75%	While there was not broader [skills] at grades 3–6, [the skills] broadened in grades 8–11. For example, grades 3–5 focused heavily on narrative; grades 6–11 included argumentative, informative, and narrative.
Deeper	50%	Descriptions and techniques (e.g., dialogue, quotations, etc.) go deeper as grades increase; organization of ideas progresses; the language conventions, grammar [and] punctuation, are stated [in] the same [way] across grades, which kept rating at 50%.	50%	Moved from introduction and conclusions in grade 7 to group information logically in grade 8; additional skills are added at grades 8 and 11 for details and supporting evidence.	50%	Some of the [focal KSAs/Essential Understandings] went deeper.

Vertical relationship	3–6	Examples	7–11	Examples	3–11	Examples
Prerequisite	75%	The prerequisite for text structure introduced in grade 5 is not present.	25%	Organization of ideas and gathering relevant information scaffold clearly; there was a huge jump to the argument piece in grade 11.	50%	Prerequisite skills are more evident in grades 3–6. However, there was a larger gap between grade 8 and 11.
New	25%	The production of informational text is introduced in grade 6.	50%	The[re was a] huge jump to the argument piece in grade 11; the research piece in grade 8 was new.	25%	The research and the argumentative writing piece were both new.
Identical	75%	Production of writing, expectations for writing, and language conventions were the same across grades 3–5; conclusion was identical in grades 3–5.	50%	Many of the production and writing expectations are identical between grades 7 and 8.	75%	None.

Note. Examples were provided by panelists.

Student Learning Expectations

Overall, panelists in the three content areas indicated that the student learning expectations exhibited vertical coherence, demonstrating that the grades built upon one another toward the exit expectations for students.

In mathematics, panelists determined the vertical coherence of the student learning expectations within grade spans for each of the five vertical relationships (see Exhibit 9). Across all grade spans, panelists indicated that the student learning expectations were *deeper* in the higher grades; they specifically cited expectations such as calculating fractions and applications of world problems. Panelists also indicated that 50% to 75% of the student learning expectations from a grade expanded upon the skills in the previous grade.

In reading, panelists determined the vertical coherence of the student learning expectations within grade spans for each of the five vertical relationships (see Exhibit 10). Across all grade spans, panelists indicated that 50% of the student learning expectations were both broader and deeper. Across all grade spans, panelists indicated that 75% of the student learning expectations in the higher grades required prerequisite skills developed in lower grades, although panelists provided few examples. Panelists indicated that the higher grades required some new skills, but reported that none of the skills referenced in the student learning expectations were identical.

In writing, panelists determined the vertical coherence of the student learning expectations within grade spans for each of the five vertical relationships (see Exhibit 11). Panelists reported that the higher grades within each grade span exhibited broader and deeper student learning expectations, and that the higher grades required prerequisite skills found in the student learning expectations. However, panelists indicated that there were fewer new expectations.

Exhibit 9. Mathematics Student Learning Expectations: Vertical Coherence Consensus Ratings

Vertical relationship	3–6	Examples	7–11	Examples	3–11	Examples
Broader	75%	Number sense consistently broadened across the span; almost every skill is expanded upon from grades 3 through 6; measurement and patterns.	50%	Proportional relationships continue to broaden in terms of how to interpret data; number system is now covered; linear equations are covered. Concept of congruence; translation.	75%	From grades 3–11, the content covers all domains.
Deeper	75%	Number sense expanded to fractions and integers, comparing, problem solving, algorithms, absolute value and using formulas, quadrilaterals; took concepts to a deeper level.	75%	Proportional relationships, linear equations, use of formulas required, linear and non-linear graphs, rational and irrational. More applications of word problems. Drilling down to mastery and application.	75%	Clearly emphasizes application and mastery of mathematics skills (e.g., whole numbers to rational and irrational numbers).
Prerequisite	50%	Heavy in number sense, graphing, symbols, and operations.	50%	Early skills needed for proportional relationships, linear equations, use of formulas, rotations/reflections, and measure of center.	50%	At the higher grades, there are fewer prerequisite skills represented.

Vertical relationship	3–6	Examples	7–11	Examples	3–11	Examples
New	25%	Mostly fleshing out what was already introduced; a big jump in grades 4 and 6 (e.g., 3-D figures, points/lines/planes).	25%	Sample populations, experimental and theoretical probabilities, surveys, exponents, irrational numbers, slope, Pythagorean theorem.	25%	None.
Identical	25%	Data collection and measurement.	0%	Data and probability.	25%	None.

Note. Examples were provided by panelists.

Exhibit 10. Reading Student Learning Expectations: Vertical Coherence Consensus Ratings

Vertical relationship	3–6	Examples	7–11	Examples	3–11	Examples
Broader	50%	Grades 3–6 include drama and poems, character motivation; non-print resources, multiple sources; how figurative language is used; how point of view influences interpretation.	50%	More emphasis on informational text indicates that there is more content; multiple sources were presented in different formats; [skills move from] relationship to conflicting evidence to authors' choice; go from meaning (inferences, summary, conclusion) to deriving meaning from text and non-print sources.	50%	None.
Deeper	50%	Self-monitoring, drawing inferences, point of view and character motivation; general words to unknown to figurative to connotative.	50%	From grades 7–8, [there is] strong evidence; evaluate the claim; previous skills being done "deeper"; evaluate the strength of support; in language, grade 7–8 is deeper; in grade 8–11, analyze an author's use of words; in grade 8, point of view and purpose of the text is more complex as compared to grade 7.	50%	None.

Vertical relationship	3–6	Examples	7–11	Examples	3–11	Examples
Prerequisite	75%	The following set of skills were prerequisite to grade 6; grade 5, summarize, compare and contrast, and integrate; grade 4, interpret, assess point of view and motivation; grade 3, determine central idea and determine meaning.	75%	None	75%	None.
New	25%	Reading at the word level; added reference materials and unknown words and phrases and shades of meaning; grade 5 figure language and in grade 6 connotative meaning was added; in informational text, compare and contrast were added in grade 4; grade 5 introduces “relationships” and how an idea contributes to another concept; grade 6 [introduces] how key ideas elaborate; presentation of events vs. just point of view; in literary text, adds interpretation.	50%	From grades 7 to 8, literary techniques, humor, conflicting evidence, connotations; how terms affect meaning; grades 8 to 11, non-print and impact of author’s choices.	50%	None.

Vertical relationship	3–6	Examples	7–11	Examples	3–11	Examples
Identical	0%	None	0%	Development of central idea; [in] grade[s] 7 and 8, points of view and characters; determining central theme.	0%	In grades 7 and 8, determining and analyzing central theme.

Note. Examples were provided by panelists.

Exhibit 11. Writing Student Learning Expectations: Vertical Coherence Consensus Ratings

Vertical relationship	3–6	Examples	7–11	Examples	3–11	Examples
Broader	75%	The expectations within the writing process broadens (opinion, narrative, informational).	50%	In grades 7 and 8 there are several areas in which the skills were the same or were very similar (e.g., writing structured arguments); significant jump from grade 8 to 11 from informative to argumentative.	75%	Overall, the skills broaden; grades 7 and 8 were [similar].
Deeper	75%	The writing process in grade 3 (writing simple explanations) to grade 5 (developing an opinion piece with introduction and conclusion) moved from temporal words, to sensory details/concrete words and phrases, to dialogue and character responses, to literary techniques, clauses, etc.	75%	Transitional words and phrases to precise language to concrete precise details; writing process increases across grades (explain a topic to convey a message, to use a style manual); editing increased as well.	75%	The writing expectations and process went deeper.
Prerequisite	75%	They mostly built on each other; the ones that were the same throughout made it fall below 100%	50%	Students understand the use of language to express ideas in grade 7 and applied in grade 8.	50%	

Vertical relationship	3–6	Examples	7–11	Examples	3–11	Examples
New	25%	Writing structured arguments in grade 6. Writing an informative piece in grade 5.	25%	Print and digital resources are new; relationship between story elements, conducting research projects, and imagery are new; introduced claims/counter claims in grade 11.	25%	.
Identical	25%	The first sentence was the same but with more details following it; language conventions and keyboarding were the same in grades 3 and 4.	25%	The second paragraph read differently but seemed very similar [in terms of] skills.	25%	There were enough minor changes throughout, but the intent seemed to be the same.

Note. Examples were provided by panelists.

Holistic Judgment

The final judgment panelists made concerned the progression of the focal KSAs/Essential Understandings and the student learning expectations. Panelists completed the Holistic Judgment Form in which they considered the progression of the focal KSAs/Essential Understandings and the student learning expectations across grades and the vertical coherence within each grade and across all grades. Facilitators asked panelists to indicate their level of disagreement or agreement with two statements using a 4-point scale: *strongly disagree*, *disagree*, *agree*, and *strongly agree*. Researchers averaged panelists' ratings within content areas and determined themes based on the rationales panelists' provided.

Across all three content areas, panelists agreed or strongly agreed that the focal KSAs/Essential Understandings evidenced strong coherence between the measurement model and NCSC's long-term outcome of college, career, and community readiness as expressed in the content claims (see Exhibit 12). All three mathematics panelists strongly agreed that the focal KSA/Essential Understandings evidenced strong coherence between the measurement model and the NCSC's long-term outcome. Reading panelists had an average agreement level of 3.3, which indicated agreement or strong agreement. Writing panelists had an average agreement level of 3.7, which indicated agreement or strong agreement.

Exhibit 12. Holistic Evaluation of the Focal KSAs/Essential Understandings

Content area	Average rating	Rationale(s)
Mathematics	4.0	• Strong coherence that builds upon grade level.
Reading	3.3	• Strong coherence—the increase of breadth and depth was found at a proportional rate. • In most grades, the focal KSAs contained content that was not included in the claim. • The majority of ratings reached 75%—indicating room for improvement and a need to clarify alignment/coherence.
Writing	3.7	• The focal KSAs and Essential Understandings evidenced strong coherence. • The new information that did not seem to build upon previous information was information about narrative writing in grades 3-5, information about informative writing in grades 6-8, and information about argumentative writing in grade 11. Some gaps exist and there is room for improvement.

Across all three content areas, panelists agreed or strongly agreed that the SLEs displayed evidence of strong coherence between the instructional model and NCSC's long-term outcome of college, career, and community readiness as expressed in the content claims (see Exhibit 13). All mathematics and writing panelists strongly agreed that the student learning expectations provided evidence of strong coherence within the NCSC system, and reading panelists agreed or strongly agreed that the student learning expectations provided evidence of strong coherence within the NCSC system.

Exhibit 13. Holistic Evaluation of the Student Learning Expectations

Content area	Average eating	Rationale(s)
Mathematics	4.0	• Strong coherence
Reading	3.3	• Strong coherence • In all grades, the student learning expectations contained evidence not included in the claim. • Most of the ratings reached 75%.
Writing	4.0	• Strong coherence

Conclusion

The purpose of this vertical coherence study was to solidify the links between the focal KSAs/Essential Understandings and the content claims, and the links between the student learning expectations and the content claims. Researchers conducted the study to provide evidence of coherence within the NCSC assessment system, specifically between instruction and measurement models.

In addressing the first of two research questions, researchers found the focal KSAs/Essential Understandings across content areas and grades provided evidence in support of the content claims. Although mathematics panelists did not rate the focal KSAs/Essential Understandings as providing full evidence in support of the content claims, they reported that the focal KSAs/Essential Understandings provided full support for some, but not for all four mathematics claims. The reading panelists reported that the focal KSAs/Essential Understandings provided full support for the reading claim, and writing panelists indicated that the focal KSAs/Essential Understandings provided some evidence of the writing claim but fell short of providing full evidence supporting it.

In general, panelists also agreed that the student learning expectations provided full evidence in support of the content claims. Mathematics panelists agreed that the student learning expectations at all but two grades provided full evidence in support of the mathematics content claims. At grades 3 and 4, panelists reported that the student learning expectations provided full evidence for most of the claims but not for all four claims. Both reading and writing panelists indicated that the student learning expectations across grades provided full evidence in support of the claims.

To answer the second research question, panelists investigated the vertical coherence of the focal KSAs/Essential Understandings and the student learning expectations. Researchers also asked panelists to judge whether the focal KSAs/Essential Understandings and, separately, the student learning expectations provided evidence of strong coherence of the instructional or measurement model and NCSC's long-term outcome of college, career, and community readiness as expressed in the content claims.

Panelists indicated that the focal KSAs/Essential Understandings in all three content areas represented vertical coherence across the five vertical relationships. In the higher grades, panelists reported some gaps in the focal KSAs/Essential Understandings, which they found reasonable given the gap between grades 8 and 11. Panelists also reported few instances of new content. (Researchers had expected this finding, given the broad nature of focal KSAs/Essential Understandings in comparison with narrower targets such as items.) Only writing panelists indicated that many of the focal KSAs/Essential understandings at higher grades represented skills identical to those at the lower grades.

Panelists also indicated that the student learning expectations in all three content areas represented vertical coherence across the five vertical relationships. Unlike panelists' focal KSAs/Essential Understandings ratings, panelists gaps across grade spans in the student learning expectations. As expected, panelists reported fewer new or identical student learning expectations across grades; the evidence panelists provided suggested that the student learning expectations grew primarily in terms of breadth and depth rather than in terms of introducing new expectations.

In their holistic judgment ratings, panelists across content areas agreed or strongly agreed the focal KSAs/Essential Understandings within and across grades provided evidence of strong coherence between the measurement model and NCSC's long-term outcome of college, career, and community readiness as expressed in the content claims. Panelists also agreed or strongly agreed the student learning expectations within and across grades provided evidence of strong coherence between the instructional model and NCSC's long-term outcome of college, career, and community readiness as expressed in the content claims.

In moving forward, NCSC state partners may consider evaluating and revising some of the focal KSAs/Essential Understandings in mathematics and reading to provide more comprehensive evidence of the content claims, thus establishing a tighter connection between the measurement model and the content claims.

References

American Educational Research Association, American Psychological Association, & National Council on Measurement in Education (2014). Standards for educational and psychological testing. Washington, DC: American Educational Research Association.

Flowers, C., Wakeman, S., Browder, D. & Karvonen, M. (2007). *Links for academic learning: An alignment protocol for alternate assessments based on alternate achievement standards*. Charlotte, North Carolina: University of North Carolina.

Webb, N. L. (2005, November). *Alignment, depth of knowledge, and change*. Paper presented at the annual meeting of the Florida Educational Research Association, Miami, Florida.

Appendix A: Vertical Coherence Recruitment Email

Overview of the Study

Thank you for your interest in our study. The purpose of the National Center and State Collaborative (NCSC) is to develop curriculum and instruction materials and an alternate assessment based on alternate achievement standards (AA-AAS) for students with the most significant cognitive disabilities. Your participation in this study will contribute to the coherent system of curriculum, instruction, and assessment.

The purpose of this study is to confirm the links between the student learning expectations and the content claims, and the focal knowledge, skills, and abilities (focal KSAs) and the content claims for mathematics, reading, and writing. Specifically, researchers want to determine if the focal KSAs and the student learning expectations support the content claims at each grade for all three content areas, and if the focal KSAs and the student learning expectations reflect vertical coherence by building toward the exit expectations manifested through the content claims. The study is two-fold: to establish within and across grade support for the focal KSAs, student learning expectations, and the content claims.

Research staff will collect data on the student learning expectations, focal KSAs, and content claims via rating sheets. While you will track your links for each of the data points, you will not need to submit personal identifying information for the purpose of the study. The research staff will hold the rating sheets in a secure location, but will remove any personal identifiers from the documents.

Time Requirement

This study will require your attendance at meetings in a location yet to be decided for four consecutive days. Days 1-3 will require your time from 9 am to 5 pm, while day 4 will require your time from 9 am to 2 pm. You will work with other participants and research staff over the course of these four days. Over the course of the four days, your travel costs, lodging costs, and food costs will be covered by the project.

Participation in the study is voluntary, and you may withdraw your consent at any time during the study. If you have any questions regarding the purpose of the study, you may contact Martha Thurlow, the principal investigator, at thurl001@umn.edu.

If you are interested in the study, please respond to the email with a “yes, I would like to participate” and your availability.

Appendix B: Participant Questionnaire

In reporting the results of this vertical coherence study to those who must interpret and use them, it will be important to describe the background of the panelists who conducted the ratings; the report describing this study will include summary information about the panelists who participated in this process. Researchers will use your responses to generate this summary information, but will not be used to identify you or be connected to your ratings. Please do not indicate your name on this form. You may use the back of this form to provide additional information, as needed.

1. Please indicate your current position. Include content area(s) and grade level(s).

_____

_____

2. Please indicate other teaching or administrative positions you have held.

_____

_____

3. For how many years have you been a professional educator?

_____

4. How many years of experience do you have in your area of expertise (ELA/mathematics, special education, etc.)?

_____

_____

5. Please indicate the teaching and/or administrative certificates you currently hold.

_____

_____

6. Please indicate your degree(s) and other qualifications.

_____

_____

7. Do you have specialized training or experience in working with students with disabilities and/or students with the most significant cognitive disabilities? If yes, please explain.

_____

_____

8. Please check all of the following statements that apply to you:

❑ I conduct/have conducted professional development for teachers in my content area.

❑ I have/had a leadership role in curriculum planning in my school or district.

❑ I have taught future teachers in a higher education setting.

9. If there is other information that would help us understand your expertise in your content area, please describe it here (like experience as an assessment item writer or reviewer, range finder, etc.).

_____

_____

_____

10. What is your gender? ❑ Male ❑ Female

11. What is your ethnicity? _____

Appendix C: Training Slides

The National Center and State Collaborative Vertical Coherence Study

July 28-30, 2015

ncsc

National Center and State Collaborative

Overview of Vertical Coherence

ncsc

Paperwork and Logistics

- Before you begin rating, we will collect:
  - Panelist Background Questionnaire
- You will receive one binder which will contain:
  - Agenda
  - Training slides
  - Focal KSAs/EUs, SLEs, and content claims by grade
  - Rating sheets
  - Vertical Coherence Form
  - Holistic Judgment Form
  - Panelist Background Questionnaire and Evaluation Form

ncsc

Paperwork and Logistics

- At the end of each day, leave all study materials with your table leaders
- Please only use cell phones during breaks and lunch
- At the end of the study, we will collect:
  - Evaluation Form
  - Rating forms, Vertical Coherence Form, Holistic Judgment Form
  - All study materials

ncsc

Today's Agenda

Time	Activity
1:45 – 2:00 pm	Panelists arrive
2:00 – 5:00 pm	Training; begin ratings
5:00 pm	Dismiss

ncsc

Agenda for 7/29 and 7/30

Time	Activity
8:00 – 8:30 am	Panelists arrive; eat breakfast
8:30 - 10:00 am	Day 2: Within-grade ratings; begin across-grade ratings Day 3: Across grade ratings
10:00 - 10:15 am	Break
10:15 am - 12:00 pm	Ratings
12:00 - 12:45 pm	Lunch
12:45 - 2:45 pm	Ratings
2:45 - 3:00 pm	Break
3:00 - 5:00 pm	Ratings; Evaluation dismiss (4:00 pm on 7/30)

Purpose

- The purpose of the vertical coherence study is two-fold:
  - To evaluate the degree to which the focal knowledge, skills, and abilities (focal KSAs) developed from the academic grade level targets and the student learning expectations (SLEs) support the content claims at and across grades within each content area
  - To evaluate the degree to which the focal KSAs and the SLEs reflect vertical coherence and help ensure students are ready for post-secondary options
- The goal is to evaluate within and across grade connections among the focal KSAs, SLEs, and content claims, thereby providing evidence of the connections between instruction and assessment

What is Vertical Coherence?

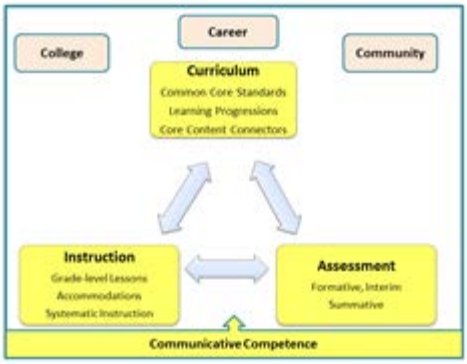
- Vertical coherence is the extent to which the focal KSAs and the SLEs across the grade spans build toward and support attainment of the content claims
- Key Question: As grade level increases, do the focal KSAs and the SLEs consistently build toward the exit expectations for college, career, and community readiness as manifested through the content claims?

Quick Review of NCSC Terms

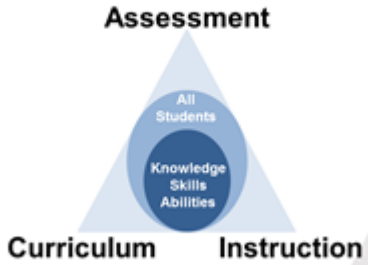
- **Academic grade level content targets**: Identify the primary grade-level, core academic content of the Common Core State Standards (CCSS) targeted by the measurement model
- **Focal Knowledge, Skills, and Abilities (focal KSAs):** The knowledge, skills, and abilities targeted for the current assessments
- **Essential Understandings (EUs)**: The entry knowledge, skills and abilities that approach the content targeted by the focal KSAs
- **Content Claims**: A concise description of the overarching skills that a student needs to be college, career, and community ready
- **Student Learning Expectations (SLEs)**: The expectations that reflect what a student should know and be able to do at the end of each grade to reach the exit expectations; these are the end of year targets for learning

Purposes of the Content Claims

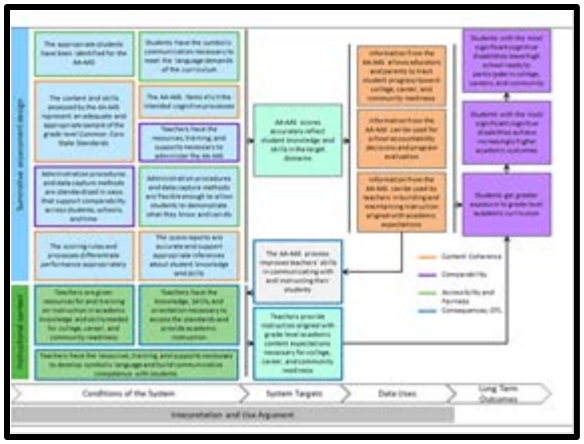
- Frame a manageable number of learning goals (around which instruction can be organized)
- Guide thinking about what it means to be proficient
- Guide the specification of appropriate assessment evidence
- Provide a basis for meaningful reporting to different interested audiences



What a Unified System Looks Like



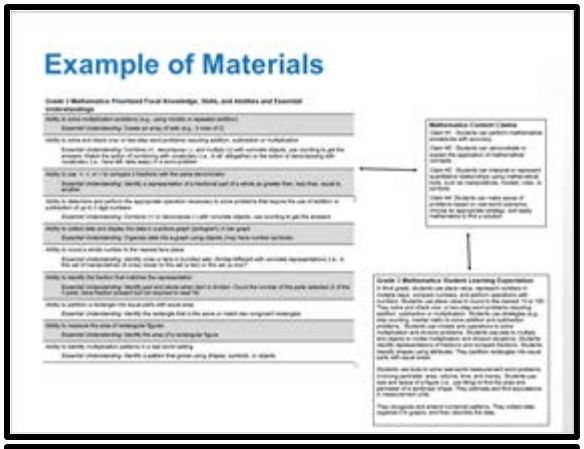
Pellegrino, J. W., Chudowsky, N., & Glaser, R. (Eds.). (2001)



What are you rating?

- The degree of coherence between the focal KSAs/EUs and the content claims at each grade level by content area (mathematics, reading, or writing)
- The degree of coherence between the SLEs and the content claims at each grade level by content area
- Vertical Coherence
  - Rating of progression of focal KSAs/EUs to content claims across grade spans
  - Rating of progression of SLEs to content claims across grade spans
- Holistic Coherence
  - Rating of the measurement model, instructional model, and NCSC's long term outcomes

Example of Materials



Roles and Responsibilities

All panelists will:

- Make determinations about the content of the grade-level focal KSAs/EUs and SLEs in relation to the content claims
- Perform holistic rating of focal KSAs and SLEs across grade spans, looking at the vertical coherence of content across the grades
- Provide an overall judgment of the connection between the measurement model, instructional model, and NCSC's long term outcomes

Roles and Responsibilities

Facilitators

- Answer any questions
- Facilitate the group process and discussion
- Ensure all individual ratings are captured appropriately
- Capture consensus findings in electronic version of rating form

Panelists

- Review focal KSAs/EUs and SLEs by content area and grade level
- Ask questions to clarify understanding
- Code the focal KSAs/EUs and SLE individually, and come to consensus as a team using training and resources

Degree of Coherence

Rating Task #1 for Panelists

- Rate the degree of coherence between the grade-level focal KSAs/EUs *as a whole* and the content claim(s)
  - 0, 1, 2, or 3 rating
  - Rationale
- Come to consensus as a group

Degree of Coherence

- Degree of Coherence: the degree to which the focal KSAs/EUs *as a whole* support the content claim(s)

Code	Description
0	These focal KSAs/EUs provide little to no evidence in support of the claim(s)
1	These focal KSAs/EUs provide some evidence in support of the claim(s), but there are notable gaps in the evidence provided
2	These focal KSAs/EUs provide some evidence in support of the claim(s) in general, with small gaps in the evidence provided
3	These focal KSAs/EUs provide full evidence in support of the claim(s)

Consensus

- Do all group participants agree on the same rating?
  - If not, discuss to achieve consensus
- Do all group participants agree on the rationale? Are there multiple rationales?
  - Provide reasoning for why you selected one of the four codes
    - Why do the focal KSAs/EUs reflect/not reflect evidence for the content claim(s)?
    - What gaps do you see between the focal KSAs/EUs and the content claim(s)?

Rating Task #2 for Panelists

- Rate the degree of coherence between the grade-level SLE and the content claim(s)
  - 0, 1, 2, or 3 rating
  - Rationale
- Come to consensus as a group

Degree of Coherence

- Degree of Coherence: the degree to which the SLE supports the content claim(s)

Code	Description
0	The SLE provides little to no evidence in support of the claim(s)
1	The SLE provides some evidence in support of the claim(s), but there are notable gaps in the evidence provided
2	The SLE provides some evidence in support of the claim(s) in general, with small gaps in the evidence provided
3	The SLE provides full evidence in support of the claim(s)

Consensus

- Do all group participants agree on the same rating?
  - If not, discuss to achieve consensus
- Do all group participants agree on the rationale? Are there multiple rationales?
  - Provide reasoning for why you selected one of the four codes
    - Why does the SLE reflect/not reflect evidence for the content claim(s)?
    - What gaps do you see between the SLE and the content claim(s)?

Rating Sheet Example

Rationale for Rating

Grade

Degree of Coherence for focal KSA/EU

Rationale for Rating

Degree of Coherence for SLE

Additional Evidence Sheet

Explanation

Grade

Yes/No

Explanation

Yes/No

Quick Tip

- It will help to rate by grade. Thus, we suggest first rating the degree of coherence for the focal KSAs/EUs to the content claim(s) for grade 3, then the degree of coherence for the SLE to the content claim(s) for grade 3, etc.

Vertical Coherence

Rating Task #3 for Panelists: Vertical Coherence

- After completing the rating tasks, you will use the Vertical Coherence Form to provide a holistic rating of the focal KSAs/EUs and SLEs across grade spans:
  - To what extent do the focal KSAs/EUs or SLEs differ within a grade band in terms of breadth, depth, and introducing new content? Across grade bands?
  - To what extent do the focal KSAs/EUs or SLEs differ within a grade band include prerequisite skills? Across grade bands?
  - To what extent do the focal KSAs/EUs or SLEs include the same skills within a grade band? Across grade bands?
- Each content area will investigate the vertical coherence of the focal KSAs/EUs and SLEs at the *grade span* level:
  - You are investigating the coherence across grade span 3-6 and grade span 7-8 and 11

Vertical Coherence

- *Broader*: The focal KSAs/EUs or SLEs cover more content than the previous grade band
- *Deeper*: The focal KSAs/EUs or SLEs include more complex content than the previous grade band
- *New content*: The focal KSAs/EUs or SLEs introduce content that was not included in the previous grade band
- *Prerequisite skills*: The focal KSAs/EUs or SLEs in the previous grade band include prerequisite skills
- *Same*: The same skills are included in both grades

Vertical Coherence Form

NCSC Vertical Coherence Form

Vertical Coherence of Content within and across Grade Bands in the NCSC 2015 Operational Assessment Targets

Please provide a holistic judgment about the differences found across the grades within a grade band or across the grade bands for the focal KSAs/EUs or SLEs. Using the following definitions (Webb, 2005), please indicate the degree to which the change is evident. When there is some level of vertical coherence, provide at least one example. Use the notes of interest column to capture anything of importance.

(a) *broader* – higher-grade focal KSAs/EUs or SLEs reflect broader application of target skill or knowledge;
(b) *deeper* – higher-grade focal KSAs/EUs or SLEs reflect deeper mastery of the target skill or knowledge;
(c) *prerequisite* – the lower-grade focal KSAs/EUs or SLEs reflect a prerequisite skill for mastery of the higher grade standard;
(d) *new* – the higher-grade has a new skill or knowledge unrelated to skills or knowledge covered at prior grades; and
(e) *identical* – higher-grade focal KSAs/EUs or SLEs appear identical to one of the lower-grade focal KSAs/EUs or SLEs.

Content Area:_____

Vertical Relationship	Ratings Per Grade Level/Grade Band				Examples	Notes of Interest
	@75%	@50%	@25%	@0%		
Broader						
Deeper						
Prerequisite						
New						
Identical						

This form is based on the work by: Flowers, C., Bibbarras, S., Browder, D. & Karpuzen, M. (2007). *Links for academic learning: An alignment protocol for alternate assessments based on alternate achievement standards*. Charlotte, North Carolina: University of North Carolina at Charlotte.

Quick Tips

- When rating the vertical coherence, look at the skills and content in focal KSAs/EUs or SLEs at each grade span as a whole
- The percentages represent estimates of the overall skills or content (e.g., 25% of the skills and content at grade 4 are broader than the skills and content at grade 3)
  - The sum of percentages across categories does not need to equal anything

Rating Task #4 for Panelists

- Overall, what is your judgment?
- Now that you've looked at the progression of the focal KSAs/EUs and SLEs across grades, and the vertical coherence within and across grade spans, do we strong evidence to support coherence in terms of our instruction and assessment model?
  - Rating of agree/disagree

Holistic Judgment Form

Holistic Judgment Form

Content Area:_____

Consider the progression of the focal KSAs/EUs and the SLES across grades, and the vertical coherence within and across grade spans when reviewing the statements below. Please indicate your selection to the statement by circling your answer. *Only answer for the content area you evaluated.*

1. The evaluation of KSA/EUs within and across grades 3-8 and 11 showed evidence of strong coherence between the measurement model and NCSC's long term outcome of college, career, and community readiness as expressed in the content claims.

Strongly Disagree Disagree Agree Strongly Agree

Rationale:

Next Steps

- Break into your content area groups
  - Mathematics, reading, or writing
- Table leaders will briefly review the process
- Table leaders will walk through the first rating to ensure understanding
- Questions?

Appendix D: Example Rating Form

Content Area:

Grade	Focal KSA/EU Degree of Coherence with Content Claims	Rationale	SLE Degree of Coherence with Content Claims	Rationale
3				
4				
5				
6				
7				
8				
11				

Appendix E: Vertical Coherence Form

Vertical Coherence of Content across Grades/Grade Bands in the NCSC 2015 Operational Assessment Targets

Please provide a holistic judgment about the differences found across the grade levels or grade bands for the focal KSAs/EUs or SLEs. Using the following definitions (Webb, 2005), please indicate the degree to which the change is evident. When there is some level of vertical coherence, provide at least one example. Use the notes of interest column to capture anything of importance.

(a) *broader*—higher-grade focal KSAs/EUs or SLEs reflect broader application of target skill or knowledge;
(b) *deeper*—higher-grade focal KSAs/EUs or SLEs reflect deeper mastery of the target skill or knowledge;
(c) *prerequisite*—the lower-grade focal KSAs/EUs or SLEs reflect a prerequisite skill for mastery of the higher grade standard;
(d) *new*—the higher-grade has a new skill or knowledge unrelated to skills or knowledge covered at prior grades; and
(e) *identical*—higher-grade focal KSAs/EUs or SLEs appear identical to one of the lower-grade focal KSAs/EUs or SLEs.

Content Area:_____

Vertical relationship	**Ratings per grade level/grade band**				**Examples**	**Notes of interest**
	@75%	@50%	@25%	@0%		
Broader						
Deeper						
Prerequisite						
New						
Identical						

Adapted from *Links for academic learning: An alignment protocol for alternate assessments based on alternate achievement standards* (p. 72), by C. Flowers, S. Wakeman, D. Browder, and M. Karvonen, 2007, Charlotte, NC: University of North Carolina. Copyright 2007 by University of North Carolina at Charlotte. Adapted with permission.

Appendix F: Holistic Judgment Form

Content Area:_____

Consider the progression of the focal KSAs/EUs and the SLES across grades, and the vertical coherence within and across grade spans when reviewing the statements below. Please indicate your selection to the statement by circling your answer. *Only answer for the content area you evaluated.*

1. The evaluation of the focal KSA/EUs within and across grades 3-8 and 11 showed evidence of strong coherence between the measurement model and NCSC's long-term outcome of college, career, and community readiness as expressed in the content claims.

Strongly Disagree Disagree Agree Strongly Agree

Rationale:

2. The evaluation of SLEs within and across grades 3-8 and 11 showed evidence of strong coherence between the instructional model and NCSC's long-term outcome of college, career, and community readiness ass expressed in the content claims.

Strongly Disagree Disagree Agree Strongly Agree

Rationale: