

Evaluation of the Alignment between PA Academic Standards and the Common Core Standards

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Curriculum Specialist/ Coach Mentor, Capital Area IU 15

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Executive Summary

The purpose of the study was to evaluate the alignment of Pennsylvania's revised 3, 5, 8, and 11 Academic Standards in Reading, Writing, Speaking, and Listening and Mathematics to the English Language Arts and Mathematics Common Core Standards, respectively. The alignment was evaluated in terms of the extent to which the content and rigor of Pennsylvania's revised 3, 5, 8, and 11 Academic Standards in Reading, Writing, Speaking, and Listening and Mathematics are similar to the content and rigor of the English Language Arts and Mathematics Common Core Standards (March 10, 2010 public draft version), respectively. It is important to note that Pennsylvania's Academic Standards are situated at grades 3, 5, 8 and 11, while the Common Core Standards are based on a K-12 framework.

Pennsylvania K-12 educators and University faculty formed the panels for the alignment study. The panel members received formal training prior to the task of aligning the standards and assigning levels of cognitive rigor to the standards.

Content Alignment

In general, the results indicated that the PA Standards were more aligned to the Common Core (CC) Content Standards for English Language Arts than for Mathematics. For grades 3, 5 and 8, approximately 50% of the PA Math Standards were considered at least minimally aligned to the Common Core Standards at the same grade level. After expanding the analysis beyond the same grade level to include off-grades, a larger percent of PA Math Standards were considered aligned, from minimal to very strong alignment, to the Common Core Math Standards: 79% at grade 3, 87% at grade 5 and 63% at grade 8. In terms of moderate and very strong alignment, when including off-grades, 64% of the PA Math Standards were considered aligned to the Common Core Math Standards at grade 3, 70% at grade 5, and 50% at grade 8. For grade 11, 84% of the PA Math Standards were considered aligned, from minimal to very strong alignment, with 61% aligned at the moderate level.

When interpreting the math results it is important to consider that for grades K-8, at a particular grade level, the goal of the Common Core Math Standards was to cover a narrower range of math content areas, but at a deeper level. This contributes to the relatively large percent of PA Math Standards that are either not aligned to the K-8 CC Math Standards at grade level or aligned at a minimal level. As an example, at the elementary levels, Pennsylvania has standards for Probability and Predictions, and Algebra and Functions, but there are few if any CC standards that address these topics at the elementary level. It is also important to note that there are 8 CC Standards for Mathematical Practice: Make sense of problems and persevere in solving them, reason abstractly and quantitatively, construct viable arguments and critique the reasoning of others, model with mathematics, use appropriate tools strategically, attend to precision, look for and make use of structure, and look for and express regularity in repeated reasoning (CCSSO & NGA, 2010b). These standards indicate how students should engage with the content described in the CC Content Standards at each grade level, and are not linked to any particular mathematical content area. It was difficult to fully incorporate these 8 CC Standards for Mathematical Practice in this alignment study because they are practices that are encouraged throughout the students' learning of mathematics and are not tied to a particular content area. In future alignment studies, it will be important to more fully consider these 8 CC Standards for Mathematical Practice.

For English Language Arts, for grades 3, 5, 8 and 11, over 80% of the PA Standards were considered aligned moderately or very strongly to the Common Core Standards: 80% for grade 3, 84% for grade 5, 81% for grade 8, and 91% for grade 11. When the analysis accounted for off-grades, over 87% of the PA ELA standards were considered aligned moderately or very strongly to the Common Core Standards: 93% for grade 3, 90% for grade 5, 81% for grade 8, and 91% for grade 11. When interpreting these results, it is important to note that the CC Standards include Reading Standards for History/ Social Studies and

Reading Standards for Science which were not formally addressed in this alignment study. In future alignment studies, it will be important to more fully consider the CC Reading Standards for History/Social Studies and Science.

Cognitive Rigor

For mathematics, the percent of standards distributed across the cognitive rigor or depth-of-knowledge (DOK) levels were similar for PA Math Standards and CC Math Standards for grades 3, 5, 8 and 11, with the majority of the standards assigned to Level 2 (Concept/Skill). For both the PA and CC Standards, there were no math standards assigned at Level 4 (Extended Thinking) for grades 3, 5, and 8. When interpreting these results, it is important to note that the 8 CC Standards for Mathematical Practice were not considered in the DOK level assignment. It appears that they are most aligned to the top two levels of DOK.

For ELA, the percent of standards distributed across the cognitive rigor levels were somewhat similar for PA Standards and CC Standards for grades 3, 5, 8 and 11. However, for grades 3, 5 and 11, a slightly larger percent of PA ELA Standards were assigned Level 4 (Extended Thinking) as compared to the CC ELA Standards. When interpreting these results, it is important to consider that the Common Core Reading Standards for History/Social Studies and Science were not included in the DOK level assignment.

As previously recommended, it is important for future alignment studies to more full consider the CC Standards for Mathematical Practice and the CC Reading Standards for History/ Social Studies and Science.

Purpose

The purpose of the study was to evaluate the alignment of Pennsylvania's revised 3, 5, 8, and 11 Academic Standards in Reading, Writing, Speaking, and Listening and Mathematics to the English Language Arts and Mathematics Common Core Standards, respectively. The alignment was evaluated in terms of the extent to which the content and cognitive rigor of Pennsylvania's revised 3, 5, 8, and 11 Academic Standards in Reading, Writing, Speaking, and Listening and Mathematics is similar to the content and cognitive rigor of the English Language Arts and Mathematics Common Core standards, respectively.

Introduction

The Council of Chief State School Officers (CCSSO) and the National Governors Association Center for Best Practices (NGA Center) proposed Kindergarten – 12th grade Common Core State Standards in English Language Arts and Mathematics that represent a set of expectations for the knowledge and skills students need so they will be successful in college and careers (CCSSO & NGA, 2010a 2010 b). The March 10, 2010 version of the Common Core Standards was used for the alignment study.

The Pennsylvania Department of Education contacted the author at the University of Pittsburgh to facilitate a study of the alignment between the PA Standards for grades 3, 5, 8 and 11 (PDE, 2009a, 2009b) and the Common Core (CC) Standards in Mathematics and Reading. The extent to which the cognitive rigor and content of the PA Academic Standards is similar to the Common Core standards was evaluated

Content Alignment

The content alignment was evaluated using a standards-to-standards alignment method. A content alignment rubric was developed by Jim Bohan and Jean Dyszel (2010) to conduct the alignment (see Appendix D). The rubric has 5 levels:

- **Level A** indicates that the content alignment is very strong; that is, both standards address the same concept using similar terminology.
- **Level B** indicates that the essential content is captured by both standards although the standards may differ in specificity of purpose, outcome, or application.
- **Level C** indicates that there is minimal alignment in that the concept addressed in both standards is similar, but the linkage between the two standards is minimal.
- **Level D** indicates that there is alignment but at a different grade level; that is, both standards address the same concept, but are in different grade levels.
- **Level E** indicates no alignment; that is, there is no compatible standard.

The content alignment rubric was used in the study to examine the alignment between the PA Standards and the Common Core Standards.

Cognitive Rigor

The cognitive rigor was evaluated using Webb's (1999) depth-of-knowledge levels (DOK). Depth-of-knowledge consistency is one of four criteria Webb identified for examining the alignment of assessments to standards. Depth-of-knowledge consistency refers to the alignment between the cognitive demands of the

standards and the cognitive demands of the assessment items that are intended to assess the standards. As stated by Webb (April, 2002),

Depth-of-knowledge consistency between standards and assessment indicates alignment if what is elicited from students on the assessment is as demanding cognitively as what students are expected to know and do as stated in the standards (p. 5).

For the purpose of this study, depth-of-knowledge consistency refers to what is expected on the PA standards is as demanding cognitively as what is expected on the Common Core standards in terms of what students know and can do. Webb has identified four levels of depth-of-knowledge:

- **Level 1** refers to Recall such as recall of a fact, information or a procedure.
- **Level 2** refers to Skill or Concept whereby students need to use information or conceptual knowledge, and two or more steps may be required.
- **Level 3** refers to Strategic Thinking which requires reasoning, development of a plan or sequence of steps, and more than one answer may be possible.
- **Level 4** refers to Extended Thinking which may require an investigation and time to think and process multiple conditions of a problem.

In contrasting Level 1 with Level 2 in mathematics, Webb (April, 2002) indicated that Level 2 requires students to make some decisions on how to approach the problem which may involve classification, estimation, collecting and displaying data, and comparing data. Strategic thinking in mathematics at Level 3 requires “reasoning, planning, using evidence, and a higher level of thinking than the previous two levels” (p. 5). At Level 3, students may be asked to make and test conjectures, interpret information from a complex graphs, explain concepts, and use concepts to solve non-routine problems. Level 4 activities require complex reasoning, planning, and developing such as “conduct a project that specifies a problem, identifies solution paths, solves the problem, and reports results of a project” (November, 2002, p. 10).

To help clarify his depth-of-knowledge levels, Webb provided examples of state standards that were assigned to the differing levels (Webb, 1999). The first example is for two objectives for grade 8 mathematics under one state’s Number Sense Standard. They were rated at Level 4, Extended Thinking. They are:

Investigate number forms such as fractions, decimals and percents, and demonstrate their use in today’s society.
Develop, analyze, and explain methods for solving proportions (Webb, 1999, p.12).

In contrast, an objective for grade 8 mathematics Numeration Standard from another state which raters assigned a Level 2, Skill or Concept, is:

Describe the properties of terminating, repeating, and non-repeating decimals and be able to convert fractions to decimals and decimals to fractions (Webb, 1999, p.12).

Methodology

Panels

To conduct the mathematics alignment study, a group of nine educators with expertise in mathematics education and standards was convened on April 8 and 9, 2010 (ten were initially identified but one member was unable to attend). To conduct the ELA alignment study, a panel of nine educators with expertise in reading education and standards was convened on April 19 and 20, 2010 (ten were initially

identified but one member was unable to attend). Two Group Leaders, one to facilitate the Mathematics study and one to facilitate the Reading study, provided information, resources, and training for the panel members.

Within each panel, half of the educators had expertise in elementary education and the other half had expertise in secondary education allowing for two groups: an elementary group and a secondary group. The group leader served as the facilitator for the secondary group and the author served as the facilitator for the elementary group. The elementary group aligned the standards for grades 3 and 5 and the secondary group aligned the standards for grades 8 and 11. Many of the panel members had expertise and experience in both elementary and secondary education. Some of the K-12 educators were selected because of their experience with the PA Standards.

Mathematics Panel. Each panel member completed a participant survey to provide demographic information. The survey results are in Appendix A. For Mathematics, all nine panel members are female and White/non-Hispanic. For their current assignment, two are classroom teachers, four are educators (non-teachers), and 3 indicated other. Below are their current positions:

- Math Project Director, Math and Science Collaborative, Allegheny IU 3
- Supervisor K-12 Curriculum/TAC and School Improvement Services, Northwest Tri-County IU 5
- Curriculum Specialist/ Coach Mentor, Capital Area IU 15
- Middle School Principal, Derry Township School District
- Middle School Teacher, East Penn School District
- High School Teacher, Camp Hill School District
- Math Supervisor & Assessment Coordinator, Phoenixville Area School District
- Associate Professor of Mathematics Education, University of Pittsburgh
- Associate Professor, Duquesne University

For the two classroom teachers, both indicated that they have students with IEPs in their classes and one indicated that LEP students are in her classes. Among other panel members, two work in an urban setting, five in a suburban setting, one indicated that she works in all three settings (urban, suburban, and rural), and one did not respond to this question. Six of the panel members have 10 or more years of K-12 teaching experience (range was from 11 - 24 years). The two university faculty members have at least 9 years of experience as a School of Education faculty member and both had K-12 teaching experience (one with 3 years and the other with 5 years). One member did not respond to this question. All nine members have expertise in mathematics education

English Language Arts Panel. Each panel member completed a participant survey to provide demographic information. The survey results are in Appendix A. For English Language Arts, all nine panel members are females; eight of the panel members are White/non-Hispanic and one is Black/ non-Hispanic. For their current assignment, three are classroom teachers, three are educators (non teachers) and three indicated other. Below are their current positions:

- Curriculum and Instruction Director for Literacy and ESL, Lancaster Lebanon IU 13
- Assistant Superintendent for Curriculum, Instruction and Assessment, Boyerstown School District
- Reading Specialist, Northeastern School District
- High School Teacher and English Department Chair, Northside Urban Pathways Charter School, Pittsburgh City School District
- Language Arts Advisor, PDE Language Education Advisor
- Language Arts Advisor, OCDEL (PDE), Language Arts Advisor

- Teacher of 8th grade Communication Arts, Susquenita School District
- Assistant Professor of English Education, University of Pittsburgh
- Assistant Professor and Coordinator of Reading Education Program, University of Pittsburgh

For the three classroom teachers, all indicated that they have students with IEPs in their classes and one indicated that LEP students are in her classes. Four panel members work in an urban setting, two in a suburban setting, one in a rural setting, and one indicated she worked in all three settings. Seven of the panel members had 10 or more years of K-12 teaching experience (range was from 10 - 21 years). The other two members had at least 9 years of experience as a School of Education faculty member as well as K-12 teaching experience (3 years for one and 8 for the other). All nine members have expertise in English language arts education.

Procedures

With the entire panel, the group leader discussed the purpose of the study and provided a context for the study with respect to PA's Race to the Top application. Each member received a binder with the following materials.

- Agenda (see Appendix B)
- PA Revised 3, 5, 8 and 11 Standards
- Common Core Standards K-12
- Webb's Depth of Knowledge Rubric (see Appendix C)
- Content Alignment Rubric (see Appendix D)
- Common Core Alignment Tables
- PA Alignment Tables

The agenda was reviewed and the materials in the binders were described. The depth of knowledge categories and their relation to Bloom's cognitive level were reviewed and discussed, and the content alignment rubric was also reviewed and discussed. It is important to note that for the Common Core Mathematics Standards at the high school level, the 177 Standards are not distributed across grade levels, but are instead grouped together as the H.S. Common Core Math Standards.

After the panel orientation, the panel broke into the two groups: elementary group and secondary group. First, the depth of knowledge assignment for the CC Standards and the PA Standards was conducted. Following this task, the content alignment was performed. A more thorough description of the process follows.

Assignment of Depth of Knowledge (DOK) Levels. First, a small number of Common Core Standards for grade 3 were assigned a DOK level independently by each panel member and then discussed as a whole group. Following this activity, a consensus was obtained for each of the standards. Next, in each small group, members independently assigned a DOK level to each CC standard, beginning with the earlier grade (i.e., grade 3 for the elementary group and grade 8 for the secondary group). After the independent assignment, the group discussed their assignments and arrived at a consensus for each standard. This process was then repeated for the 5th grade CC Standards in the elementary group and for the H.S. CC Standards for the secondary group.

Next, panel members independently assigned a DOK level to the 3rd grade PA Standards in the elementary group and to the 8th grade PA Standards in the secondary group. In each small group, they then discussed their assignments and arrived at a consensus for each standard. This process was then

repeated for the 5th grade PA Standards in the elementary group and the 11th grade PA Standards in the secondary group.

Evaluation of Content Alignment. First, a small set of Common Core Standards for grade 3 were aligned to the PA Standards independently and then discussed by the whole group. A consensus was then obtained for each of these standards. Next, in each small group, for each CC Standard members independently identified one or more PA Standards at the same grade level that were aligned to it and assigned a level of alignment according to the rubric:

- A - content alignment very strong,
- B - captures essential content (moderate alignment),
- C - minimal alignment, and
- E - no alignment.

After the alignment was completed for a particular grade, the group discussed their assignments and arrived at a consensus for each CC Standard.

After consensus was reached for each CC Standard, for those CC Standards that were not aligned to one or more PA Standards at the same grade level, the small group determined whether one or more PA Standards at a *different* grade were aligned to the CC Standard at an A or B level (very strongly or moderately aligned). The elementary group began with 3rd grade CC Standards followed by the 5th grade CC Standards and the secondary group began with 8th grade CC Standards followed by the H.S. CC Standards.

After the alignment was completed for each CC Standard, the PA Standards were reviewed. For a PA Standard that was not aligned to a CC standard at the same grade level, the small group identified if one or more CC Standards at a *different* grade were aligned to it at the A or B level (very strongly or moderately aligned).

Summary of Procedure. In summary, the procedures that were followed in each small group (elementary group and secondary group) are provided below.

1. Each member independently assigned a DOK Level for each CC Standard, beginning with the lower grade level.
2. Each member independently assigned a DOK Level for each PA Standard, beginning with the lower grade level.
3. Each small group arrived at a consensus DOK Level for each CC Standard, beginning with the lower grade level.
4. Each small group arrived at a consensus DOK Level for each PA Standard, beginning with the lower grade level.
5. For each CC Standard, each member independently identified one or more PA Standards that were aligned to the CC Standard and indicated the level of alignment, beginning with the lower grade level.
6. For each CC Standard, each small group arrived at a consensus for the content alignment, beginning with the lower grade level.
7. For each CC Standard that was not considered aligned to one or more PA Standards, the small group determined whether one or more *different* grade level PA standards were aligned to the CC Standard at the A or B level (very strongly or moderately aligned).

8. Lastly, for each PA Standard, if there were no CC Standards aligned to it, the small group determined whether one or more *different* grade level CC Standards were aligned to the PA Standard at the A or B level.

Evaluation. The panel members completed an evaluation form to determine their understanding of the process and level of confidence with the final assignments of the DOK levels and the content alignment categories.

Results

The results for the mathematics study will be presented first followed by the results of the ELA study. From this point forward the Reading, Writing, Speaking and Listening PA Academic Standards will be referred to as ELA Standards.

Mathematics Results

Results for Depth of Knowledge. Table 1 provides the number and percent of the PA Math Standards and the Common Core Math Standards assigned to each of the four depth-of -knowledge (DOK) levels by the panelists. Level 1 refers to Recall, Level 2 refers to Skill/Concept, Level 3 refers to Strategic Thinking, and Level 4 refers to Extended Thinking. As indicated in Table 1, for grades 3, 5, and 8, the percent of standards distributed across the cognitive levels are similar for the PA Math Standards and the Common Core Math Standards. For grade 11/HS, the panelists assigned a larger percent of CC standards to Level 1, the Recall Level, as compared to the PA Standards. The panelists did not assign any PA Standard nor any CC Standard to Level 4, Extended Thinking, for grades 3, 5 and 8, and they assigned only one PA Standard to Level 4 for grade 11. Appendices F and G provide the DOK level for each individual CC Math Standard and PA Math Standard, respectively.

When interpreting these results, it is important to consider that the eight Common Core Standards for Mathematical Practice were not included in the DOK level assignment. If they were included, they most likely would have been assigned one of the top two DOK levels. The 8 CC Standards for Mathematical Practice are (CCSSO & NGA, 2010b):

- Make sense of problems and persevere in solving them,
- Reason abstractly and quantitatively,
- Construct viable arguments and critique the reasoning of others,
- Model with mathematics,
- Use appropriate tools strategically,
- Attend to precision,
- Look for and make use of structure, and
- Look for and express regularity in repeated reasoning.

Table 1. Number and Percent of PA Mathematics Standards and CC Mathematics Standards at each Depth of Knowledge (DOK) Level

Grade/ Cognitive Rigor	Mathematics Standards			
	PA Math Standards		Common Core Math Standards	
Grade 3 / Level 1	10	26%	8	22%
Level 2	23	59%	22	61%
Level 3	6	15%	6	17%
Level 4	0	0%	0	0%
Grade 5 / Level 1	9	22.5%	7	20%
Level 2	26	65%	23	66%
Level 3	5	12.5%	5	14%
Level 4	0	0%	0	0%
Grade 8 / Level 1	9	24%	9	23%
Level 2	23	60%	22	56%
Level 3	6	16%	8	21%
Level 4	0	0%	0	0%
Grade 11/ Level 1	4	13%	70	40%
HS Level 2	20	65%	96	54%
Level 3	6	19%	11	6%
Level 4	1	3%	0	0%

Table 2 provides the number and percent of Common Core Math Standards that were considered aligned to one or more PA Math Standards at grade level. It is important to note again that the H.S. Common Core Math Standards are not distributed across the grade levels, but are considered as a whole. There are a total of 177 H.S. Common Core Math Standards.

For grades 3 and H.S., slightly more than 50% of the CC Math Standards were considered aligned to one or more PA Standards, from minimal to very strong alignment. For grade 5, 83% of the CC Math Standards were considered at least minimally aligned to one or more PA Standards and 67% of grade 8 CC Math Standards were considered at least minimally aligned. The results also indicate that few CC Math Standards were considered aligned to the PA Math Standards at a very strong level. The majority of the CC Math Standards were considered aligned to the PA Math Standards at the moderate or minimal level (Levels B and C).

When interpreting the results, it is important to consider that for grades K-8, the goal of the Common Core Math Standards was to cover a narrower range of math content areas at a particular grade level, and to go deeper into the content areas that are covered. This contributes to the relatively large percent of CC Math Standards that are either not aligned to the PA Math Standards at grade level or aligned at a minimal level. As an example, at the elementary levels, there are PA Math Standards for Probability and Predictions, and Algebra and Functions, but there are few if any CC Standards that address these topics at the elementary level.

Table 2. Number and Percent of CC Math Standards Aligned to PA Math Standards at Grade Level

Grade / Number of CC Math Standards	Content Alignment Level							
	A Alignment Very Strong		B Captures Essential Content		C Minimal Alignment		E No PA Standard Aligned to CC Standard	
3 (n=36)	0	0%	5	14%	14	39%	17	47%
5 (n=35)	1	3%	13	37%	15	43%	6	17%
8 (n=39)	2	5%	11	28%	13	33%	13	33%
HS (n=177)	2	1%	52	29%	45	25%	78	44%

In order to broaden the examination of content alignment, the off-grade level standards were also examined. Table 3 provides the number and percent of Common Core Math Standards considered aligned to one or more PA Math Standards at grade level or at a *different* grade level. For a given CC Math Standard, if there were no PA Math Standards that were considered aligned to it at grade level or if the alignment was minimal at grade level (Category C), in the small group it was determined whether there was an off-grade level PA Math Standard aligned to it at level A (very strong alignment) or B (moderate alignment).

As indicated in Table 3, for grades 3, 5, and 8, at least 85% of the CC Math Standards were now considered to be aligned to one or more PA Math Standards. At these three grades, the percent of CC Math Standards that were considered to be aligned at a minimal level (Level 2) decreased considerably once the off-grade PA Standards were considered. There was no considerable change for the HS Common Core Math Standards which is reasonable given that there were no PA Math Standards at grades 9, 10 and 12 to be considered.

For those CC Math Standards that were aligned to a PA Math Standard at a different grade level, the majority were aligned with a PA Math Standard at a higher grade level: at grade 3, approximately two-thirds were aligned to a grade 4 PA Standard and approximately one-third were aligned to a grade 5 PA Standard; at grade 5, most were aligned to a grade 6 PA Standard; at grade 8, they were aligned to a grade 11 PA Standard; and at grade 11, they were aligned to a grade 8 PA Standard. Appendix F includes the tables that indicate for each Common Core Math Standard, the PA Math Standards that are aligned to it.

Table 3. Number and Percent of CC Math Standards Aligned to PA Math Standards at Grade Level and Different Grade Level

Grade/ No. of CC Math Stds	Content Alignment Level									
	A Alignment Very Strong		B Captures Essential Content		C Minimal Alignment		D Alignment at a Different Grade at Level A or B (from C and E In Table 2)		E No PA Standard Aligned to CC Standard	
3 (n=36)	0	0%	5	14%	6	17%	21	58%	4	11%
5 (n=35)	1	3%	13	37%	7	20%	11	31%	3	9%
8 (n=39)	2	5%	11	28%	6	15%	14	36%	6	15%
HS (n=177)	2	1%	52	29%	43	24%	3	2%	77	44%

Table 4 provides the number and percent of PA Math Standards that were considered aligned to one or more Common Core Math Standards at grade level. The column for Mathematical Practice CC Standards in Table 4 reflects the 8 CC Standards for Mathematical Practice such as make sense of problems and persevere in solving them, reason abstractly and quantitatively, construct viable arguments, model with mathematics, and look for and make use of structure (CCSSO & NGA, 2010b). These standards indicate how students should engage with the content described in the grade level CC Math Standards, and are not linked to any particular mathematical content area.

For grades 3, 5, and 8, approximately 50% of the PA Math Standards were considered to be aligned to one or more CC Math Standards at some level of alignment, with most of these being aligned at the moderate or minimal level. Again, it is important to note that for grades K-8, the goal of the Common Core Standards was to cover a narrower range of math content areas at a particular grade level, and to go deeper into the content areas. This factor contributes to the relatively large percent of PA Math Standards that are either not aligned to the CC Math Standards at grade level or aligned at a minimal level. As an example, at the elementary levels, there are PA standards for Probability and Predictions, and Algebra and Functions, but there are few if any CC standards that address these topics at the elementary level.

At grade 11, the majority, 84%, of the PA Math Standards were considered aligned to one or more Common Core Standards. This is reasonable given that the 31 PA Math Standards were being aligned to the 177 CC Math Standards at the High School Level.

At grades 3 and 5, the PA Standards associated with Mathematical Reasoning and Connections, Mathematical Problem Solving and Communication, and Patterns were considered moderately or very strongly aligned to some of the 8 CC Standards for Mathematical Practice. At grades 8 and 11, the PA Standards associated with Mathematical Reasoning and Connections and Mathematical Problem Solving and Communication were considered moderately or very strongly aligned to some of the 8 CC Standards for Mathematical Practice.

Table 4. Number and Percent of PA Math Standards Aligned to CC Math Standards at Grade Level

Grade/ No. of PA Math Stds	Content Alignment Level								CC Mathematical Practice Standards Level A or B	
	A Alignment Very Strong		B Captures Essential Content		C Minimal Alignment		E No CC Standard Aligned to PA Standard			
3 (n=39)	0	0%	5	13%	6	15%	23	59%	5	13%
5 (n=40)	1	2.5%	9	22.5%	7	17.5%	18	45%	5	12.5%
8 (n=38)	3	8%	8	21%	4	11%	19	50%	4	11%
11 (n=31)	1	3%	19	61%	2	6%	5	16%	4	13%

Table 5 provides the number and percent of PA Math Standards considered aligned to one or more CC Math Standards at grade level or at a *different* grade level. For a given PA Math Standard, if there were no CC Standards that were aligned to it at the same grade level (Category E in Table 4), the small group went on to determine whether there was one or more off-grade level CC Math Standards aligned to it at level A (very strong alignment) or B (moderate alignment).

As indicated in Table 5, when considering off-grades, a large majority of the PA Math Standards were considered aligned at some level for grades 3, 5, and 8: 79% at grade 3, 87% at grade 5, and 63% at grade 8. It is important to note that for these three grades, the percent of CC Math Standards that were considered not aligned at grade level decreased considerably once the off-grade CC Standards were considered. There was no change for grade 11.

The results for the PA Math Standards that were aligned to a CC Math Standard at a different grade level are as follows: at grade 3, approximately one-third were aligned to an upper grade level CC Standard, and the remaining were aligned to either a grade 1 or grade 2 CC Standard; at grade 5, most were aligned to an upper grade level PA Standard; and at grade 8, they were typically aligned to a grade 6 CC Standard. For grades 3 and 5, the PA Standards were aligned to an upper grade level CC Standard because the CC Standards did not cover particular content domains until the upper grades (e.g., probability, algebra). Appendix G includes the tables that indicate for each PA Math Standard, the CC Standards that are aligned.

Table 5. Number and Percent of PA Math Standards Aligned to CC Math Standards at Grade Level and Different Grade Level

Grade/ No. of PA Math Stds	Content Alignment Level										CC Mathematical Practice Standards Level A or B	
	A Alignment Very Strong		B Captures Essential Content		C Minimal Alignment		D Alignment at a Different Grade at A or B Level (from E in Table 4)		E No CC Standard Aligned to PA Standard			
3 (n=39)	0	0%	5	13%	6	15%	15	38%	8	21%	5	13%
5 (n=40)	1	2.5%	9	22.5%	7	17.5%	13	32.5%	5	12.5%	5	12.5%
8 (n=38)	3	8%	8	21%	4	10%	5	13%	14	37%	4	11%
11 (n=31)	1	3%	19	61%	2	6%	0	0%	5	16%	4	13%

English Language Arts (ELA) Results

Results for Depth of Knowledge. Table 6 provides the number and percent of the PA ELA Standards and the Common Core ELA Standards assigned to each of the four depth of knowledge levels by the panelists. Level 1 refers to Recall, Level 2 refers to Skill/Concept, Level 3 refers to Strategic Thinking, and Level 4 refers to Extended Thinking.

As indicated in Table 6, for grades 3, 5, and 11, a greater percent of PA ELA Standards were assigned a Level 4, Extended Thinking, as compared to the CC ELA Standards. At grade 8, the PA ELA Standards and the Common Core ELA Standards were distributed similarly across the DOK levels. It is also important to note that compared to mathematics, there was a relatively larger percent of both PA and CC ELA standards at the higher levels. Appendices H and I provide the DOK level for each individual CC ELA Standard and PA ELA Standard, respectively.

When interpreting these results, it is important to consider that the CC Reading Standards for History/Social Studies and Science were not included in the DOK level assignment. If these CC Reading Standards for the other content domains were included, most likely there would have been a larger percent of CC Standards at Levels 3 and 4.

Table 6. Number and Percent of PA ELA Standards and CC ELA Standards at each Depth of Knowledge (DOK) Level

Grade / DOK Level	Standards			
	PA Standards		Common Core Standards	
Grade 3 / Level 1	5	17%	1	3%
Level 2	8	27%	18	49%
Level 3	7	23%	13	35%
Level 4	10	33%	5	14%
Grade 5 / Level 1	0	0%	1	2%
Level 2	10	32%	12	29%
Level 3	6	19%	18	44%
Level 4	15	48%	10	24%
Grade 8 / Level 1	0	0%	1	2%
Level 2	11	35%	10	24%
Level 3	12	39%	21	51%
Level 4	8	26%	9	22%
Grade 11/ Level 1	0	0%	0	0%
Level 2	8	26%	8	20%
Level 3	7	23%	20	49%
Level 4	16	51%	13	32%

Table 7 provides the number and percent of Common Core ELA Standards that were considered aligned to the PA ELA Standards at grade level. As indicated in Table 7, all of the CC ELA Standards were considered aligned to one or more PA ELA Standards at some level except for one PA Standard in grade 3. Moreover, the majority of the CC ELA Standards were considered very strongly or moderately aligned to one or more PA ELA Standards, with 58% at grade 3, 68% at grade 5, 80% at grade 8 and 88% at grade 11.

When interpreting these results, it is again important to note that the Reading Standards for History/ Social Studies and Science were not formally considered in the alignment process.

Table 7. Number and Percent of CC ELA Standards Aligned to PA ELA Standards at Grade Level

Grade / Number of CC ELA Standards	Content Alignment Level							
	A Alignment Very Strong		B Captures Essential Content		C Minimal Alignment		E No PA Standard Aligned to CC Standard	
3 (n=35)	3	9%	17	49%	14	40%	1	3%
5 (n=41)	10	24%	18	44%	13	32%	0	0%
8 (n=41)	8	20%	25	60%	8	20%	0	0%
11 (n=41)	13	32%	23	56%	5	12%	0	0%

Table 8 provides the number and percent of Common Core ELA Standards considered aligned with one or more PA ELA Standards at grade level or at a *different* grade level. As with the math analysis, if there were no PA Standards that aligned at grade level, in the small group it was determined if there was one or more off-grade level PA Standards aligned to it at level A (very strong alignment) or B (moderate alignment). Appendix H includes the tables that indicate for each Common Core ELA Standard, the PA ELA Standards that are aligned to it.

As indicated in Table 8, the only affected grade was grade 3 in that the one standard that was not considered aligned at grade level is now in the column indicating that is aligned at a different grade level (grade 5).

Table 8. Number and Percent of CC ELA Standards Aligned to PA ELA Standards at Grade Level and Different Grade Level

Grade/ No. of CC ELA Stds	Alignment Level									
	A Alignment Very Strong		B Captures Essential Content		C Minimal Alignment		D Alignment at a Different Grade at A or B Level (from E in Table 7)		E No PA Standard Aligned to CC Standard	
3 (n=35)	3	9%	17	49%	14	40%	1	3%	0	0%
5 (n=41)	10	24%	18	44%	13	32%	0	0%	0	0%
8 (n=41)	8	20%	25	60%	8	20%	0	0%	0	0%
11 (n=41)	13	32%	23	56%	5	12%	0	0%	0	0%

Table 9 provides the number and percent of PA ELA Standards that were considered aligned to one or more Common Core ELA Standards at the grade level. For all four grade levels, most of the PA ELA Standards were considered aligned to one or more CC ELA Standards: 83% for grade 3, 94% for grades 5 and 8, and 97% for grade 11. Moreover, the majority of the PA ELA Standards were considered very strongly or moderately aligned to the CC ELA Standards: 80% for grade 3, 84% for grade 5, 81% for grade 8, and 91% for grade 11.

Table 9. Number and Percent of PA ELA Standards Aligned to CC ELA Standards at Grade Level

Grade / Number of PA ELA Standards	Alignment Level							
	A Alignment Very Strong		B Captures Essential Content		C Minimal Alignment		E No CC Standard Aligned to PA Standard	
3 (n=30)	9	30%	15	50%	1	3%	5	17%
5 (n=31)	20	65%	6	19%	3	10%	2	6%
8 (n=31)	7	23%	18	58%	4	13%	2	6%
11 (n=31)	11	36%	17	55%	2	6%	1	3%

Lastly, Table 10 provides the number and percent of PA ELA Standards considered aligned to CC ELA Standards at grade level or at a *different* grade level. For a given PA ELA standard, if there were no CC Standards that were aligned to it at grade level, in the small group it was determined if there was one or more off-grade level CC standards aligned to it at level A or B (very strongly or moderately aligned). Appendix I includes the tables that indicate for each PA ELA Standard, the aligned CC ELA Standards.

As indicated in Table 10, the only affected grades were grades 3 and 5: for both of these grades all PA ELA Standards were considered aligned to the CC Standards at grade level or at a *different* grade level. For grade 3, two PA ELA Standards were aligned to a lower grade level CC Standard and three were aligned to an upper grade level CC Standard; and for grade 5, one was aligned to a lower grade level standard and one to an upper grade level standard.

Table 10. Number and Percent of PA ELA Standards Aligned to CC ELA Standards at Grade Level and Different Grade Level

Grade/ No. of PA ELA Stds	Alignment Level									
	A Alignment Very Strong		B Captures Essential Content		C Minimal Alignment		D Alignment at a Different Grade at Level A or B (from E In Table 2)		E No CC Standard Aligned to PA Standard	
3 (n=30)	9	30%	15	50%	1	3%	5	17%	0	0%
5 (n=31)	20	65%	6	19%	3	10%	2	6%	0	0%
8 (n=31)	7	23%	18	58%	4	13%	0	0%	2	6%
HS (n=31)	11	36%	17	55%	2	6%	0	0%	1	3%

Evaluation Results

The panelists responded to a short questionnaire regarding their understanding of the process and level of confidence with the DOK level assignments and content alignment assignments. The results are presented in Appendix E.

Evaluation Results for Mathematics Panel. The mathematics grades 3 and 5 panel evaluation results indicated that the panel members either agreed or strongly agreed with the statements indicating that they understood the training, standards, depth of knowledge task, and content alignment task. They also either agreed or strongly agreed with the statements indicating that they were confident with the DOK and content alignment level assignments, with the majority of the panel strongly agreeing to these statements. The mathematics grades 8 and 11 panel evaluation results indicated that the majority of the panel agreed or strongly agreed with the statements that they understood the training, standards, depth of knowledge task, and content alignment task. The majority of the panel members also agreed or strongly agreed with the statements that they were confident with the DOK and content alignment level assignments. It should be noted that one panel member either somewhat disagreed or disagreed with the statements about being confident with the assignment of the DOK levels and content levels.

Evaluation Results for English Language Arts Panel. The English Language Arts grades 3 and 5 panel evaluation results indicated that the majority of the panel members either agreed or strongly agreed with the statements indicating that they understood the training, standards, depth of knowledge task, and content alignment task. One panel member somewhat disagreed with the statement about understanding her role and task in the alignment process. The majority of the panel also either agreed or strongly agreed with the statements that they were confident with the DOK and content alignment level assignments. Two panel members however indicated that they somewhat agreed with the statement about being confident with the content level assignments. The ELA grades 8 and 11 panel evaluation results indicated that they either agreed or strongly agreed with the statements indicating that they understood the training, standards, depth of knowledge task, and content alignment task. They also either agreed or strongly agreed with the statements that they were confident with the DOK and content alignment level assignments.

Conclusion

Mathematics Content Alignment

In general, the results indicated that the PA Standards were more aligned to the Common Core Content Standards for English Language Arts than for Mathematics. For grades 3, 5 and 8, approximately 50% of the PA Math Standards were considered at least minimally aligned to one or more Common Core Standards at the same grade level. When including off-grades, a larger percent of PA Math Standards were considered aligned, from minimal to very strong alignment, to one or more Common Core Math Standards: 79% at grade 3, 87% at grade 5, and 63% at grade 8. In terms of moderate and very strong alignment, when including off-grades, 64% of PA Math Standards were considered aligned to one or more Common Core Math Standards at grade 3, 70% at grade 5, and 50% at grade 8. For grade 11, 84% of PA math standards were considered aligned, from minimal to very strong alignment, with 61% aligned at the moderate level. Across the grades, there were few standards that were aligned at the very strong level.

For grades 3 and H.S., slightly more than 50% of the Common Core Math Standards were considered aligned to one or more PA Math Standards, from minimal to strong alignment. For grade 5, 83% were considered aligned to one or more PA Math Standards, from minimal to strong alignment, and 67% of

Common Core Math Standards were considered aligned at grade 8. When including off-grades, at least 85% of the Common Core Math Standards were considered aligned, from minimal to very strong alignment, at grades 3, 5 and 8. For high school, only 66% of the Common Core Math Standards were considered aligned to the PA Math Standards. This is reasonable given that there were no PA Standards at grades 9, 10, and 12. There were very few standards that were aligned at the very strong level across the grades.

When interpreting these results it is important to consider that for grades K-8, the goal of the Common Core Math Standards was to cover a narrower range of math content areas at a particular grade level, and to go deeper into the content areas. This contributes to the relatively large percent of PA Math Standards that were considered either not aligned to the K-8 CC Math Standards at grade level or aligned at a minimal level. As an example, at the elementary levels, there are PA standards for Probability and Predictions, and Algebra and Functions, but there are few if any CC standards that address these topics at the elementary level.

It is also important to consider that there are 8 CC Standards for Mathematical Practice (e.g., make sense of problems, reason abstractly and quantitatively, construct viable arguments, model with mathematics, and look for and make use of structure) that indicate how students should engage with the content described in the CC Content Standards at each grade level, and are not linked to any particular mathematical content area. It was difficult to fully incorporate these 8 CC Standards for Mathematical Practice in this alignment study. It is recommended that future alignment studies more fully consider these 8 CC Standards for Mathematical Practice.

English Language Arts Content Alignment

For English Language Arts, in grades 3, 5, 8, and 11, over 80% of the PA Standards were considered aligned moderately or very strongly to one or more Common Core ELA Standards (80% for grade 3, 84% for grade 5, 81% for grade 8, and 91% for grade 11). When including off-grade levels, 97% of the PA ELA standards for grade 3 and 90% for grade 5 were considered aligned moderately or very strongly to one or more Common Core ELA Standards. There were no changes for grades 8 and 11.

The majority of the Common Core ELA Standards were aligned to one or more PA Standards at a moderate or strong level: 58% for grade 3, 68% for grade 5, 80% for grade 8, and 88% for grade 11. The remaining Common Core ELA Standards were considered minimally aligned to the PA Standards. An exception was for grade 3 for which 40% were considered minimally aligned and 3% were considered not aligned. Since grade 3 was the only grade for which there were CC Standards not aligned to one or more PA Standard, off-grade standards were considered only for grade 3. When including off-grade levels for grade 3, 61% of the CC ELA Standards were considered aligned to one or more PA Standards.

When interpreting these results, it is important to consider that the CC Standards include Reading Standards for History/Social Studies and Reading Standards for Science and these were not incorporated formally into this study. It is recommended that future alignment studies more fully address these CC Reading Standards for History/Social Studies and Science.

Cognitive Rigor

For mathematics, the percent of standards distributed across the cognitive rigor levels were similar for PA Math Standards and CC Math Content Standards for grades 3, 5, 8, and 11, with the majority of the standards assigned to Level 2 (Concept/Skill). There were no standards assigned at Level 4 (Extended Thinking) for grades 3, 5, and 8. When interpreting these results, it is important to consider that the 8 CC

Standards for Mathematical Practice were not included in the DOK level assignment. If they were included, they most likely would have been assigned one of the top two DOK levels.

For ELA, the percent of standards distributed across the cognitive rigor levels were similar for PA Standards and CC Standards for grades 3, 5, 8 and 11, except for grades 3, 5, and 11, a slightly larger percent of PA ELA Standards were considered at Level 4 (Extended Thinking) as compared to the CC ELA Standards. When interpreting these results, it is important to note that the Reading Standards for History/ Social Studies and Science were not considered in the DOK level assignment.

As previously indicated, it is recommended that future alignment students more fully address the CC Standards for Mathematical Practices and the CC Reading Standards for History/Social Studies and Science.

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Appendix A

Alignment Study – Participant Survey

Please clearly mark your responses.

- 1. Name: _____
- 2. Gender: Female _____ Male _____
- 3. Ethnicity:
 - Asian/Pacific Islander _____
 - Amer. Indian/Alaskan Native _____
 - Black/non-Hispanic _____
 - Latino/Hispanic _____
 - Multi-racial/ethnic _____
 - White/non-Hispanic _____
- 4. Current Assignment:
 - Classroom Teacher _____ indicate grade and subject _____
 - Educator (non-teacher) _____
 - Other _____

If you are a classroom teacher: 1) are there students with IEPs in your class? Yes _____ No _____
2) are there LEP students in your class? Yes _____ No _____

If educator (non teacher), indicate your title and how you work with teachers and students:

If other, indicate your title and how you work with teachers and students:

- 5. Work Setting: Urban _____ Suburban _____ Rural _____
- 6. District name: _____
- 7. How many years of your career have you been a classroom teacher (include this year)? _____
- 8. List the grades and number of years taught at each grade for your subject.

Appendix B

COMMON CORE ALIGNMENT STUDY

MATH
APRIL 8-9

READING
APRIL 19-20

AGENDA

1. Welcome and Introductions
2. Logistics
 - a. Work Day
 - b. Procedure for Reimbursements
3. Background
 - a. Common Core
 - b. Race to the Top
 - c. State Board of Education
 - d. University of Pittsburgh
4. Session Goal: Complete an alignment study to discern degree of alignment between the revised PA Academic Standards and the Common Core Standards minimally in Grades 3, 5, 8, and 11. Alignment will be measured through two lenses: content and rigor.
5. Tools for the Task
 - a. Revised PA Standards, K-12
 - b. Common Core Standards, K-12
 - c. Webb's Depth of Knowledge (DOK) Rubric
 - d. Content Alignment Rubric
 - e. PA Standard Alignment Table
 - f. Common Core Alignment Table
6. The Process
 - a. Determining DOK of Common Core and PA Standards (Handout)
 - i. Individual Analysis
 - ii. Reaching Group Consensus
 - b. Aligning and Charting the Common Core to PA Standards and Measuring Degree of Content Alignment Between PA and CC (Handout)
 - i. Individual Analysis
 - ii. Reaching Consensus
 - c. Evaluation of Process
7. Getting Started
 - a. Breakout by Levels (Elementary: Grades 3, 5; Secondary: Grades 8, 11)
 - b. Recording the Work
 - c. Day's Schedule
8. Questions

Appendix C
Cognitive Level Comparison Matrix (Developed by Jim Bohan and Jean Dyszel)

COGNITIVE LEVEL COMPARISON MATRIX: BLOOM AND WEBB CATEGORIES			
BLOOM		WEBB	
1.0	Knowledge	1.0	Recall
2.0	Comprehension	2.0	Basic Application of Skill/Concept
3.0	Application		
4.0	Analysis	3.0	Strategic Thinking
5.0	Synthesis	4.0	Extended Thinking
6.0	Evaluation		

DEFINITIONS			
BLOOM		WEBB	
1.0	Student remembers or recalls appropriate previously learned information.	1.0	Student recalls facts, information, procedures, or definitions.
2.0	Student translates, comprehends, or interprets information based on prior learning.	2.0	Student uses information, conceptual knowledge, and procedures.
3.0	Student selects, transfers, and uses data and principles to complete a task or problem with a minimum of direction		
4.0	Student distinguishes, classifies, and relates the assumptions, hypotheses, evidence, or structure of a statement or question.	3.0	Student uses reasoning and develops a plan or sequence of steps; process has some complexity.
5.0	Student originates, integrates, and combines ideas into a product, plan, or proposal that is new.	4.0	Student conducts an investigation, needs time to think and process multiple conditions of problem or task.
6.0	Student appraises, assesses, or critiques on a basis of specific standards and criteria.		

COGNITIVE LEVEL COMPARISON MATRIX: BLOOM AND WEBB

Action Words			
BLOOM		WEBB	
1.0	define, identify, name, select, state, order (involves a one-step process)	1.0	define, identify, name, select, state, order (involves a one-step process)
2.0	convert, estimate, explain, express, factor, generalize, give example, identify, indicate, locate, picture graphically (involves a two-step process)	2.0	apply, choose, compute, employ, interpret, graph, modify, operate, plot, practice, solve, use (involves a two-step process)
3.0	apply, choose, compute, employ, interpret, graph, modify, operate, plot, practice, solve, use, (involves a three-or-more step process)		
4.0	compare, contrast, correlate, differentiate, discriminate, examine, infer, maximize, minimize, prioritize, subdivide, test	3.0	compare, contrast, correlate, differentiate, discriminate, examine, infer, maximize, minimize, prioritize, subdivide, test
5.0	arrange, collect, construct, design, develop, formulate, organize, set up, prepare, plan, propose, create, experiment and record data	4.0	arrange, collect, construct, design, develop, formulate, organize, set up, prepare, plan, propose, create, experiment and record data
6.0	appraise, assess, defend, estimate, evaluate, judge, predict, rate, validate, verify		

Appendix D
Content Alignment Rubric

CONTENT ALIGNMENT RUBRIC

A CONTENT ALIGNMENT VERY STRONG	B CAPTURES ESSENTIAL CONTENT	C MINIMAL ALIGNMENT	D ALIGNMENT BUT AT A DIFFERENT GRADE LEVEL	E No ALIGNMENT
Both standards address same concept using similar terminology	Both standards address same concept although they may differ in specificity of purpose, outcome, or application	While the concept is similar, the linkage is minimal	Both standards address the same concept but are contained in different grade levels	Compatible standard not found
EXAMPLE	EXAMPLE	EXAMPLE	EXAMPLE	EXAMPLE
<p>PA STANDARD: Evaluate as a reader how an author's choice of words advances the theme or purpose of a work.</p> <p>COMMON CORE: Analyze how specific word choices shape the meaning and tone of the text.</p>	<p>PA STANDARD: Use media and technology resources for research, information analysis, problem solving, and decision making in content learning.</p> <p>COMMON CORE: Extract key information efficiently in print and online using text features and search techniques.</p>	<p>PA STANDARD: Demonstrate comprehension / understanding of a wide variety of appropriate literary works from different cultures and literary movements, including classic and contemporary literature.</p> <p>COMMON CORE: Draw upon relevant prior knowledge to enhance comprehension, and note when the text expands on or challenges that knowledge</p>	<p>PA STANDARD: Compare the literary elements within and among texts used by an author, including characterization, setting, plot, theme, and point of view. (<u>Grade 6</u>)</p> <p>COMMON CORE: Compare the point of view of two or more authors by comparing how they treat the same or similar historical topics, including which details they include and emphasize in their respective accounts. (<u>Grade 9-10</u>)</p>	<p>PA STANDARD: None</p> <p>COMMON CORE: Interpret how an author uses and refines the meaning of a key term or terms over the course of a text (e.g., how Madison defines faction in Federalist No. 10 and No. 51).</p>

CONTENT ALIGNMENT RUBRIC

A CONTENT ALIGNMENT VERY STRONG	B CAPTURES ESSENTIAL CONTENT	C MINIMAL ALIGNMENT	D ALIGNMENT BUT AT A DIFFERENT GRADE LEVEL	E No ALIGNMENT
Both standards address same concept using similar terminology	Both standards address same concept although they may differ in specificity of purpose, outcome, or application	While the concept is similar, the linkage is minimal	Both standards address the same concept but are contained in different grade levels	Compatible standard not found
EXAMPLE	EXAMPLE	EXAMPLE	EXAMPLE	EXAMPLE
<p>PA STANDARD: 2.3.1.B. Use concrete objects to measure length by repeating and the number of nonstandard or standard units.</p> <p>COMMON CORE: 3. Measure the length of an object by using another object as a length unit.</p>	<p>PA STANDARD: 2.2.K.B. Represent addition and subtraction in every day situations using up to ten concrete objects.</p> <p>COMMON CORE: 6. Understand that addition and subtraction apply to situations of adding-to, taking-from, putting together, taking apart, and comparing. See <i>Glossary, Table 1.</i></p>	<p>PA STANDARD: 2.2.2.B. Add and subtract multi-digit numbers with and without regrouping, to include problems with money.</p> <p>COMMON CORE: 2. Solve word problems involving addition and subtraction within 100, e.g., by using drawings or equations to represent the problem.</p>	<p>PA STANDARD: <u>Grade 6</u> 2.1.6.F. Apply the associative, commutative, distributive and/or identity properties to write equivalent forms of expressions.</p> <p>COMMON CORE: <u>Grade 3</u> 2. Understand the properties of multiplication. a. Multiplication is commutative. <i>For example, the total number in 3 groups with 6 things each is the same as the total number in 6 groups with 3 things each, that is, $3 \times 6 = 6 \times 3$.</i> b. Multiplication is associative. For example, $4 \times 3 \times 2$ can be calculated by first calculating $4 \times 3 = 12$ then calculating $12 \times 2 = 24$, or by first calculating $3 \times 2 = 6$ then calculating $4 \times 6 = 24$. c. 1 is the multiplicative identity. d. Multiplication distributes over addition</p>	<p>PA STANDARD: None</p> <p>COMMON CORE: 5. Understand that a decade word refers to one, two, three, four, five, six, seven, eight, or nine tens.</p>

CONTENT ALIGNMENT RUBRIC

A CONTENT ALIGNMENT VERY STRONG	B CAPTURES ESSENTIAL CONTENT	C MINIMAL ALIGNMENT	D ALIGNMENT BUT AT A DIFFERENT GRADE LEVEL	E No ALIGNMENT
Both standards address same concept using similar terminology	Both standards address same concept although they may differ in specificity of purpose, outcome, or application	While the concept is similar, the linkage is minimal	Both standards address the same concept but are contained in different grade levels	Compatible standard not found
			(the distributive property). For example, $5 \square (3 + 4) = (5 \square 3) + (5 \square 4)$.	

Appendix E
Panel Evaluation Results

Table E.1. Mathematics Grades 3 and 5 Panel Evaluation Results

Training	Grade 3						Grade 5					
	StrA	A	SoA	SoD	D	StrD	StrA	A	SoA	SoD	D	StrD
a. After training, I understood my <u>role</u> in the alignment process.	5						5					
b. After training, I understood my <u>task</u> in the alignment process	5						5					
Standards												
a. After training, I had an understanding of the PA Standards.	4	1					4	1				
b. After training, I had an understanding of the Common Core (CC) Standards.	5						5	1				
Depth of Knowledge Task												
a. I understood the method for <u>independently</u> assigning the Depth of Knowledge (DOK) Levels to the PA Standards and the CC Standards.	5						5					
b. I understood the <u>consensus</u> process for the final assignment of Depth of Knowledge (DOK) Levels to the PA Standards and the CC Standards.	5						5					
c. The group discussion aided my understanding during the consensus process for the final assignment of the DOK Levels to the PA Standards.	4	1					4	1				
d. The group discussion aided my understanding during the consensus process for the final assignment of the DOK Levels to the CC Standards.	4	1					4	1				
e. I am confident that the final assignments of the DOK Levels to the PA Standards reflect the views of the panelists.	5						5					
f. I am confident that the final assignments of the DOK Levels to the CC Standards reflect the views of the panelists.	5						5					
g. I am confident about the appropriateness of the final assignments of the DOK Levels to the PA Standards.	3	2					3	2				
h. I am confident about the appropriateness of the final assignments of the DOK Levels to the CC Standards.	4	1					4	1				

Content Alignment Process	Grade 3						Grade 5					
	StrA	A	SoA	SoD	D	StrD	StrA	A	SoA	SoD	D	StrD
a. I understood the method for <u>independently</u> assigning the initial levels of alignment (categories A, B, C, D, E) between the PA Standards and the CC Standards.	5						5					
b. I understood the <u>consensus</u> method for assigning the <u>final</u> levels of content alignment (categories A, B, C, D, E) between the PA Standards and the CC Standards.	4	1					4	1				
c. The group discussion aided my understanding of the consensus process for assigning the <u>final</u> levels of content alignment (categories A, B, C, D, E) between the PA Standards and the Common Core Standards.	5						5					
d. I am confident that the <u>final</u> levels of content alignment (categories A, B, C, D, E) reflect the views of the panelists.	4	1					4	1				
e. I am confident about the reasonableness of the <u>final</u> levels of content alignment (categories A, B, C, D, E).	5						5					

Comments

Grade 3	Grade 5
<p>The third grade math team worked efficiently and cooperatively.</p> <p>The collaboration with colleagues was invaluable and enlightening.</p> <p>Excellent process used for the 2 days. It was very efficient and productive</p> <p>I tended to rate some PA Standards in Data Analysis and Statistics higher than the consensus of our group.</p> <p>I have concerns regarding the common core standards and the PA standards alignment in 2 areas: 1) grade level content differences (e.g., multiplication/division is in CC at grade 3, but PA at grade 4, and 2) when looking at the intended level of knowledge/understanding it is, at times, difficult to determine (especially in PA) and therefore the alignment may be inaccurate. Also, CC standards statement to teach multiplication as repeated addition – I disagree. It is not.</p>	<p>I found a more coherent alignment at the 5th grade level than at the 3rd grade level, although overall at a minimal level.</p> <p>I find the overemphasis of standard algorithms and computation in the CC standards alarming. This emphasis is an indication of political agendas and not a reflection of best practice and evidence. As an educator, I believe it calls into question the entire effort.</p>

Table E.2. Mathematics Grades 8 and 11/HS Panel Evaluation Results

Training	Grade 8						Grade 11					
	StrA	A	SoA	SoD	D	StrD	StrA	A	SoA	SoD	D	StrD
a. After training, I understood my <u>role</u> in the alignment process.	3	1					3	1				
b. After training, I understood my <u>task</u> in the alignment process	3	1					3	1				
Standards												
a. After training, I had an understanding of the PA Standards.	3		1				3		1			
b. After training, I had an understanding of the Common Core (CC) Standards.	3		1				3		1			
Depth of Knowledge Task												
a. I understood the method for <u>independently</u> assigning the Depth of Knowledge (DOK) Levels to the PA Standards and the CC Standards.	3	1					3	1				
b. I understood the <u>consensus</u> process for the final assignment of Depth of Knowledge (DOK) Levels to the PA Standards and the CC Standards.	3			1			3			1		
c. The group discussion aided my understanding during the consensus process for the final assignment of the DOK Levels to the PA Standards.	3		1				3		1			
d. The group discussion aided my understanding during the consensus process for the final assignment of the DOK Levels to the CC Standards.	3			1			3			1		
e. I am confident that the final assignments of the DOK Levels to the PA Standards reflect the views of the panelists.	3			1			3			1		
f. I am confident that the final assignments of the DOK Levels to the CC Standards reflect the views of the panelists.	2	1		1			2	1		1		
g. I am confident about the appropriateness of the final assignments of the DOK Levels to the PA Standards.	3			1			3			1		
h. I am confident about the appropriateness of the final assignments of the DOK Levels to the CC Standards.	2	1		1			2	1		1		

Content Alignment Process	Grade 8						Grade 11/ HS					
	StrA	A	SoA	SoD	D	StrD	StrA	A	SoA	SoD	D	StrD
a. I understood the method for <u>independently</u> assigning the initial levels of alignment (categories A, B, C, D, E) between the PA Standards and the CC Standards.	3	1					3	1				
b. I understood the <u>consensus</u> method for assigning the <u>final</u> levels of content alignment (categories A, B, C, D, E) between the PA Standards and the CC Standards.	3				1		3				1	
c. The group discussion aided my understanding of the consensus process for assigning the <u>final</u> levels of content alignment (categories A, B, C, D, E) between the PA Standards and the Common Core Standards.	3			1			3			1		
d. I am confident that the <u>final</u> levels of content alignment (categories A, B, C, D, E) reflect the views of the panelists.	3				1		3				1	
e. I am confident about the reasonableness of the <u>final</u> levels of content alignment (categories A, B, C, D, E).	2	1			1		2	1			1	

No Comments

Table E.3. ELA Grades 3 and 5 Panel Evaluation Results

Training	Grade 3						Grade 5					
	StrA	A	SoA	SoD	D	StrD	StrA	A	SoA	SoD	D	StrD
a. After training, I understood my <u>role</u> in the alignment process.	1	2		1			1	2		1		
b. After training, I understood my <u>task</u> in the alignment process	1	2		1			1	2		1		
Standards												
a. After training, I had an understanding of the PA Standards.	3		1				3		1			
b. After training, I had an understanding of the Common Core (CC) Standards.	2		2				2		2			
Depth of Knowledge Task												
a. I understood the method for <u>independently</u> assigning the Depth of Knowledge (DOK) Levels to the PA Standards and the CC Standards.	3	1					4					
b. I understood the <u>consensus</u> process for the final assignment of Depth of Knowledge (DOK) Levels to the PA Standards and the CC Standards.	3	1					4					
c. The group discussion aided my understanding during the consensus process for the final assignment of the DOK Levels to the PA Standards.	3	1					3	1				
d. The group discussion aided my understanding during the consensus process for the final assignment of the DOK Levels to the CC Standards.	4						4					
e. I am confident that the final assignments of the DOK Levels to the PA Standards reflect the views of the panelists.	2	2					2	2				
f. I am confident that the final assignments of the DOK Levels to the CC Standards reflect the views of the panelists.	2	2					2	2				
g. I am confident about the appropriateness of the final assignments of the DOK Levels to the PA Standards.	3	1					3	1				
h. I am confident about the appropriateness of the final assignments of the DOK Levels to the CC Standards.	3	1					3	1				

Content Alignment Process	Grade 3						Grade 5					
	StrA	A	SoA	SoD	D	StrD	StrA	A	SoA	SoD	D	StrD
a. I understood the method for <u>independently</u> assigning the initial levels of alignment (categories A, B, C, D, E) between the PA Standards and the CC Standards.	4						3	2				
b. I understood the <u>consensus</u> method for assigning the <u>final</u> levels of content alignment (categories A, B, C, D, E) between the PA Standards and the CC Standards.	4						4	1				
c. The group discussion aided my understanding of the consensus process for assigning the <u>final</u> levels of content alignment (categories A, B, C, D, E) between the PA Standards and the Common Core Standards.	4						3	2				
d. I am confident that the <u>final</u> levels of content alignment (categories A, B, C, D, E) reflect the views of the panelists.	2	1	1				3	2				
e. I am confident about the reasonableness of the <u>final</u> levels of content alignment (categories A, B, C, D, E).		3	2				2	3				

Comments

Grade 3	Grade 5
I have a concern about assigning an alignment category to individual standards rather than to the standards as a whole (when identifying CC standards that are aligned to PA standards)	I have a concern about assigning an alignment category to individual standards rather than to the standards as a group (when identifying CC standards that are aligned to PA standards)

Table E.4. ELA Grades 8 and 11 Panel Evaluation Results

Training	Grade 8						Grade 11					
	StrA	A	SoA	SoD	D	StrD	StrA	A	SoA	SoD	D	StrD
a. After training, I understood my <u>role</u> in the alignment process.	5						5					
b. After training, I understood my <u>task</u> in the alignment process	5						5					
Standards												
a. After training, I had an understanding of the PA Standards.	5						5					
b. After training, I had an understanding of the Common Core (CC) Standards.	4	1					4	1				
Depth of Knowledge Task												
a. I understood the method for <u>independently</u> assigning the Depth of Knowledge (DOK) Levels to the PA Standards and the CC Standards.	5						5					
b. I understood the <u>consensus</u> process for the final assignment of Depth of Knowledge (DOK) Levels to the PA Standards and the CC Standards.	5						5					
c. The group discussion aided my understanding during the consensus process for the final assignment of the DOK Levels to the PA Standards.	5						5					
d. The group discussion aided my understanding during the consensus process for the final assignment of the DOK Levels to the CC Standards.	5						5					
e. I am confident that the final assignments of the DOK Levels to the PA Standards reflect the views of the panelists.	5						5					
f. I am confident that the final assignments of the DOK Levels to the CC Standards reflect the views of the panelists.	5						5					
g. I am confident about the appropriateness of the final assignments of the DOK Levels to the PA Standards.	4	1					4	1				
h. I am confident about the appropriateness of the final assignments of the DOK Levels to the CC Standards.	3	2					3	2				

Content Alignment Process	Grade 8						Grade 11					
	StrA	A	SoA	SoD	D	StrD	StrA	A	SoA	SoD	D	StrD
a. I understood the method for <u>independently</u> assigning the initial levels of alignment (categories A, B, C, D, E) between the PA Standards and the CC Standards.	3	2					3	2				
b. I understood the <u>consensus</u> method for assigning the <u>final</u> levels of content alignment (categories A, B, C, D, E) between the PA Standards and the CC Standards.	4	1					4	1				
c. The group discussion aided my understanding of the consensus process for assigning the <u>final</u> levels of content alignment (categories A, B, C, D, E) between the PA Standards and the Common Core Standards.	3	2					3	2				
d. I am confident that the <u>final</u> levels of content alignment (categories A, B, C, D, E) reflect the views of the panelists.	3	2					4	1				
e. I am confident about the reasonableness of the <u>final</u> levels of content alignment (categories A, B, C, D, E).	2	3					2	3				

Comments

Grade 8	Grade 11
<p>I think the process worked very well- many thanks to Jean. Great experience! Very productive use of time. Well organized and presented.</p> <p>This was a very great experience. I learned a lot about the core standards and their connection to current PA and national standards (NCTE)</p>	<p>The group worked very well together. It was a very thoughtful process and enlightening.</p>

