



# **Alignment of the ACT to the Wisconsin Academic Standards in ELA and Mathematics**

## **Final Report**

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## Executive Summary

The Wisconsin Student Assessment System (WSAS) includes a series of assessments designed to measure what students know and can do in core academic areas. At high school (grade 11), this system includes the ACT tests of Reading, Math, English, Science, and Writing. As a part of the validation effort for the WSAS, the Wisconsin Department of Public Instruction (WDPI) sought an independent alignment study evaluating how the content of the ACT in ELA (Reading, English, Writing), and Mathematics tests aligned with the Wisconsin Academic Standards (WAS) that were adopted by Wisconsin in 2010. ACS Ventures, LLC (ACS) was contracted to complete this independent alignment study in October of 2017. This report documents the process, results, and findings from the alignment study.

The specific process for this study was created to meet the needs of the WDPI and gather the information needed for documentation, reporting, and supporting the claims made based on the administration of the ACT to Wisconsin high school students. Subject matter experts (panelists) were asked to review the connections between the WAS and the ACT by aligning the ACT College and Career Readiness Standards (CCRS) and the ACT content (items, task scoring elements) to the WAS. Panelists were recruited for the study by WDPI; most of the panel included educators from across the state. Panelists were provided training on the alignment study purpose, process, and the specific judgments they were to make. Over three days, the panelists completed three tasks which included a combination of independent judgments and group consensus discussions.

Following the study, a series of analyses were conducted to determine what these judgments said about the alignment of the ACT to the WAS. Several key results were identified:

- **Alignment of ACT to WAS - Content:** All ACT CCRS were aligned to the WAS as were all ACT items (except one Mathematics item) which supports the claim that the ACT is measuring knowledge, skills, and abilities (KSAs) that are included in the WAS. In Mathematics, some ACT CCRS (44%) and items (25%) were identified as targeting foundational KSAs that are typically addressed at lower grade levels.
- **Alignment of ACT to WAS - Depth of Knowledge:** For both ELA and Mathematics, panelists identified the WAS standards as targeting DOK levels 2 and 3 and items/tasks targeting DOK levels 2 and 3 (primarily) with some DOK level 1 and 4 in ELA. Across all ACT subject areas, approximately half of the items/tasks were at or above the DOK target for the aligned standards.
- **Coverage of the WAS by the ACT – Content Areas:** Each domain of the WAS in ELA and Mathematics was represented by ACT standards and ACT items. The only exception in ELA were domains that specifically referenced application of skills that could not be measured by an item or task on a standardized assessment or the connection could not be identified through a standards-standards or items-standards alignment. Within particular domains, the amount of alignment often varied across standards indicating that some were targeted more frequently than others. This resulted in some standards and domains not meeting the criteria recommended for Webb’s alignment criteria.
- **Coverage of the WAS by the ACT – Ability Levels:** The WAS domains in both ELA and Mathematics were aligned to content across all score ranges of the ACT indicating that measurement spanned the ability levels assessed by the ACT.

An evaluation framework for validity evidence was applied to the process and results. Overall, there was a substantial amount of validity evidence supporting the outcomes of this study for use by WDPI.



# Introduction

The Wisconsin Student Assessment System (WSAS) includes a series of assessments designed to measure what students know and can do in core academic areas. At high school (grade 11), this system includes the ACT tests of Reading, Mathematics, English, Science, and Writing. As a part of the validation effort for the WSAS, the Wisconsin Department of Public Instruction (WDPI) sought an independent alignment study evaluating how the content of the ACT in ELA (Reading, English, Writing) and Mathematics tests aligned with the Wisconsin Academic Standards (WAS). ACS Ventures, LLC (ACS) was contracted to complete this independent alignment study in October of 2017.

Traditional educational assessment processes involve developing measures that are intended to evaluate students’ learning based on the curriculum designed to reflect the statewide academic content standards. The alignment process is often conducted as an independent evaluation as to whether the test content supports the intended interpretation of test scores thus providing validity evidence for the use of the test in this way. This is accomplished by having subject matter experts (SMEs) identify the fit between the content of the assessment and the target standards. In the current study, these same concepts were used to evaluate the alignment between the ACT and WAS. The specific process created for this study was done to capture the evidence needed to evaluate the fidelity of the claims about student learning in reference to the WAS.

## Panelists

Two panels were formed to provide the expert judgments which would serve as the foundation for this study: Mathematics and English Language Arts (ELA, inclusive of Reading, Language, and Writing). The group of subject matter experts (SMEs) serving as panelists was selected by WDPI to represent the types of educators working across the state with these students. Two additional panelists (one per subject area) who have expertise working with the WAS on a national level were included to provide an additional perspective. The qualifications and expertise of each panel is provided in Table 1. As is evidenced in the information presented, the panelists represented several districts/organizations, had extensive experience in education, and most held graduate level degrees in their respective professional areas. Additional information about the professional background and experience of the panelists can be found in Appendix A.

**Table 1. Summary of Panelist Expertise and Experience**

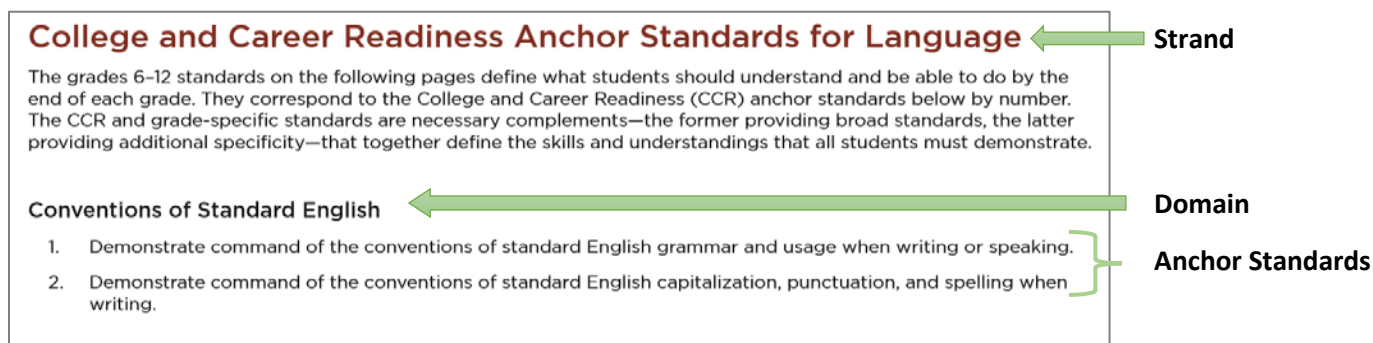
	ELA	Math
Panelists	7	7
Districts/Organizations Represented	7	7
Years of Experience	21.0	15.1
Highest Degree		
Bachelors	1	0
Masters	6	7
Current Position		
Teacher	5	6
Researcher	1	1
Coordinator	1	0

## Alignment Approach

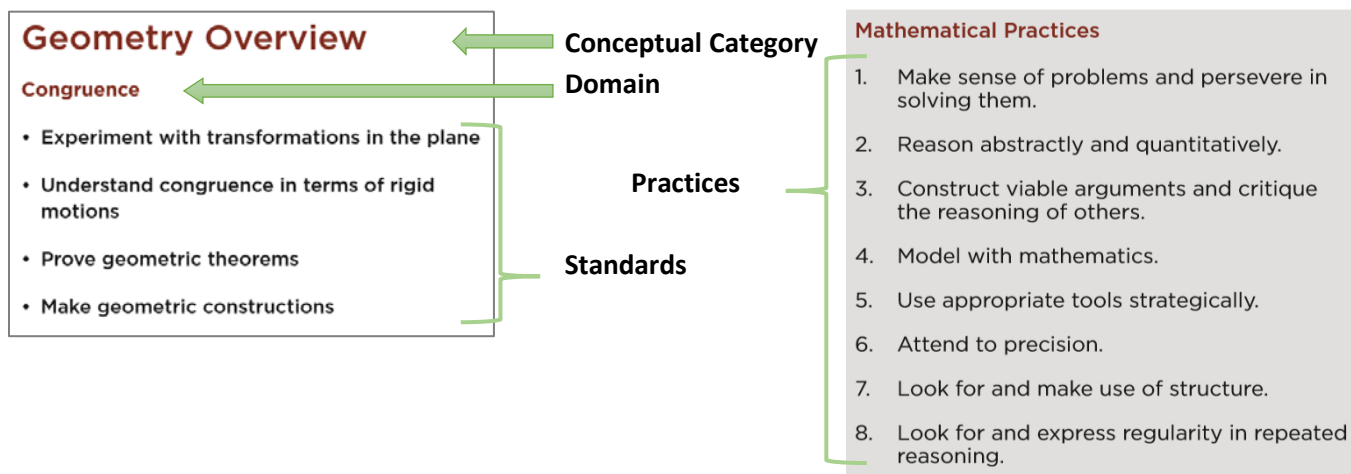
The overall alignment process was designed through a collaborative effort between ACS and WDPI (including input from their Technical Advisory Committee). The specific judgments to be made were determined based on the organization of the WAS, the organization of the ACT, and the use of the ACT as the Wisconsin high school assessment.

The WAS are organized by subject areas (ELA, Mathematics), strands (ELA) /conceptual category (Mathematics), domains<sup>1</sup> and standards (anchor standards in ELA with subsumed grade-specific standards, standards in mathematics<sup>2</sup>). In addition, the Math WAS also includes a series of mathematical practices that are common across all conceptual categories within math. The organization of the WAS is shown in Figures 1a and 1b.

**Figure 1a. Organization of Expectations within ELA Standards**



**Figure 1b. Organization of Expectations within Mathematics Standards**



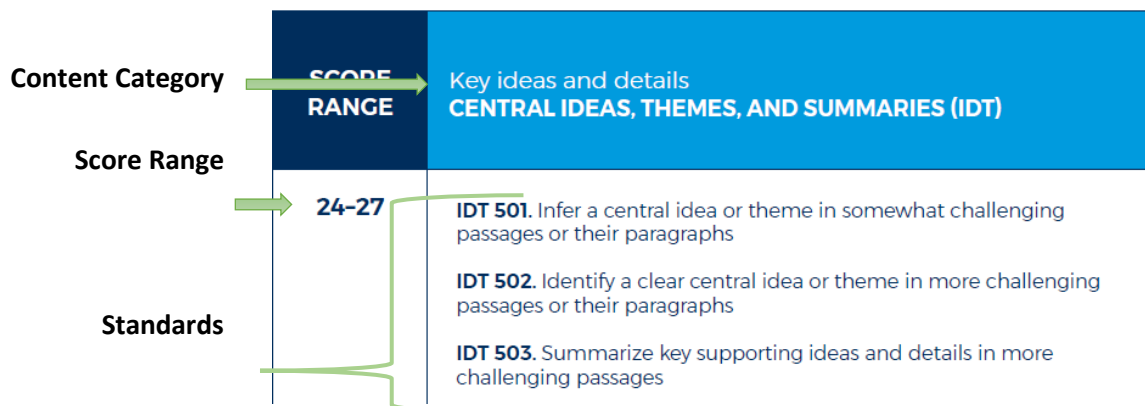
<sup>1</sup> The term "Domains" is used in the description of the Mathematics WAS standards but not specifically the ELA. This term is used here to define the identified level.

<sup>2</sup> The expectations at this level (see Figure 1b) are sometimes referred to as "clusters" but this term is also used to refer to a set of expectations that includes the level shown in Figure 1b as well as the subsumed standards.



The framework for the ACT that was used throughout this study is organized into subject areas (Reading, English, Writing, Mathematics, Science), content categories<sup>3</sup> within each subject area, score ranges that indicate a given level of proficiency within each content category, and standards (ACT college and career readiness standards, CCRS) that are characteristic of each score range within each reporting category (see Figure 2). The knowledge, skills, and abilities (KSAs) outlined in the CCRS are then operationalized through items and tasks on the ACT test forms (Reading = 40 items/form, English = 75 items/form, Writing = 1 task/form, Mathematics = 60 items/form).

**Figure 2. Organization of ACT Content Categories, Score Ranges, and Standards**



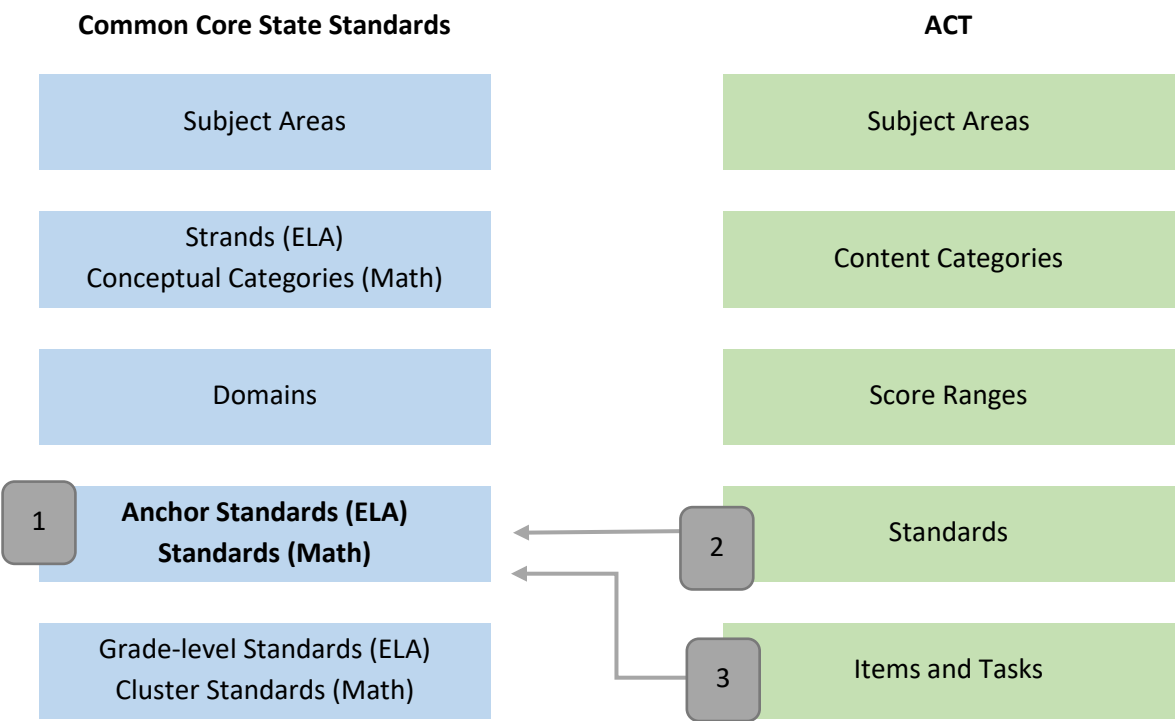
It was determined that alignment would be evaluated at multiple levels in order to develop a comprehensive picture as to how the KSAs outlined in the WAS were measured by the ACT (shown graphically in Figure 3). For the WAS, the focus was on the higher-level standards (bolded in Figure 3) for several reasons. First, this level of content standard in the WAS represents the fundamental college and career readiness expectations that Wisconsin has for students once they complete high school (rather than the specific tasks articulated for each grade). Second, the ACT is designed to measure the culmination of learning from a student throughout their academic career rather than to test a single year of high school in any given content area or represent the subject matter a student has covered within a single course. Third, the goal of the current alignment study was to evaluate how well the KSAs measured by the ACT represented the essential or core components of the WAS. Although this level was the focus for alignment of this study, panelists had access to the more detailed specific standards (ELA grade-level standards, Math cluster standards) for reference if they wanted to clarify all that was included within a standard.

<sup>3</sup> For ELA, this level also represents the ACT reporting categories. For Mathematics this level has some parallelism to the ACT reporting categories but there are some differences based on the organization of the content. Therefore, this level is generically referred to in this report as the ACT content categories.



For the ACT, the alignment judgments were focused on two levels. The first is the ACT CCRS<sup>4</sup> which outline the KSAs that underlie the ACT items. Each standard is classified within an ACT scale score range and a subject-area content category. The second level is the items and tasks from which the standards were defined. Focusing on these levels not only allowed for a direct connection from two levels of the ACT to the WAS, but also for the results to be summarized at the higher levels in the WAS (e.g., domains) and the ACT (score ranges, content categories).

**Figure 3. Graphical Representation of WAS and ACT Organization with Alignment Tasks Identified**



With this perspective, the panelists were asked to complete three alignment tasks within this study (see numbers in Figure 3). The first task was to review the WAS (anchor standards for ELA, standards for Math) and determine the appropriate depth of knowledge (DOK) target for each. Panelists were asked to make these judgments independently using Webb’s DOK framework (see Appendix B for resources). When a standard could be measured at multiple DOK levels, panelists were asked to identify the level of cognitive processing that would be most appropriate for students at this level (e.g., high school). Because many of the WAS are written at a broad level, panelists referred to the grade-specific standards (ELA) or cluster standards (Mathematics) to develop a better understanding as to how each standard is operationalized. These independent judgments then became the foundation for a panel-level discussion during which time the panelists came to a final consensus judgment. By completing this activity first, panelists were able to discuss all WAS, the intended measurement

<sup>4</sup> Full copies of the ACT Standards can be found in Appendix B or accessed here:  
<http://www.act.org/content/act/en/education-and-career-planning/college-and-career-readiness-standards.html>

focus of each, and the types of challenges that were presented to students within each. These ratings were to be used to evaluate whether the aligned items matched the DOK of the identified WAS.

The second task was to align the ACT CCRS to the WAS. Specifically, each ACT standard was reviewed and the aligned WAS (one or multiple) was identified. Panelists were instructed to only record alignment if they felt there was a direct connection based on the wording of the standard and/or the underlying KSAs. For this aspect of the work, each panel was split into two subpanels with each panel reviewing all of the ACT CCRS but responsible for rating approximately 50%. This process was conducted by first having panelists make independent ratings and then having consensus discussions to determine the group decision. For Mathematics, panelists also identified the Mathematical Practice(s) that were aligned to each CCRS.

The third task was to align the ACT items and task scoring elements (writing) to the WAS. Panelists were asked to review each item on the ACT test form and determine (1) the DOK of the item, and (2) the content alignment of the item to the WAS. For DOK, if an item was identified as requiring multiple levels of DOK, panelists were asked to record the highest that a student at this grade level would reasonably demonstrate to determine the correct answer. For the content alignment, panelists were instructed to only indicate an item was aligned if the KSAs included within a (WAS) standard were required to determine the correct answer to the item. For Mathematics, this also included identifying the associated Mathematical Practices. Based on a recommendation from the ACT, the panels each reviewed three forms of the test so that the full results could account for the content variations that exist among ACT forms due to domain sampling. The panel completed the alignment process for the first form by making independent judgments and then coming to consensus on all ratings (DOK and content alignment). Completing the first form in this way allowed for the panelists to calibrate on identifying the DOK of an item and judging content alignment (and mathematical process alignment). The second and third forms of the ACT were conducted in the same fashion but in subpanels. As a final step in the study, panelists completed an evaluation of the alignment process.

The ELA panel was tasked with reviewing the three subjects encompassed in this area (Reading, English, Writing) and completing each task for each subject. During their review they were provided with full copies of all ELA-relevant standards (Reading, Language, Writing) from which to determine alignment. However, the panel was asked to identify primary alignment (i.e., not search for all possible ways to align an item) and began this search with the focal subject area (e.g., Reading->Reading, English->Language, Writing->Writing). In some cases, the ELA panel did identify cross-subject area alignment but when there was a primary alignment in the focal subject area, the panel did not extensively search for alignment in other subject areas. However, given the organization of the WAS, it is understood that this may have existed due to similarity in standards<sup>5</sup>.

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<sup>5</sup> An example of this similarity would be Reading standard 4 (Interpret words and phrases as they are used in text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone) and Language standard 4 (Determine or clarify the meaning of unknown and multiple-meaning words and phrases by using context clues, analyzing meaningful word parts, and consulting general and specialized reference materials, as appropriate).





## Study Process

ACS was responsible for preparing all materials and facilitating the meeting. ACT staff provided access to the secure testing materials that were used throughout the study. On the first day, panelists were welcomed by ACS staff (Dr. Susan Davis-Becker and Dr. Andrew Wiley) who explained the purpose of the meeting, the rules regarding test security, and provided the panelists with an orientation to the overall process and training on the specific judgments they were to make. During this general session, panelists signed a confidentiality agreement with ACT and completed a demographic form documenting their expertise and experience.

Panelists then met in their subject area panels (ELA, Mathematics) to begin their work. Table 2 provides an overview as to how the work was organized and completed by each panel. Although the ELA panel worked subject-by-subject through each task (ACT Reading, ACT Writing, ACT English), they were allowed to identify alignment across subjects (e.g., had access to the full set of WAS for ELA, English items could be aligned to the Writing standards) based on where they felt the best match was identified.

**Table 2. Work Process for each Alignment Panel**

	Day 1	Day 2	Day 3
<b>ELA</b>	Orientation and Training  <i>Reading</i> <ul style="list-style-type: none"><li>- Task 1</li><li>- Task 2</li><li>- Task 3</li></ul>	<i>Writing</i> <ul style="list-style-type: none"><li>- Task 1</li><li>- Task 2</li><li>- Task 3</li></ul> <i>English</i> <ul style="list-style-type: none"><li>- Task 1</li><li>- Task 2</li><li>- Task 3 (Form 1)</li></ul>	<ul style="list-style-type: none"><li>- Task 3 (Form 1, continued)</li><li>- Task 3 (Forms 2/3)</li></ul> Evaluation and wrap up
<b>Mathematics</b>	Orientation and Training  Task 1  Task 2	Task 2 (continued)  Task 3 (Form 1)	Task 3 (Forms 2/3)  Evaluation and wrap up



## Results

The results are summarized by task within this section of the report. Details on each task, including the consensus ratings, can be found in the Appendices. The tables within this section provide a summary of the results from which the major findings and conclusions are drawn.

### Task 1

The panelists identified the targeted DOK level for each of the WAS and the results are summarized in Table 3 and detailed in Appendix C. The panelists discussed the multifaceted nature of the standards and how there were multiple levels at which a particular standard could be assessed. However, the panelists were asked to identify the target level for each standard for this grade level with the understanding that the KSAs within a standard targeting a DOK level build upon the KSAs developed at lower DOK levels. As is shown in the Table, the majority of WAS anchor standards for ELA were identified as targeting DOK level 3 and the majority of WAS standards for Mathematics were identified as targeting at the DOK level 2 with most of the remaining standards targeting DOK 3.

**Table 3. Task 1 Results by Subject Area**

WAS Subject Area	DOK 1	DOK 2	DOK 3	DOK 4
ELA	0	5	14	5
Reading	0	1	8	0
Language	0	3	3	0
Writing	0	1	3	5
Mathematics	1	31	19	3

### Task 2

The panelists were able to identify the linkages between the ACT CCRS and the WAS. The level of direct alignment varied by subject area but focused on primary alignment to WAS in the focal area:

- ELA
  - Reading: All ACT CCRS were aligned to the Reading WAS anchor standards. Two ACT CCRS were identified to be at a notably lower DOK level than the aligned anchor standard
  - English: All ACT CCRS were aligned to the Language WAS anchor standards.
  - Writing: All ACT CCRS were aligned to the WAS anchor standards. Most ACT standards (4 out of 5 sections) were aligned to the WAS anchor standards in Writing and the remaining section was aligned to the Language WAS anchor standards.
- Mathematics
  - All ACT CCRS were aligned to the WAS Mathematics standards. Most (~56%) were aligned to the high school standards and the remaining (~44%) were aligned to middle school standards indicating the targeted KSAs were foundational.
  - All ACT CCRS were aligned to the WAS mathematical practices that are common across all conceptual categories within the WAS standards.



As shown in Tables 4a-4e, the results from this task can be summarized to show the alignment at the standard level between the ACT and the WAS organized by (1) ACT content categories and (2) ACT Score Ranges (consensus ratings found in Appendix D).

The Reading results presented in the first few rows of Table 4a show the percentage of ACT CCRS, within each content category, that were aligned to each of the WAS Domains. These results show that the expected pattern was found given the similarity between the organization of each set of standards (WAS and CCRS) and the panel's task of aligning to the focal area of the WAS. Some ACT CCRS were aligned to other WAS domains which reflects the overlap of content in these various areas. In the lower part of the Table, the results show that the CCRS aligned to each Domain of the WAS were distributed across the ACT score ranges. Stated another way, within each score band there are standards aligned to all WAS domains indicating that students at all ability levels should have the opportunity to demonstrate their knowledge and skills within each domain. Although no CCRS were aligned to the *Range of Reading and Level of Text Complexity* domain, the ACT CCRS do reference application of Reading skills and abilities to texts with a variety of challenge levels (e.g., somewhat challenging, more challenging, and complex passages). Therefore, each ACT CCRS that mentions a varying level of text complexity could be seen as measuring this expectation.

**Table 4a. Task 2 Reading Results Organized by ACT Content Category and Score Range**

WAS Domains ->	Key Ideas and Details	Craft and Structure	Integration of Knowledge and Ideas	Total
<b>ACT Content Categories</b>				
Key ideas and details	78%	22%	0%	100%
Craft and structure	0%	100%	0%	100%
Integration of Knowledge and Ideas	33%	0%	67%	100%
<b>ACT Score Ranges</b>				
13-15	40%	40%	20%	100%
16-19	25%	58%	17%	100%
20-23	50%	40%	10%	100%
24-27	43%	50%	7%	100%
28-32	45.5%	45.5%	9%	100%
33-36	48%	43%	9%	100%

\* No ACT CCRS were aligned to the Domain of *Range of Reading and Level of Text Complexity* and therefore these are not listed in the above Table.

The English results (shown in Table 4b) indicate ACT CCRS largely aligned as expected to the focal area standards given the parallelism between these categories and the domains within the WAS<sup>6</sup>. In the lower part of the Table, the results show the proportion of ACT CCRS – within a score range – that were aligned to each of the WAS

<sup>6</sup> The ELA panel focused on finding alignment to the Reading WAS but noted similarity between some standards in Reading and Language.



domains. The proportion varies across domains but there is an overall distribution of CCRS within each score range across WAS Domains.

**Table 4b. Task 2 English Results Organized by ACT Content Category and Score Range**

WAS Domains ->	Conventions of Standard English	Knowledge of Language	Vocabulary Acquisition and Use	Total
<b>ACT Content Categories</b>				
Production of Writing	0%	25%	75%	100%
Knowledge of Language	0%	50%	50%	100%
Conventions of Standard English Grammar, Usage, and Punctuation	92%	8%	0%	100%
<b>ACT Score Ranges</b>				
13-15	60%	10%	30%	100%
16-19	47%	21%	32%	100%
20-23	28%	32%	40%	100%
24-27	32%	25%	43%	100%
28-32	36%	28%	36%	100%
33-36	36%	28%	36%	100%

The Writing results (shown in Table 4c<sup>7</sup>) show specific connections of the ACT content categories to two of the WAS Writing domains and one WAS Language domain. The results in the later part of the Table confirm that the KSAs measured by the ACT are distributed across the ACT score ranges within each of the WAS Domains.

**Table 4c. Task 2 Writing Results Organized by ACT Content Category and Score Range**

WAS Domains ->	Text Types and Purposes	Production and Distribution of Writing	Conventions of Standard English (LANGUAGE)	Total
<b>ACT Content Categories</b>				
Expressing Judgments	100%	0%	0%	100%
Focusing on the Topic	0%	100%	0%	100%
Developing Ideas	100%	0%	0%	100%
Organizing Ideas	0%	100%	0%	100%
Using Language	0%	0%	100%	100%
<b>ACT Score Ranges</b>				
3-4	40%	40%	20%	100%
5-6	40%	40%	20%	100%
7-8	36%	46%	18%	100%

<sup>7</sup> ACT has recently published a revised version/organization of the Writing Standards as compared to the version used in this study. The content largely remains the same, but the wording was updated to better align to the current task and there is no longer a “Focusing on the Topic” category.



WAS Domains ->	Text Types and Purposes	Production and Distribution of Writing	Conventions of Standard English (LANGUAGE)	Total
9-10	36%	46%	18%	100%
11-12	36%	46%	18%	100%

\* No ACT CCRS were aligned to the Domains of *Research to Build and Present Knowledge* or *Range of Writing* and therefore these are not listed in the above Table.

The Math results for Task 2 are summarized in Tables 4d and 4e. In Table 4d, the content connections between the CCRS<sup>8</sup> within the ACT Content Categories and the WAS Mathematics conceptual categories follow an expected pattern (e.g., Number and Quantity aligned to Number and Quantity). In addition, the panel found some CCRS that were targeting more foundational KSAs and were therefore aligned to WAS at lower grade levels (e.g., middle school). In terms of the score range, the results in Table 4d show the CCRS within each WAS Mathematics conceptual category had aligned content across the score ranges. Those items that were identified as best aligning to grade levels other than high school were predominantly from the lower score ranges. This same information is also provided in Table 4e for the Mathematical practices. Each ACT CCRS was identified as connected to one (sometimes more) of the Mathematical practices. As is evident from these results, some practices were identified more frequently but all were represented to some degree by content area and score range. Important to note is that the alignment did not consider the structure and requirements of overall ACT test forms. As a result, it is a somewhat reductionist process, and some aspects of the ACT, such as providing a range of problems that a student need to address may not be captured.

**Table 4d. Task 2 Math Results Organized by ACT Content Category and Score Range (Mathematics Conceptual Categories)**

WAS Domains ->	Number and Quantity	Algebra	Functions	Geometry	Statistics and Probability	Other Grades
<b>ACT Content Categories</b>						
Number and Quantity	52%	0%	0%	0%	0%	48%
Algebra	6%	62%	23%	0%	0%	9%
Functions	0%	29%	68%	0%	0%	3%
Geometry	2%	0%	0%	83%	0%	15%
Statistics and Probability	0%	0%	0%	0%	91%	9%
<b>ACT Score Ranges</b>						
13-15	8%	17%	0%	0%	0%	75%
16-19	0%	11%	5%	5%	33%	44%
20-23	7%	20%	7%	23%	17%	26%
24-27	12%	23%	27%	15%	10%	13%
28-32	11%	23%	14%	29%	14%	9%
33-36	13%	21%	36%	13%	17%	0%

<sup>8</sup> Some ACT standards are double counted in this table as they are coded to both Algebra and Functions.



**Table 4e. Task 2 Math Results Organized by ACT Content Category and Score Range (Mathematical Practices)**

	1	2	3	4	5	6	7	8
<b>ACT Content Categories</b>								
Number and Quantity	0%	20%	3%	0%	3%	10%	57%	7%
Algebra	5%	26%	0%	18%	7%	11%	31%	2%
Functions	9%	26%	0%	21%	5%	5%	26%	7%
Geometry	6%	2%	4%	23%	15%	31%	17%	2%
Statistics and Probability	30%	0%	13%	23%	3%	17%	3%	10%
<b>ACT Score Ranges</b>								
13-15	8%	8%	0%	8%	8%	50%	8%	8%
16-19	9%	13%	0%	13%	9%	39%	9%	9%
20-23	6%	12%	3%	18%	12%	18%	24%	6%
24-27	8%	20%	3%	15%	7%	12%	32%	3%
28-32	14%	12%	0%	26%	5%	14%	30%	0%
33-36	8%	21%	10%	13%	3%	5%	31%	10%

### Task 3

The item level alignment results were analyzed in multiple ways. Table 5 shows the summative results by subject area. Across all areas, the items were identified as assessing a range of DOK levels and approximately half of the content was at or above the DOK of the standard to which it was aligned. As noted above, the panelists were asked to identify a standard-level DOK target which represents a culmination of KSAs at multiple DOK levels. In addition, all items were identified as aligned by content to the WAS (with the exception of one item in Mathematics) with a few being aligned to multiple WAS. Finally, all ELA items were aligned to the high school WAS as were most Mathematics with a portion identified as aligned to foundational standards in the WAS (i.e., appear at an earlier grade level).

**Table 5. Task 3 Results by Subject Area**

ACT Subject Area	Depth of Knowledge				At or Above Standard	Content Alignment		
	1	2	3	4		Total	Multiple Standards	High School
Reading	31%	51%	18%		35%	100%	<1%	100%
English	19%	57%	24%		50%	100%	11%	100%
Writing			50%	50%	85%	100%	All 4 criteria	100%
Mathematics	5%	84%	11%	0%	60%	99.5%	13%	75%

The percent of items aligned by Standard is shown in Tables 6a through 6c. In some cases, the cumulative percentages in a subject sum to more than 100% as some items were aligned to multiple standards. For some standards, the results indicate that 0% of the items aligned were matched to that standard. However, this may be characteristic of the selection of forms reviewed as other forms may sample content that is aligned to these standards. For Reading (Table 6a), items were aligned to all but one domain and all but two standards. The first of these (R7) requires analyzing content across mediums. The second (R10) involves reading and full comprehension across multiple types of texts. As noted in Task 2, it was not expected that any one



ACT CCRS or item would address this item as written. Rather, the standard is largely addressed by the set of Reading passages and items included on the test form which was not measured directly through this task.

**Table 6a. Percent of ACT Reading items aligned to each WAS Reading Standard and Domain**

Standard	Percent of Items
<b>Key Ideas and Details</b>	<b>63%</b>
R1	48%
R2	11%
R3	5%
<b>Craft and Structure</b>	<b>29%</b>
R4	16%
R5	6%
R6	8%
<b>Integration of Knowledge and Ideas</b>	<b>8%</b>
R7	0%
R8	3%
R9	6%
<b>Range of Reading and Level of Text Complexity</b>	<b>0%</b>
R10	0%

The results for the Language and Writing WAS are shown collectively in Table 6b as items from the English and the scoring elements from the Writing task were aligned to both sets of WAS<sup>9</sup>. For the Language WAS, items were aligned to all three Language domains and all but two standards. One of these two Standards, one (L6) refers to the acquisition and use of general academic and domain-specific vocabulary which may not be suitable for testing in this format. In addition, some alignment was identified between the English items and the Writing standards. For the Writing task, the scoring elements (4 in total) were aligned to all but one of the Writing domains and all the Language domains. The standards-level results (expressed as a percent of the scoring elements that were aligned) were expected as the standards to which no content was aligned referenced a different type of writing than is measured on the ACT (W2, W3) or more extended writing efforts that integrated research and editing (W5, W6, W7, W8, W10).

**Table 6b. ACT English items and Writing scoring elements aligned to each WAS Language/Writing Standard.**

Standard	Percent of English Items	Writing Scoring Elements
<b>LANGUAGE</b>		
<b>Conventions of Standard English</b>	<b>37%</b>	<b>25%<sup>10</sup></b>
L1	12%	25%

<sup>9</sup> As noted previously, the ELA panel approached this task by first searching the most relevant standards for a primary alignment (English-> English) and then reviewed other standards when alignment was not identified in this source.

<sup>10</sup> This domain-level total only sums to 25% as the same scoring element (Language Use) was aligned to both standards L1 and L2



Standard	Percent of English Items	Writing Scoring Elements
L2	25%	25%
<b>Knowledge of Language</b>	<b>53%</b>	<b>25%</b>
L3	53%	25%
<b>Vocabulary Acquisition and Use</b>	<b>4%</b>	<b>25%</b>
L4	0%	
L5	4%	25%
L6	0%	
<b>WRITING</b>		
<b>Text Types and Purposes</b>	<b>0%</b>	<b>100%</b>
W1	0%	100%
W2	0%	
W3	0%	
<b>Production and Distribution of Writing</b>	<b>6%</b>	<b>100%</b>
W4	0%	100%
W5	6%	
W6	0%	
<b>Research to Build and Present Knowledge</b>	<b>0%</b>	<b>25%</b>
W7	0%	
W8	0%	
W9	0%	25%
<b>Range of Writing</b>	<b>0%</b>	<b>0%</b>
W10	0%	

The results for Mathematics (Table 6c) show that there are a large number of standards to which a small percentage of items were aligned (e.g., 1% or 2%) indicating the aligned items were spread across the standards. In addition, there was a sizeable proportion of the items aligned to each of the mathematical practices.

**Table 6c. Percent of Mathematics Items Aligned to each WAS Mathematical Practice and Standard**

Standard	Percent of items	Standard	Percent of items
<b>Mathematical Practices</b>		HSN.Q.A	3%
MP1	39%	HSN.CN.A	2%
MP2	10%	HSN.CN.B	1%
MP3	1%	HSN.CN.C	0%
MP4	16%	HSN.VM.A	0%
MP5	9%	HSN.VM.B	0%
MP6	22%	HSN.VM.A	1%
MP7	18%	<b>Algebra</b>	<b>31%</b>
MP8	5%	HSN.SSE.A	1%
<b>Number and Quantity</b>	<b>12%</b>	HSN.SSE.B	1%
HSN.RN.A	3%	HSN.APR.A	1%
HSN.RN.B	2%	HSN.APR.B	1%





Standard	Percent of items
HSN.APR.C	1%
HSN.APR.D	2%
HSN.CED.A	14%
HSN.REI.A	2%
HSN.REI.B	6%
HSN.REI.C	1%
HSN.REI.D	3%
<b>Functions</b>	<b>18%</b>
HSF.IF.A	3%
HSF.IF.B	2%
HSF.IF.C	1%
HSF.BF.A	2%
HSF.BF.B	2%
HSF.LEA.A	1%
HSF.LEA.B	0%
HSF.TF.A	2%
HSF.TF.B	3%
HSF.TF.C	2%
<b>Geometry</b>	<b>17%</b>
HSG.CO.A	1%
HSG.CO.B	0%
HSG.CO.C	3%
HSG.CO.D	0%

Standard	Percent of items
HSG.SRT.A	0%
HSG.SRT.B	1%
HSG.SRT.C	3%
HSG.SRT.D	0%
HSG.CA.A	1%
HSG.CA.B	1%
HSG.GPE.A	1%
HSG.CPE.B	3%
HSG.GMD.A	1%
HSG.CMD.B	0%
HSG.MG.A	4%
<b>Statistics and Probability</b>	<b>12%</b>
HSS.ID.A	3%
HSS.ID.B	2%
HSS.ID.C	0%
HSS.IC.A	0%
HSS.IC.B	1%
HSS.CP.A	1%
HSS.CP.B	5%
HSS.MD.A	0%
HSS.MD.B	1%
<b>Other Grades</b>	<b>25%</b>

The consensus judgments from the item-level alignment were further evaluated based on Webb's framework. In Webb's model, he describes analyzing alignment to a content framework based on several criteria.

### Categorical Concurrence

The first criterion identified by Webb is *categorical concurrence* which reflects the degree to which the items in the assessment address each part of the WAS. To determine if this criterion is met, the analysis required aggregating the content connections from the ACT items to the WAS (average across three forms). Webb (1997) recommends a criterion of six items (or score points) as an acceptable level of categorical concurrence between the standard and the measure. For ELA (26 standards and 115 items per form), this was evaluated at the standard and domain level. Given the specificity and number of standards in Mathematics (54 standards and 60 items per form), this was evaluated at the domain level. To account for the three forms reviewed, the results are analyzed based on an average (i.e., total number of items aligned divided by 3).

### Depth of Knowledge Consistency

This second criterion reflects the consistency in the cognitive level/levels measured by the assessment and the level/levels indicated within the standards. Webb suggests that a reasonable benchmark for consistency



between the assessment and the standards is that 50% or more of the items aligned to a standard should be at or above the level of knowledge of the standard. This criterion was analyzed by determining the percent of items, aligned to a standard, that were at or above the target DOK level for the standard. The results were also presented at the domain level. To account for the three forms reviewed, the results are analyzed based on an average (i.e., total number of items aligned to a standard at or above the standard DOK divided by 3).

### Range of Knowledge Consistency

The third criterion is the range-of-knowledge which is used to evaluate the correspondence between the span of KSAs identified within a domain and what is measured by an assessment. In other words, how well the content of the assessment measures the full range of what is included within a domain. Webb recommends that this criterion is met if 50% percent of the standards subsumed within a domain had to have at least one item aligned as this indicates that at least half of the standards are being measured by the assessment. For this evaluation, the domains were the unit of analysis and the WAS standards/anchor standards were evaluated for distribution of aligned content within the domain. To account for the three forms reviewed, the results are analyzed based on an average (i.e., number of standards within a domain that had at least 3 total items aligned across the forms [1 item on average]).

### Balance of Representation

The fourth criterion, balance-of-representation, indicates the degree to which one standard is given more emphasis on the assessment than another. This value represents how well the items, aligned to a domain, were distributed across the standards. This analysis only evaluates the distribution across those standards to which at least one item is aligned. The index for this criterion involves computing the difference in the proportion of the domain that the standard represents, and the proportion of items aligned to the standard using the following formula (Webb, 1995):

$$BOR\ Index = 1 - \frac{\sum \left( abs \left[ \frac{1}{\text{Number of standards (in domain) with items aligned}} - \frac{\text{Number of item hits to standard (k)}}{\text{Number of item hits to the domain}} \right] \right)}{2}$$

The Balance of Representation is not reported for domains in which there is only one standard (i.e., nothing to balance) or domains where items were only aligned to one standard. Webb recommended that values at or above 0.70 indicate an acceptable level of this criterion (and between 0.60 and 0.70 as “Weakly Met”). To account for the three forms reviewed, the results are analyzed based on the total items aligned to each standard and what proportion that represents of all the items aligned to the Domain.



The results for each of these analyses are presented in Tables 7a through 7c by subject area and domain (ELA)/conceptual category (mathematics)<sup>11</sup>. More detail, including the standard level results, are provided in Appendix E.

As shown in Table 7a, there were a large number of items aligned to particular areas within the Reading standards which impact several of the Webb criteria (CC, BOR). For example, a majority of Reading items were aligned to the *Key Ideas and Details* domain. On the other hand, because items did not directly align with *Range of Reading and Level of Text Complexity*, the categorical concurrence was not evaluated for this domain.

**Table 7a. Task 3 Results for Reading Following Webb’s Analysis**

	Aligned Items (avg)	Categorical Concurrence	Depth of Knowledge	Range of Knowledge	Balance of Representation
<b>Key Ideas and Details</b>	25.3	Met	Not Met	Meet	Not Meet
<b>Craft and Structure</b>	11.6	Met	Not Met	Met	Met
<b>Integration of Knowledge and Ideas</b>	3.3	Not Met	Met	Met	Met
<b>Range of Reading and Level of Text Complexity</b>	0	--	Not met	Not Met	--

The Webb analysis for English test is presented in Table 7b showing alignment to both the WAS Language and Writing domains. For the Language and Writing standards, the analysis represents the combined measurement opportunities between the English test and Writing task<sup>12</sup>. Similar to Reading, there were several standards to which a significant majority of items were aligned, with other standards demonstrating alignment to notably smaller numbers of items. The pattern of the alignment impacted the range of knowledge and balance of representation results.

**Table 7b. Task 3 Results for English test Following Webb’s Analysis**

	Aligned Items (avg)	Categorical Concurrence	Depth of Knowledge	Range of Knowledge	Balance of Representation
<b>Conventions of Standard English</b>	43.3	Met	Met	Met	Met
<b>Knowledge of Language</b>	50.7	Met	Not Met	Met	--
<b>Vocabulary Acquisition and Use</b>	9.0	Met	Met	Not met	--
<b>Text Types and Purposes</b>	24	Met	Met	Not met	--

<sup>11</sup> At the domain or conceptual category level, categorical concurrence was “Met” if the topic had 6 or more items aligned. The depth of knowledge criteria was met if 50% or more of the aligned items to that domain or conceptual category were at or above the DOK level of the aligned standard.

<sup>12</sup> To put the Writing task on a comparable scale as the English items, the alignment of each writing scoring element was multiplied by 6 (as a student can earn up to 6 points) and then by 3 (to be comparable with the 3 forms of the English test) for a total maximum value of 72. Given the scaling that occurs to create the overall ACT ELA score, there is no perfect way to make these scores comparable, but this approach allows for consideration of measurement in both subject areas.



	Aligned Items (avg)	Categorical Concurrence	Depth of Knowledge	Range of Knowledge	Balance of Representation
<b>Production and Distribution of Writing</b>	28.7	Met	Met	Not met	Not met
<b>Research to Build and Present Knowledge</b>	6.0	Met	Met	Not met	--
<b>Range of Writing</b>	0.0	Not met	Not met	Not met	--

The conceptual category-level results for task 3 in Mathematics are summarized in Table 7c. All conceptual categories met the expectations for categorical concurrence and most met for depth of knowledge. For some conceptual categories, the items largely aligned to particular standards thus impacting the range of knowledge. The results are also included for the Mathematical Practices. These are intended to be part of teaching the various KSAs included in the Mathematics standards. As is shown in the Table, the items were distributed across the Mathematical practices.

**Table 7c. Task 3 Results for Mathematics Following Webb’s Analysis**

	Aligned Items (avg)	Categorical Concurrence	Depth of Knowledge	Range of Knowledge	Balance of Representation
<b>Number and Quantity</b>	7.00	Met	Met	Met	Met
<b>Algebra</b>	18.33	Met	Met	Not Met	Met
<b>Functions</b>	10.67	Met	Met	Met	Met
<b>Geometry</b>	10.33	Met	Not Met	Not Met	Met
<b>Statistics and Probability</b>	7.00	Met	Met	Not Met	Met
<b>Mathematical Practices</b>	78.67	Met	-- <sup>13</sup>	Met	Met

## Panelist Evaluation

The results of the post-study evaluation are shown in Table 8. Panelists provided feedback as to how prepared they felt for each task, the time allocated to each part of the training, their confidence in the tasks they completed, the time allocated to complete the tasks, and the overall success of the study. As is shown in the Table, the panel generally felt prepared for each task, the right amount of time was allocated to each training component, confidence in their completed work (Mathematics was slightly higher than ELA), and that there was an appropriate amount of time allocated to completing each task. The panelists were also allowed to provide comments on their perceptions of the alignment study which are included in Appendix F.

**Table 8. Evaluation results by Panel**

	Mathematics	ELA
<b>Preparedness for Task<sup>1</sup></b>		
Task 1	3	2
Task 2	3	2

<sup>13</sup> Given the intention of the mathematical practices, it was determined that a DOK analysis was not appropriate for these expectations.



	Mathematics	ELA
Task 3	2	2
<b>Time Allocated to Training<sup>2</sup></b>		
Task 1	2	2
Task 2	2	2
Task 3	2	2
<b>Confidence in the completed tasks<sup>3</sup></b>		
Task 1	3	2.5
Task 2	3	2.5
Task 3	3	2
<b>Time allocated to each task<sup>2</sup></b>		
Task 1	2	2
Task 2	2	2
Task 3	2	2
<b>Overall success of the alignment study<sup>4</sup></b>	<b>3</b>	<b>3</b>

<sup>1</sup> Preparedness rating scale: 1=Not Prepared, 2=Somewhat Prepared, 3=Very Prepared

<sup>2</sup> Time rating scale: 1=Not enough time, 2=The right amount of time, 3=Too much time

<sup>3</sup> Confidence rating scale: 1=Not Very Confident, 2=Somewhat Confident, 3=Very Confident

<sup>4</sup> Success rating scale: 1= Totally Unsuccessful, 2=Unsuccessful, 3=Successful, 4=Totally Successful

## Overall Findings

Based upon the review of the SMEs of the WAS, the ACT Standards, and three ACT test forms, a number of important conclusions can be identified for the WDPI as they evaluate the use of the ACT. Among the critical findings are:

- **Alignment of ACT to WAS - Content:** All ACT CCRS were aligned to the WAS as were all ACT items (except one Mathematics item) which supports the claim that the ACT is measuring knowledge, skills, and abilities that are included in the WAS. In Mathematics, some ACT CCRS (44%) and items (25%) were aligned to WAS as lower grade levels indicating measurement of foundational skills.
- **Alignment of ACT to WAS - Depth of Knowledge:** For both ELA and Mathematics, panelists identified the WAS standards as targeting DOK levels 2 and 3 and items/tasks targeting DOK levels 2 and 3 (primarily) with some DOK level 1 and 4 in ELA. Across all ACT subject areas, approximately half of the items/tasks were at or above the DOK target for the aligned standards (ranging from Reading at 35% to Writing at 85%).
- **Coverage of the WAS by the ACT – Content Areas:** Each domain of the WAS in ELA and Mathematics was represented by ACT standards and ACT items. The only exception in ELA were domains that specifically referenced application of skills that could not be measured by an item or task on a standardized assessment or the connection could not be identified through a standards-standards or items-standards alignment. Within particular domains, the amount of alignment often varied across standards indicating that some were targeted more frequently than others. This resulted in some standards and domains not meeting the criteria recommended for Webb’s alignment criteria.



- **Coverage of the WAS by the ACT – Ability Levels:** The WAS domains in both ELA and Mathematics were aligned to content across all score ranges of the ACT indicating that measurement spanned the ability levels assessed by the ACT.

Based on the results of the evaluation, the panel comprised to complete this alignment activity indicated that they felt comfortable completing the work and that they indicated a high degree of confidence in the results.

## Evaluation of Validity Evidence

To evaluate the alignment study, we applied the validation framework suggested by Davis-Becker and Buckendahl (2013). Within this framework, the authors suggested four sources of evidence that should be considered in the validation process: procedural, internal, external, and utility. Threats to validity observed in these areas should mitigate policymakers' judgments regarding the usefulness of the results and the validity of the interpretation. Evidence within each of these areas that was observed in this study is discussed here.

### Procedural

Procedural evidence was available when considering panelist selection and qualifications, choice of methodology, application of the methodology, and panelists' perspectives about the implementation of the methodology. For this study, the recruited panel included experienced educators in various roles from across the state and one national expert in each area. In addition, the panelists were independent of any development and validation activities for the ACT. Completing two levels of alignment judgments allowed for the analyses to provide two perspectives on how the ACT aligned with the WAS. More specifically, the item-level judgmental process following Webb's recommendations is one of the common approaches for evaluating the alignment of standards to assessment. Panelists' perspectives on the process were collected and the evaluation responses were consistently positive. The comments provided by panelists during the evaluation provided some suggestions for future studies but did not threaten the validity of the results.

### Internal

The internal evidence for alignment studies can be evaluated by examining the consistency of panelists' ratings and the convergence of the recommendations. For this study, the rating tasks and decision rules were based on agreement/consensus judgments and each of the panels were consistently able to reach consensus judgments for each of the tasks assigned to them. Although the results should not be interpreted as unanimous support for every judgment by the panelists, the panelists worked well together in evaluating differences of opinion to calibrate amongst themselves on each judgmental task, and from several tasks, determine the most appropriate consensus judgment. In addition, their evaluation ratings suggested they were confident in the results and for the consensus activities this includes the known final judgments on alignment.

### External

External evidence is often the most difficult to obtain but in the design of this study, the ability to look at the results across levels provided one source of such evidence. Between the two markers, several indicators of consistency were found:

- All ACT CCRS were aligned to the WAS and all but one of the ACT items was aligned to the WAS
- For Reading,



- the ACT CCRS and ACT items were aligned to all of the Reading WAS with the exception of the same two (R7 and R10).
- Most of the ACT CCRS aligned to the domains of *Key Ideas and Details* and *Craft and Structure* as did the ACT items. Similarly, fewer of both aligned to *Integration of Knowledge and Ideas* and *Range of Reading*.
- For English and Writing,
  - The ACT CCRS in these subject areas were aligned to WAS in both Language and Writing. The ACT items were also aligned to WAS in both Language and Writing.
  - In WAS standards, the domains with the most ACT CCRS were also those with the most ACT items aligned.
- For Mathematics,
  - the portion of ACT CCRS aligned to each Mathematics WAS conceptual category was similar to the portion of ACT items aligned to each Mathematics WAS conceptual category (i.e., Algebra was the largest category, Functions was second, Number & Quantity and Statistics & Probability were the lowest).
  - Although most of the ACT CCRS were aligned to the WAS in high school, a number were identified as representing foundational KSAs (i.e., best aligning to middle school standards). The same pattern was found in the item-level alignment.

### Utility

Evidence of utility is based largely on the extent to which the summative and formative feedback can be used to inform policy and operational decisions related to the interpretation of exam scores. This study reviewed the alignment of the ACT to the WAS from multiple perspectives, using both ACT items and the ACT CCRS across the entire score range. As a result, we believe that the summative information from the study provide the evidence necessary for Wisconsin to move forward with the use of the ACT as their high school statewide assessment for English Language Arts and Mathematics representing a sampling of the WAS. The areas where the WAS were not aligned to the ACT (i.e., no ACT CCRS or items covering particular WAS standards) should be reviewed to determine if/how they are being assessed by classroom measures.

## References

- Davis-Becker S. & Buckendahl, C. W. (2013). A proposed framework for evaluating alignment studies. *Educational measurement: Issues and practice*, 32(1), 23-33.
- Webb, N. L. (1995, April). *Issues Related to Judging the Alignment of Curriculum Standards and Assessments*. Paper presented at the annual meeting of the American Educational Research Association. Montreal, CA.
- Webb, N. L. (1997). Criteria for alignment of expectations and assessments in mathematics and science education (Council of Chief State School Officers and National Institute for Science Education Research Monograph No. 6). Madison, WI: University of Wisconsin, Wisconsin Center for Education Research.



## Appendix A: Demographic Information of Panelists

Table A.1 provides additional detail on the demographic information for the fourteen panelists.

**Table A.1 Panelist Demographic Information**

Panelist	Panel	Employer	Title	Grades	Years of Experience	Highest Degree
1	Math	School District of Mondovi	Math teacher	8th, HS Pre-Algebra, HS Algebra	15	Masters
2	Math	Oconomowoc Area School District	Math teacher	9 to 12	9	Masters
3	Math	Hortonville HS	Math teacher/ Dept chair	9 to 12	10	Masters
4	Math	Edgerton School District	Math teacher	9 to 12	23	Masters
5	Math	Waunakee Community School District	Math teacher	9 to 12	18	Masters
6	Math	edCount, LLC	Senior Associate (Researcher)	formerly HS, college	20	Masters
7	Math	Pewaukee School District	Math teacher	9 to 12	11	Masters
8	ELA	Tomorrow River School District	ELA Teacher	9 to 12	25	Masters
9	ELA	edCount, LLC	Senior Associate (Researcher)		15	Masters
10	ELA	Waunakee HS	ELA Teacher	9 to 12	19	Masters
11	ELA	Clear Lake School District	ELA Teacher	9 to 12	23	Masters
12	ELA	Freedom Area School District	ELA Teacher	9 to 12	14	Bachelors
13	ELA	Hortonville Area School District	ELA Teacher	11 and 12	26	Masters
14	ELA	Pewaukee School District	Secondary Literacy Coordinator	7 to 12	25	Masters





## Appendix B: Study Materials and Resources

The files below include the materials developed for the alignment study and used throughout the study.

### Instructions and DOK Resources Provided to Panelists



ELA Instructions with  
DOK



Math Instructions  
with DOK

### Common Core State Standards



ELA Standards



Math Standards

### ACT Standards



ACT English  
Standards



ACT Reading  
Standards



ACT Writing  
Standards



ACT Math Standards



## Appendix C: Task 1 Detailed Results

### ELA

Table C.1 Reading Task 1 Results

WAS Domain and Anchor Standard	DOK
<b>Key Ideas and Details</b>	
R1	2
R2	3
R3	3
<b>Craft and Structure</b>	
R4	3
R5	3
R6	3
<b>Integration of Knowledge and Ideas</b>	
R7	3
R8	3
R9	4
<b>Range of Reading and Level of Text Complexity</b>	
R10	3

Table C.3 Writing Task 1 Results

WAS Domain and Anchor Standard	DOK
<b>Text Types and Purposes</b>	
W1	4
W2	4
W3	4
<b>Production and Distribution of Writing</b>	
W4	3
W5	3
W6	2
<b>Research to Build and Present Knowledge</b>	
W7	4
W8	4
W9	4
<b>Range of Writing</b>	
W10	3

Table C.2 Language Task 1 Results

WAS Domain and Anchor Standard	DOK
<b>Conventions of Standard English</b>	
L1	2
L2	2
<b>Knowledge of Language</b>	
L3	3
<b>Vocabulary Acquisition and Use</b>	
L4	2
L5	3
L6	3



# Mathematics

**Table C.4 Mathematics Task 1 Results**

WAS Standards	DOK
<b>Mathematical Practices</b>	
MP1	4
MP2	3
MP3	4
MP4	3
MP5	3
MP6	3
MP7	4
MP8	3
<b>Number and Quantity</b>	
HSN.RN.A	2
HSN.RN.B	2
HSN.Q.A	3
HSN.CN.A	2
HSN.CN.B	2
HSN.CN.C	2
HSN.VM.A	2
HSN.VM.B	2
HSN.VM.A	2
<b>Algebra</b>	
HSN.SSE.A	2
HSN.SSE.B	3
HSN.APR.A	2
HSN.APR.B	2
HSN.APR.C	3
HSN.APR.D	2
HSN.CED.A	3
HSN.REI.A	2
HSN.REI.B	2
HSN.REI.C	2
HSN.REI.D	2

WAS Standards	DOK
<b>Functions</b>	
HSF.IF.A	2
HSF.IF.B	2
HSF.IF.C	3
HSF.BF.A	3
HSF.BF.B	3
HSF.LEA.A	3
HSF.LEA.B	2
HSF.TF.A	2
HSF.TF.B	2
HSF.TF.C	3
<b>Geometry</b>	
HSG.CO.A	2
HSG.CO.B	2
HSG.CO.C	3
HSG.CO.D	2
HSG.SRT.A	2
HSG.SRT.B	3
HSG.SRT.C	2
HSG.SRT.D	3
HSG.CA.A	2
HSG.CA.B	2
HSG.GPE.A	2
HSG.CPE.B	3
HSG.GMD.A	2
HSG.CMD.B	1
HSG.MG.A	3
<b>Statistics</b>	
HSS.ID.A	2
HSS.ID.B	2
HSS.ID.C	2
HSS.IC.A	2
HSS.IC.B	3
HSS.CP.A	2
HSS.CP.B	2
HSS.MD.A	3
HSS.MD.B	3



## Appendix D: Task 2 Detailed Results

ELA

Table D.1 Reading Task 2 Results

ACT Standards	Aligned WAS
<b>Key ideas and details</b>	
<b>Close Reading</b>	
CLR 201	R1
CLR 202	R3
CLR 301	R1
CLR 302	R1
CLR 401	R1
CLR 402	R1
CLR 403	R1
CLR 404	R2
CLR 501	R4
CLR 502	R1
CLR 503	R1
CLR 504	R4
CLR 505	R1
CLR 506	R4
CLR 601	R2
CLR 602	R1
CLR 603	R4
CLR 604	R1
CLR 605	R4
CLR 701	R1
CLR 702	R1
CLR 703	R1
CLR 704	R1
CLR 705	R4
CLR 706	R4
<b>Central Ideas, Themes, And Summaries</b>	
IDT 201	R2
IDT 301	R5
IDT 401	R2
IDT 402	R2
IDT 403	R2

ACT Standards	Aligned WAS
IDT 501	R2
IDT 502	R2
IDT 503	R2
IDT 601	R2
IDT 602	R2
IDT 701	R2
IDT 702	R2
<b>Relationships</b>	
REL 201	R3
REL 202	R5
REL 301	R3
REL 302	R5
REL 401	R1
REL 402	R3
REL 403 – Literature	R3
REL 403 – Information	R5
REL 501	R3
REL 502	R3
REL 503	R1
REL 504	R3
REL 505	R3
REL 601	R1
REL 602	R3
REL 603	R1
REL 604 – Literature	R3
REL 604 – Information	R5
REL 605	R1
REL 701	R1
REL 702	R3
REL 703	R3
REL 704 – Literature	R3
REL 704 – Information	R5
REL 705 – Literature	R3
REL 705 – Information	R5



ACT Standards	Aligned WAS
<b><i>Craft and structure</i></b>	
<b>Word Meanings And Word Choice</b>	
WME 201	R4
WME 301	R4
WME 302	R4
WME 401	R4
WME 402	R4
WME 501	R4
WME 502	R4
WME 503	R4
WME 504	R4
WME 601	R4
WME 602	R4
WME 603	R4
WME 701	R4
WME 702	R4
WME 703	R4
<b>Text Structure</b>	
TST 201	R5
TST 301	R5
TST 302	R5
TST 401	R5
TST 402	R5
TST 403	R5
TST 404	R5
TST 501	R5
TST 502	R5
TST 503	R5
TST 504	R5
TST 505	R5
TST 601	R5
TST 602	R5
TST 603	R5
TST 701	R5
TST 702	R5
TST 703	R5

ACT Standards	Aligned WAS
<b>Purpose And Point Of View</b>	
PPV 201	R6
PPV 301	R6
PPV 401	R6
PPV 402	R6
PPV 501	R6
PPV 502	R6
PPV 503	R6
PPV 601	R6
PPV 602	R6
PPV 701	R6
PPV 702	R6
<b>Integration of Knowledge and Ideas</b>	
<b>Arguments</b>	
ARG 201	R8
ARG 301	R8
ARG 401	R8
ARG 402	R2
ARG 501	R8
ARG 502	R2
ARG 503	R2
ARG 601	R8
ARG 602	R2
ARG 701	R8
ARG 702	R2
ARG 703	R2
<b>Multiple Texts</b>	
SYN 201	R9
SYN 301	R9
SYN 401	R9
SYN 501	R9
SYN 601	R9
SYN 701	R9



Table D.2 Language Task 2 Results

ACT Standard	Aligned Standard
<b><i>Production of Writing</i></b>	
<b>Topic Development in Terms Of Purpose And Focus</b>	
TOD 201	L5
TOD 301	L5
TOD 302	L3
TOD 303	L5
TOD 401	L5
TOD 402	L3
TOD 403	L3
TOD 501	L5
TOD 502	L3
TOD 503	L5
TOD 504	L3
TOD 601	L5
TOD 602	L3
TOD 603	L3
TOD 701	L3
TOD 702	L5
TOD 703	L3
<b>Organization, Unity, and Cohesion</b>	
ORG 201	L5
ORG 301	L5
ORG 302	L5
ORG 401	L5
ORG 402	L5
ORG 403	L5
ORG 404	L5
ORG 405	L5
ORG 501	L5
ORG 502	L5
ORG 503	L5
ORG 504	L5
ORG 505	L5
ORG 601	L5
ORG 602	L5
ORG 603	L5
ORG 604	L5
ORG 701	L5
ORG 702	L5
<b><i>Knowledge of Language</i></b>	

ACT Standard	Aligned Standard
<b>Knowledge of Language</b>	
KLA 201	L3
KLA 301	L3
KLA 302	L3
KLA 401	L3
KLA 402	L3
KLA 403	L3
KLA 404	L3
KLA 501	L3
KLA 502	L3
KLA 503	L3
KLA 504	L3
KLA 505	L3
KLA 601	L3
KLA 602	L3
KLA 603	L3
KLA 604	L3
KLA 701	L3
KLA 702	L3
KLA 201	L5
KLA 301	L5
KLA 302	L5
KLA 401	L5
KLA 402	L5
KLA 403	L5
KLA 404	L5
KLA 501	L5
KLA 502	L5
KLA 503	L5
KLA 504	L5
KLA 505	L5
KLA 601	L5
KLA 602	L5
KLA 603	L5
KLA 604	L5
KLA 701	L5
KLA 702	L5
<b><i>Conventions of Standard English Grammar, Usage, and Punctuation</i></b>	
<b>Sentence Structure and Formation</b>	
SST 201	L1
SST 201	L2
SST 202	L1



ACT Standard	Aligned Standard
SST 301	L1
SST 301	L2
SST 302	L1
SST 401	L1
SST 501	L1
SST 502	L1
SST 601	L1
SST 602	L1
SST 602	L3
SST 701	L1
<b>Usage Conventions</b>	
USG 201	L1
USG 202	L1
USG 301	L3
USG 302	L1
USG 303	L1
USG 304	L1
USG 305	L1
USG 401	L3
USG 402	L1
USG 403	L1
USG 404	L3
USG 501	L1
USG 502	L1

ACT Standard	Aligned Standard
USG 503	L1
USG 601	L1
USG 602	L1
USG 603	L1
USG 701	L1
USG 702	L1
<b>Punctuation Conventions</b>	
PUN 201	L2
PUN 301	L2
PUN 302	L2
PUN 401	L2
PUN 402	L2
PUN 403	L2
PUN 404	L2
PUN 501	L2
PUN 502	L2
PUN 503	L2
PUN 504	L2
PUN 601	L2
PUN 602	L2
PUN 603	L2
PUN 604	L2
PUN 701	L2
PUN 702	L2



**Table D.3 Writing Task 2 Results**

ACT Standard	Aligned Standard
<b>Expressing Judgments</b>	
EXJ 201	W1
EXJ 202	W1
EXJ 301	W1
EXJ 302	W1
EXJ 401	W1
EXJ 402	W1
EXJ 501	W1
EXJ 502	W1
EXJ 601	W1
EXJ 602	W1
<b>Focusing On The Topic</b>	
FOC 201	W4
FOC 301	W4
FOC 401	W4
FOC 402	W4
FOC 501	W4
FOC 502	W4
FOC 601	W4
FOC 602	W4
<b>Developing Ideas</b>	
DEV 201	W2
DEV 202	W2
DEV 301	W2
DEV 302	W2
DEV 401	W2
DEV 402	W2
DEV 501	W2
DEV 502	W2
DEV 601	W2

ACT Standard	Aligned Standard
DEV 602	W2
<b>Organizing Ideas</b>	
ORI 201	W4
ORI 202	W4
ORI 203	W4
ORI 301	W4
ORI 302	W4
ORI 303	W4
ORI 401	W4
ORI 402	W4
ORI 403	W4
ORI 501	W4
ORI 502	W4
ORI 503	W4
ORI 601	W4
ORI 602	W4
ORI 603	W4
<b>Using Language</b>	
USL 201	L1
USL 201	L2
USL 301	L1
USL 301	L2
USL 401	L1
USL 401	L2
USL 501	L1
USL 501	L2
USL 601	L1
USL 601	L2





## Mathematics

Table D.4 Mathematics Task 2 Results

ACT Standard	HS WAS	Practice	Other grade
<b>Number and Quantity</b>			
N 201		MP6	6 <sup>TH</sup>
N 202		MP7	6 <sup>TH</sup>
N 203		MP6	6 <sup>TH</sup>
N 301		MP7	6 <sup>TH</sup>
N 302		MP6	6 <sup>TH</sup>
N 303		MP2	6 <sup>TH</sup>
N 401		MP8	6 <sup>TH</sup>
N 402	HSN.RN.A	MP8	
N 403		MP2	6 <sup>TH</sup>
N 404		MP7	6 <sup>TH</sup>
N 405		MP5	6 <sup>TH</sup>
N 406	HSN.VM.A	MP7	
N 501		MP2	6 <sup>TH</sup>
N 502		MP7	6 <sup>TH</sup>
N 503		MP7	6 <sup>TH</sup>
N 504	HSN.CN.A	MP2	
N 505	HSN.VM.A	MP7	
N 601		MP7	7 <sup>TH</sup>
N 602		MP7	7 <sup>TH</sup>
N 603		MP7	7 <sup>TH</sup>
N 604	HSN.RN.B	MP2	
N 605	HSN.RN.A	MP7	
N 606	HSN.CN.A	MP2	
N 607	HSN.VM.B	MP7	
N 607	HSN.VM.A		
N 701	HSN.Q.A	MP3	
N 702	HSN.RN.B	MP7	
N 703	HSN.RN.B	MP7	
N 703	HSN.RN.B	MP2	
N 704	HSN.CN.B	MP7	
N 704	HSN.CN.B	MP8	
N 705	HSN.VM.A	MP7	
N 706	HSN.VM.A	MP7	
<b>Algebra (A) &amp; Functions (F)</b>			
AF 201		MP5	6 <sup>TH</sup>
A 201	HSN.SSE.A	MP2	
A 202	HSN.REI.B	MP6	
F 201		MP8	6 <sup>TH</sup>
AF 301		MP5	6 <sup>TH</sup>
AF 302		MP6	7 <sup>TH</sup>

ACT Standard	HS WAS	Practice	Other grade
AF 303	HSF.IF.B	MP2	
AF 304		MP2	8 <sup>TH</sup>
A 301		MP6	7 <sup>TH</sup>
A 302	HSN.REI.B	MP6	
A 303	HSN.APR.A	MP7	
F 301		MP8	6 <sup>TH</sup>
AF 401		MP5	7 <sup>TH</sup>
AF 402	HSN.SSE.A	MP4	
AF 402	HSN.CED.A	MP4	
AF 403	HSN.REI.D	MP4	
A 401		MP2	8 <sup>TH</sup>
A 402	HSN.APR.A	MP7	
A 403	HSN.REI.B	MP6	
A 404	HSN.APR.A	MP7	
A 405		MP2	8 <sup>TH</sup>
A 406	HSF.IF.B	MP2	
F 401	HSF.TF.C	MP7	
AF 501	HSF.IF.B	MP2	
AF 502	HSN.CED.A	MP4	
AF 502	HSN.REI.B	MP7	
AF 503	HSN.REI.B	MP7	
A 501	HSF.IF.B	MP2	
A 502	HSN.CED.A	MP4	
A 502	HSN.REI.B	MP4	
A 503	HSN.REI.B	MP6	
A 504		MP4	8 <sup>TH</sup>
A 505	HSN.APR.A	MP7	
A 506	HSN.REI.B	MP2	
A 507	HSN.APR.B	MP2	
A 507	HSN.REI.B	MP7	
A 508	HSN.SSE.B	MP7	
A 509	HSN.RN.A	MP2	
A 510	HSN.RN.A	MP2	
A 511	HSN.RN.A	MP7	
A 511	HSN.SSE.B		
A 512	HSN.RN.A	MP7	
A 513		MP7	8 <sup>TH</sup>
A 514	HSF.IF.B	MP7	
F 501	HSF.IF.A	MP7	
F 502	HSF.IF.A	MP8	
F 503	HSF.IF.C	MP4	



ACT Standard	HS WAS	Practice	Other grade
F 503	HSF.IF.C	MP7	
F 504	HSF.IF.B	MP2	
F 505	HSF.IF.A	MP2	
F 505		MP7	
F 506	HSF.IF.A	MP1	
F 507	HSF.IF.A	MP2	
F 507	HSF.IF.B	MP7	
F 508	HSF.IF.A	MP1	
F 508		MP6	
F 509	HSF.IF.A	MP1	
F 509		MP6	
F 510	HSF.IF.C	MP7	
F 511	HSF.IF.A	MP2	
AF 601	HSN.CED.A	MP2	
AF 601		MP4	
AF 602	HSF.BF.A	MP4	
AF 602	HSN.CED.A		
AF 603	HSN.REI.D	MP1	
AF 604	HSF.BF.B	MP7	
A 601	HSN.SSE.B	MP7	
A 602	HSN.REI.B	MP1	
A 602		MP6	
A 603		MP4	8 <sup>TH</sup>
A 604	HSN.REI.C	MP7	
A 605	HSN.REI.B	MP5	
A 606	HSN.REI.B	MP6	
A 606	HSN.REI.D		
F 601	HSF.IF.B	MP2	
F 602	HSN.CED.A	MP4	
F 603	HSF.BF.A	MP4	
F 604	HSF.IF.A	MP7	
F 604	HSF.BF.B	MP6	
AF 701	HSF.IF.C	MP2	
AF 701	HSF.LEA.A		
AF 701	HSN.SSE.B		
AF 701	HSN.CED.A		
AF 702	HSF.BF.A	MP2	
AF 702	HSF.BF.B	MP7	
AF 702	HSN.CED.A		
AF 703	HSF.IF.C	MP7	
AF 703	HSN.REI.A		
AF 704	HSF.IF.C	MP4	
AF 704	HSN.REI.D		
AF 705	HSN.SSE.A	MP7	

ACT Standard	HS WAS	Practice	Other grade
AF 705	HSF.BF.B		
AF 706	HSN.CED.A	MP7	
AF 706	HSF.BF.B		
A 701	HSN.REI.B	MP1	
A 702	HSN.REI.D	MP2	
A 703	HSN.APR.B	MP8	
F 701	HSF.LEA.A	MP6	
F 702	HSF.BF.A	MP2	
F 702		MP4	
F 703	HSF.BF.A	MP8	
F 704	HSF.TF.A	MP7	
F 705	HSF.TF.B	MP4	
F 706	HSF.TF.C	MP1	
F 707	HSF.IF.C	MP2	
F 707	HSF.BF.B	MP2	
F 707	HSF.LEA.A	MP2	
F 708	HSF.BF.A	MP7	
<b>Geometry</b>			
G 201		MP6	8 <sup>TH</sup>
G 202		MP6	8 <sup>TH</sup>
G 203	HSN.Q.A	MP1	
G 301	HSG.CO.C	MP1	
G 302		MP4	3 <sup>RD</sup>
G 302		MP6	
G 303		MP4	6 <sup>TH</sup>
G 303		MP6	
G 304		MP6	5 <sup>TH</sup>
G 304		MP5	
G 401	HSG.CO.C	MP7	
G 402	HSG.CO.C	MP7	
G 403	HSG.CPE.B	MP6	
G 404	HSG.SRT.C	MP4	
G 404		MP5	
G 404		MP6	
G 405	HSG.GMD.A	MP6	
G 405	HSG.MG.A		
G 406		MP6	
G 406		MP5	5 <sup>TH</sup>
G 407	HSG.CO.A	MP6	
G 407		MP4	
G 501	HSG.CO.C	MP7	
G 502	HSG.CO.A	MP4	
G 503	HSG.CO.C	MP7	
G 504		MP5	



ACT Standard	HS WAS	Practice	Other grade
G 504		MP6	
G 505	HSG.CPE.B	MP6	
G 506		MP6	7 <sup>TH</sup>
G 507	HSG.SRT.C	MP4	
G 508	HSG.SRT.C	MP8	
G 509	HSG.CPE.B	MP4	
G 510	HSG.CPE.B	MP5	
G 511	HSG.CO.C	MP5	
G 511	HSG.CO.D		
G 511	HSG.CPE.B		
G 512	HSG.CO.A	MP5	
G 601	HSG.CPE.B	MP7	
G 601	HSG.GMD.A	MP7	
G 602	HSG.SRT.C	MP4	
G 603	HSG.CO.B	MP7	
G 603	HSG.SRT.A		
G 603	HSG.SRT.B		
G 603	HSG.SRT.C		
G 604	HSG.SRT.C	MP2	
G 604		MP5	
G 605	HSG.SRT.C	MP4	
G 605	HSG.CPE.B		
G 606	HSG.CPE.B	MP7	
G 607	HSG.CO.A	MP4	
G 607		MP6	
G 608	HSG.CO.A	MP4	
G 608		MP6	
G 609	HSG.GPE.A	MP1	
G 701	HSG.CA.A	MP7	
G 701	HSG.CA.B		
G 702	HSG.CPE.B	MP4	
G 703	HSG.SRT.A	MP6	
G 704	HSG.MG.A	MP3	
G 705	HSG.MG.A	MP3	

ACT Standard	HS WAS	Practice	Other grade
<b>Statistics and Probability</b>			
S 201		MP6	6 <sup>TH</sup>
S 202		MP4	6 <sup>TH</sup>
S 301	HSS.ID.A	MP6	
S 302	HSS.ID.A	MP6	
S 302	HSS.ID.B		
S 303	HSS.ID.B	MP1	
S 304	HSS.ID.B	MP4	
S 305	HSS.CP.A	MP8	
S 401	HSS.ID.A	MP4	
S 402	HSS.ID.A	MP7	
S 403	HSS.CP.A	MP1	
S 404	HSS.CP.A	MP3	
S 405	HSS.CP.B	MP1	
S 501	HSS.ID.B	MP6	
S 502	HSS.ID.A	MP1	
S 503		MP1	7 <sup>TH</sup>
S 504	HSS.CP.B	MP4	
S 505	HSS.IC.B	MP3	
S 506	HSS.IC.A	MP3	
S 601	HSS.ID.A	MP6	
S 602	HSS.ID.B	MP4	
S 603	HSS.CP.B	MP1	
S 604	HSS.CP.A	MP4	
S 605	HSS.CP.A	MP1	
S 606	HSS.CP.A	MP1	
S 701	HSS.ID.A	MP5	
S 702	HSS.ID.B	MP3	
S 702	HSS.CP.A		
S 703	HSS.IC.B	MP8	
S 704	HSS.CP.B	MP1	
S 705	HSS.ID.C	MP4	
S 705	HSS.IC.A	MP8	
S 705	HSS.IC.B		



## Appendix E: Task 3 Detailed Results for Webb's Item-Level Alignment Analyses

ELA

Table E.1 Reading Results for Webb's Item-Level Analyses

	Categorical Concurrence			Depth of Knowledge				Range of Knowledge			Balance of Representation	
	Total	By Form	Met CC criterion?	DOK	At/Above DOK		Meting Criterion?	Standards with 1 or more aligned	Meting Criterion?		BOR	Meting Criteria?
<b>Key Ideas and Details</b>	76	25.3	Met		27	36%	Not Met	3	100%	Met	0.58	Not Met
R1	57	19.0	Met	2	22	39%	Not Met					
R2	13	4.3	Not Met	3	3	23%	Not Met					
R3	6	2.0	Not Met	3	2	33%	Not Met					
<b>Craft and Structure</b>	35	11.7	Met		9	26%	Not Met	3	100%	Met	0.79	Met
R4	19	6.3	Met	3	0	0%	Not Met					
R5	7	2.3	Not Met	3	2	29%	Not Met					
R6	9	3.0	Not Met	3	7	78%	Met					
<b>Integration of Knowledge and Ideas</b>	10	3.3	Not Met		6	60%	Met	2	67%	Met	0.80	Met
R7	0	0.0	Not Met	3	0	0%	Not Met					
R8	3	1.0	Not Met	3	0	0%	Not Met					
R9	7	2.3	Not Met	4	6	86%	Met					
<b>Range of Reading and Level of Text Complexity</b>	0	0.0	Not Met		0	0%	Not Met			--	--	--
R10	0	0.0	--	3	0		Not Met				--	



Table E.2 English Results for Webb's Item-Level Analyses

	Categorical Concurrence			Depth of Knowledge				Range of Knowledge			Balance of Representation	
	Total	By Form	Met CC criterion?	DOK	At/Above DOK		Meting Criterion?	Standards w/ 1 + aligned	Meting Criteria?	BOR	Meting Criteria?	
Conventions of Standard English	130		Met		98	75%	Met	2	100%	Met	0.88	Met
L1	49	43.3	Met	2	44	90%	Met					
L2	81	27.0	Met	2	54	67%	Met					
Knowledge of Language	152	50.7	Met		68	45%	Not met		--		--	--
L3	152	50.7	Met	3	68	45%	Not met					
Vocabulary Acquisition and Use	27		Met		19	70%	Met	1	33%	Not met	--	--
L4	0	9.0	Not met	2	0		Not met					
L5	27	0.0	Met	3	19	70%	Met					
L6	0	0.0	Not met	3	0		Not met					
Text Types and Purposes	72	24.0	Met		36	50%	Met	1	33%	Not met		--
W1	72	24.0	Met	4	36	50%	Met					
W2	0	0.0	Not met	4	0		Not met					
W3	0	0.0	Not met	4	0		Not met					
Production and Distribution of Writing	86	28.7	Met		84	98%	Met	2	66%	Met	0.49	Not met
W4	72	24.0	Met	3	72	100%	Met					
W5	14	4.7	Not met	3	12	86%	Met					
W6	0	0.0	Not met	2	0		Not met					
Research to Build and Present Knowledge	18	6.0	Met		18	100%	Met	1	33%	Not met	--	--
W7	0	0.0	Not met	4	0		Not met					
W8	0	0.0	Not met	4	0		Not met					
W9	18	6.0	Met	4	18	100%	Met					
Range of Writing	0	0.0	Not met		0	0%	Not met	0	0%	Not met	--	--
W10	0	0.0	Not met	3	0		Not met					



## Mathematics

**Table E.3 Mathematics Results for Webb's Item-Level Analyses**

	Categorical Concurrence			Depth of Knowledge			Range of Knowledge			Balance of Representation	
	Total	By Form	Met CC criterion?	DOK	At/Above DOK	Meting Criterion?	Standards with 1 or more aligned	Meting Criteria?		BOR	Meting Criteria?
<b>Mathematical Practices</b>	236	78.67	Met		12 11%	Not Met	7 88%	Met		0.76	Met
1	71	23.67		4	0 0%	Not Met					
2	18	6.00		3	3 17%	Not Met					
3	1	0.33		4	0 0%	Not Met					
4	28	9.33		3	5 18%	Not Met					
5	16	5.33		3	1 6%	Not Met					
6	39	13.00		3	2 5%	Not Met					
7	33	11.00		4	0 0%	Not Met					
8	9	3.00		3	1 11%	Not Met					
<b>Number and Quantity</b>	21	7.00	Met		15 71%	Met	4 57%	Met		0.86	Met
N1	6	2.00		2	4 67%	Met					
N2	3	1.00		2	3 100%	Met					
N3	6	2.00		3	2 33%	Not Met					
N4	3	1.00		2	3 100%	Met					
N5	1	0.33		2	1 100%	Met					
N6	0	0.00		2	0						
N7	0	0.00		2	0						
N8	0	0.00		2	0						
N9	2	0.67		2	2 100%	Met					
<b>Algebra</b>	55	18.33	Met		31 56%	Met	5 45%	Not Met		0.73	Met
A1	2	0.67		2	2 100%	Met					
A2	1	0.33		3	0 0%	Not Met					
A3	1	0.33		2	0 0%	Not Met					
A4	1	0.33		2	1 100%	Met					



	Categorical Concurrence			Depth of Knowledge				Range of Knowledge			Balance of Representation	
	Total	By Form	Met CC criterion?	DOK	At/Above DOK		Meting Criterion?	Standards with 1 or more aligned	Meting Criteria?		BOR	Meting Criteria?
A5	1	0.33		3	0	0%	Not Met					
A6	3	1.00		2	3	100%	Met					
A7	25	8.33		3	4	16%	Not Met					
A8	3	1.00		2	3	100%	Met					
A9	10	3.33		2	10	100%	Met					
A10	2	0.67		2	2	100%	Met					
A11	6	2.00		2	6	100%	Met					
<b>Functions</b>	<b>32</b>	<b>10.67</b>	<b>Met</b>		<b>20</b>	<b>63%</b>	<b>Met</b>	<b>7</b>	<b>70%</b>	<b>Met</b>	<b>0.92</b>	<b>Met</b>
F1	5	1.67		2	5	100%	Met					
F2	4	1.33		2	4	100%	Met					
F3	2	0.67		3	1	50%	Met					
F4	3	1.00		3	0	0%	Not Met					
F5	4	1.33		3	2	50%	Met					
F6	2	0.67		3	0	0%	Not Met					
F7	0	0.00		2	0							
F8	3	1.00		2	3	100%	Met					
F9	5	1.67		2	4	80%	Met					
F10	4	1.33		3	1	25%	Not Met					
<b>Geometry</b>	<b>31</b>	<b>10.33</b>	<b>Met</b>		<b>12</b>	<b>39%</b>	<b>Not Met</b>	<b>4</b>	<b>27%</b>	<b>Not Met</b>	<b>0.89</b>	<b>Met</b>
G1	2	0.67		2	2	100%	Met					
G2	0	0.00		2	0							
G3	6	2.00		3	0	0%	Not Met					
G4	0	0.00		2	0							
G5	0	0.00		2	0							
G6	1	0.33		3	0	0%	Not Met					
G7	5	1.67		2	5	100%	Met					
G8	0	0.00		3	0							
G9	1	0.33		2	1	100%	Met					
G10	1	0.33		2	1	100%	Met					



	Categorical Concurrence			Depth of Knowledge				Range of Knowledge			Balance of Representation	
	Total	By Form	Met CC criterion?	DOK	At/Above DOK		Meting Criterion?	Standards with 1 or more aligned	Meting Criteria?		BOR	Meting Criteria?
G11	1	0.33		2	1	100%	Met					
G12	6	2.00		3	1	17%	Not Met					
G13	1	0.33		2	0	0%	Not Met					
G14	0	0.00		1	0							
G15	7	2.33		3	1	14%	Not Met					
<b>Statistics and Probability</b>	21	7.00	Met		18	86%	Met	3	33%	Not Met	0.81	Met
S1	5	1.67		2	5	100%	Met					
S2	3	1.00		2	3	100%	Met					
S3	0	0.00		2	0							
S4	0	0.00		2	0							
S5	1	0.33		3	0	0%	Not Met					
S6	1	0.33		2	1	100%	Met					
S7	9	3.00		2	9	100%	Met					
S8	0	0.00		3	0							
S9	2	0.67		3	0	0%	Not Met					





## Appendix F: Evaluation Comments

- Solid group of knowledgeable professionals who took the study seriously.
- "[Re: low rating on confidence in Task 2] - Confident with HS ratings, difficult to do math practices and alignment with below HS standards
- Since ACT tests standards covered before high school, it was difficult to precisely align questions and ACT standards to WAS.
- Math practice standards are so broad that many apply for many questions and difficult to come to consensus.
- Math practice 3 is difficult to assess on an MC test and I saw very little evidence of alignment with the MP3 standard. "
- Good use of spending time looking at the alignments for what this can mean in terms of relevancy.
- Very good experience. The group dynamic was a huge plus and the facilitation was clear and supportive of the tasks. The amount of time was also well planned. Never felt rushed or bored.
- I really enjoyed the process! I learned a lot and met some great people! Thanks for asking for our input and help.
- This study was well designed and professionally conducted! Thank you!
- Will we be kept informed of the progress of this alignment?
- Maybe more of a discussion about how each defines a standard rather than just DOK. A lot of DOK for standards is task dependent, not sure how to address this.
- "ELA is tough to parse. The categories of ELA often overlap. Each standard includes a lot of skills ranging complexity and required skill. Also difficult to label with DOK and/or connect to test items.
- Facilitators were friendly and organized
- Might be better to ""unpack"" each standard instead of labeling with DOK but that would have taken longer"
- It would have potentially helped to have interrater agreement or have a conversation about the expectations of the standards (WAS) and how panelists interpret them (perhaps before the Task 2 activities). Drew and Susan did a great job monitoring the process and answering questions! They were a pleasure to work with!

