SC EDUCATION OVERSIGHT COMMITTEE
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AGENDA

Joint Academic Standards and Assessments & Public Awareness Subcommittee Meeting

Monday, November 15, 2021
Blatt Building, Room 321
10:00 A.M.

I. Welcome ..... Neil Robinson

II. Approval of ASA Minutes, September 20, 2021 ..... Neil Robinson

III. *Action Items:*
Cyclical Review of SC Mathematics Standards ..... Dr. Rainey Knight

Career Readiness Measures:
SC High School Credential ..... Dr. Jenny May

Student Engagement (School Quality) Measure:
Teacher and Student Survey ..... Matthew Ferguson & Dr. Matthew Lavery

Preparing for Success Indicator at High School:
US History & Constitution Operational Field Test ..... Matthew Ferguson

IV. *Discussion Items:*
SCPASS Science Alignment Study ..... Dr. Matthew Lavery

Executive Director Update ..... Matthew Ferguson

V. Adjournment

Academic Standards and Assessments
Neil Robinson, Vice Chair
Barbara Hairfield
Sen. Greg Hembree
Sidney Locke
Dr. Patti Tate
Dr. Scott Turner

Public Awareness
Barbara Hairfield, Chair
Rep. Terry Alexander
Rep. Raye Felder

SOUTH CAROLINA EDUCATION OVERSIGHT COMMITTEE

Academic Standards and Assessments (ASA)/Public Awareness
Joint Subcommittee Meeting

Minutes of the Meeting

September 20, 2021

Members Present (in-person or remote): Neil Robinson, Subcommittee Chair (remote); Barbara Hairfield; Sidney Locke; Dr. Patti Tate; Dr. Bob Couch; Rep. Raye Felder; Dr. Scott Turner; and Sen. Greg Hembree.

EOC Staff Present: Matthew Ferguson; Dr. Jenny May (remote); Hope Johnson-Jones; Dr. Rainey Knight; Dr. Matthew Lavery; and Dana Yow.

Guests Present: Ivy Alford; Dave Winkler; and Dr. Angel Malone.

Ms. Hairfield chaired the meeting and welcomed members. The minutes from May 17, 2021 Subcommittee meeting were approved as submitted.

Mr. Ferguson presented an overview of the 2021 School Report Cards. He stated that this is not the time to normalize poor results; we must make this our floor. He stated that he wants to look closely at the missingness piece and how poverty impacts student outcomes. He will return in October with additional information for the committee.

Dr. Turner asked if he would be able to tell the committee in October what percentage of students are face-to-face and virtual in terms of testing. Mr. Ferguson stated he was not sure he could answer that from last year's data, which is inconsistent. Staff will bring forth what data they do have.

Dr. Turner also asked if we could break out student demographics into Pupils in Poverty status. Mr. Ferguson said he would like to bring this analysis back to the committee in October.

Dr. Turner asked if they could see previous years' data for college and career readiness. Mr. Ferguson said that those data could be shown, but it would be an unfair comparison. The denominator has changed from only graduates to the 9GR, at the direction of the US Dept. of Education.

Ms. Hairfield stated that it is disheartening to see that only three out of ten students are college and career ready while our graduation rate continues to go up. This is confusing to the public, she stated. She said that students are behind, creating a huge challenge for the teachers.

Ms. Hairfield then asked Mr. Ferguson to bring forth items for discussion related to accountability. Mr. Ferguson noted that the plan is for staff to bring back recommendations to the November ASA meeting; this meeting is intended to provide information and introduction.

Dr. Angel Malone then presented an overview of the stackable credentials work the South Carolina Department of Education (SCDE) is doing with the Southern Regional Education Board (SREB).

Dr. Turner asked if there were districts that don't have agreements in place for dual credit. Dr. Malone stated that every district should have one on file.

Dr. Malone said that the work they are completing is intended to provide students with the opportunity to obtain credentials that truly align with entering the workforce, rather than "a false hope." She introduced Ivy Alford and Dale Winkler from the SREB, who provided an overview of the proposed CTE tiered credential system and their suggestions for approval of credentials.

Over the next year, Dr. Malone stated that they will analyze the data to see how we fare as a state; the plan is to move into full implementation during school year 2022-23. She stated that we must be focused on credentials that have a high sense of labor market value. Currently, 288 of 465 credentials have career-ready status.

Sen. Hembree asked whether tightening this system up would impact our career-ready measure. Mr. Ferguson stated that it most certainly would; we want to gather the data and measure the impact.

Sen. Hembree also asked about what other states we should be looking at. Dr. Alford stated that they can point us to some promising practices, such as those in North Carolina. Kentucky also uses a workforce innovation board to make decisions. Ohio is referenced a good bit; they rank from a scale of 1-12, every student must have a minimum of 12 points. Dr. Alford noted that Louisiana should be looked at too.

It was suggested that it may be time to consider removing some of the certifications from the list. Sen. Hembree asked what the average rate for the number of certifications offered was. Dr. Alford stated that 250-300 is the average in other states. She stated it is important to categorize these by industry; we want quality over quantity. What are they seeing from their industries?

Dr. Malone stated it is important to have conversations with testing vendors who provide the career assessments; we need a test blueprint for each assessment as people will want more information before they make decisions.

Rep. Felder pointed out that we are losing students early on who have an interest in healthcare.

Dr. Turner stated that 62% of the career ready credentials are designated as career ready; is that in place now? Dr. Malone discussed the current integration of credentials like OSHA and Microburst, and how those certifications fall within the proposed tiered plan.

Dr. Turner asked if adopting this system would reduce the number of career ready students. Dr. Malone highlighted that students must still achieve completion in order to be considered career-ready.

Dr. Turner asked SREB if the structure of our current accountability system is vulnerable to making districts offer credentials in order to play the system. Dr. Winkler stated that unfortunately yes, that is what happens.

Dr. Couch stated that OSHA is required at his Institute at the beginning of each program, because of the importance of safety, which is considered a pre-requisite requirement.

Dr. Jenny May presented an overview of the Cambridge weighting.

The EOC is looking into incorporating D and E as an additional indicator of college readiness, along with A-C. Staff wants to be fair and acknowledge recognitions appropriately without opening the door to lowering standards. We have started the process, but we don't have a clear picture of why CHE lowered the threshold. Staff continues to gather data.

Dr. Turner asked what the lowest score on a Cambridge exam is. Dr. May stated that a "U" means "Does Not Pass."

Dr. Tate asked Dr. May to explain what the Cambridge assessment is like. Dr. May outlined the structure, explaining that for English, there are 3 different courses: General Paper, Literature, and Composition.

Sen. Hembree asked if the central question focused on whether to give credit for D and E. Mr. Ferguson stated that we are starting the discussion, however, someone will need to tell us that the rigor is equivalent. Therefore, we are not ready to make a recommendation.

Dr. Turner questioned if colleges are accepting D and E credits since CHE's approval. EOC staff conveyed that according to current information, they are not currently accepting credit, although there could be a delay.

Dr. Matt Lavery then presented data related to chronic absenteeism as a measure of student engagement. Mr. Ferguson stated that the EOC will need to make a recommendation for the points once allocated to the Student Engagement survey. As this school year has started, he feels less comfortable with chronic absenteeism as a measure.

Dr. Tate stated that she is against using chronic absenteeism as a measure, saying that the youngest and the oldest students suffer the most with this and that many circumstances surrounding chronic absenteeism are outside of a school's control.

Rep. Felder said she was pleased that we no longer have the survey. She said she was also concerned with using chronic absenteeism because she struggles with the definition. Rep. Fielder stated that this should not just be a student engagement survey; it needs to include the community – all people who support the schools within the community. She also discussed the idea of putting a survey link on the property tax bills to seek input from the community.

Members asked about how other states are addressing student engagement. Mr. Ferguson said the timeline is short. Therefore, as a stop-gap measure, the points may need to be reallocated into existing categories.

Mr. Robinson stated that he has struggled with the student engagement piece in the accountability system; it ends up being subjective in many ways. This is a difficult assignment, he stated.

Mr. Ferguson asked members to give staff ideas; with the plan to provide a staff recommendation to both subcommittees in November.

There being no further business, the meeting adjourned.

2021

2015 SC College-and Career-Ready Mathematics Academic Standards

CYCLICAL REVIEW

SC EDUCATION OVERSIGHT COMMITTEE

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INTRODUCTION

The South Carolina Education Accountability Act of 1998 establishes an accountability system for public education that focuses on improving teaching and learning so that students are equipped with a strong foundation in the four primary academic disciplines and a strong belief in lifelong learning. Academic standards are used to focus schools and districts toward higher performance by aligning the state assessments to those standards. The implementation of quality standards in classrooms across South Carolina is dependent upon systematic review of adopted standards, focused teacher development, strong instructional practices, and a high level of student engagement. Pursuant to Section 59-18-350(A) of the Education Accountability Act, the Education Oversight Committee (EOC) and the State Board of Education (SBE) are responsible for reviewing South Carolina's standards and assessments to ensure that high expectations for teaching and learning are being maintained.

> *The State Board of Education, in consultation with the Education Oversight Committee, shall provide for a cyclical review by academic area of the state standards and assessments to ensure that the standards and assessments are maintaining high expectations for learning and teaching. At a minimum, each academic area should be reviewed and updated every seven years. After each academic area is reviewed, a report on the recommended revisions must be presented to the Education Oversight Committee and the State Board of Education for consideration. After approval by the Education Oversight Committee and the State Board of Education, the recommendations may be implemented. However, the previous content standards shall remain in effect until approval has been given by both entities. As a part of the review, a task force of parents, business and industry persons, community leaders, and educators, to include special education teachers, shall examine the standards and assessment system to determine rigor and relevancy.*

In October 2021, the EOC completed the cyclical review of the 2015 South Carolina College- and Career Ready Standards for Mathematics that was adopted in March 2015. This document provides recommendations from the EOC for modifications to the 2015 mathematics standards. The recommendations were compiled under the advisement of two review teams: a national review team of educators who have worked with national or other state organizations and a state committee composed of parents, business/community representatives, mathematics educators, and teachers of English Language Learners and exceptional education students. The state team was composed of individuals from various geographical areas across South Carolina.

It is important to note that the state adopted 2015 South Carolina College-and Career Ready Standards for Mathematics represent the work of many educators, and that this review of the standards was undertaken to identify ways in which their work could be strengthened and supported. The EOC expresses its appreciation to those educators and commends their utilization of national documents and their belief in the achievement of all students. The EOC intends to enhance the work of school level educators and, ultimately, to ensure that all students are provided the opportunity to experience the breath and depth of the specific discipline.

CYCLICAL REVIEW PROCESS

The review of the 2015 South Carolina College-and Career Ready Standards for Mathematics began with a focus on the accomplishment of goals articulated in the Education Accountability Act (EAA) of 1998. The law, as amended in 2008, specifies: "The standards must be reflective of the highest level of academic skills with rigor necessary to improve the curriculum and instruction in South Carolina's schools so that students are encouraged to learn at unprecedented levels and must be reflective of the highest level of academic skills at each grade level." (Article 3, 59-18-300)

The Standard Operating Procedures for the Review of Standards (SOP) agreed upon by the State Department of Education (SDE) and the EOC during the summer 2016 were followed for this review. A timeline established during the spring of 2021 outlined the timeframe in which the required review teams were to review the 2015 standards adopted by the end of the year 2021. The SOP also outlines the steps to be taken to revise the current standards should the completion of the reviews indicate that revision is needed.

The recommendations for revisions to the 2015 South Carolina College-and Career Ready Standards for Mathematics, as approved by the EOC, will be submitted to the South Carolina Department of Education (SDE) for consideration in any proposed revisions of the standards.

A. CRITERIA DESCRIPTIONS

The standards review process emphasized the application of the criteria addressing comprehensiveness/balance, rigor, measurability, manageability, and organization/ communication. SDE representatives, district and university curriculum leaders, and EOC staff collaborated to identify the standards review criteria in 2003. Decisions on the criteria to be used were based on a comprehensive review of professional literature, and the goals for the standards review as specified in the Education Accountability Act of 1998. The identified criteria were each applied through the two review panels: (1) leaders in the discipline and/or cognitive processes drawn from across the nation and (2) mathematics educators; teachers of English Language Learners and exceptional education students; parents; business representatives; and community leaders.

The criteria are:

CRITERION ONE: COMPREHENSIVENESS/BALANCE

The criterion category for Comprehensiveness/Balance is an evaluation of how helpful the 2015 South Carolina College-and Career Ready Standards for Mathematics are to educators in designing a coherent curriculum. The criterion is directed at finding evidence that the standards document clearly communicates what constitutes mathematics content, that is, what all students should know and be able to do in mathematics by the time they graduate. The criterion includes consideration of the following areas:

- The standards address essential content and skills of math;

- The standards are aligned across grades as appropriate for content and skills;
- The standards have an appropriate balance of the content and skills needed for mastery of each area in math; and
- The standards reflect diversity (especially for ethnicity and gender) as appropriate for the subject area.

CRITERION TWO: RIGOR

This criterion calls for standards that require students to use thinking and problem-solving skills that go beyond knowledge and comprehension. Standards meeting this criterion require students to perform at both national and international benchmark levels.

- Standards should focus on cognitive content and skills (not affect);
- Standards should be developmentally appropriate for the grade level;
- Standards should include a sufficient number of standards that require application of learning (application, analysis, synthesis, and evaluation);
- Standards should be informed by the content and skills in national and international standards; and,
- Standards should be written at a level of specificity that would best inform instruction for each grade level.

CRITERION THREE: MEASURABILITY

Knowledge and skills presented in the standards are assessable for school, district and state accountability. The primary element of measurability is:

- The content and skills presented in the standards should be assessable (are observable and demonstrable).

CRITERION FOUR: MANAGEABILITY

This criterion applies to instructional feasibility, that is, whether the complete set of mathematics standards at a particular grade level can reasonably be taught and learned in the class time allotted during one year. The primary element of manageability is:

- The number and scope of the standards for each grade level should be realistic for teaching, learning, and student mastery within the academic year.

CRITERION FIVE: ORGANIZATION/COMMUNICATION

The Organization/Communication criterion category stipulates that the expectations for students are to be clearly written and organized in a manner understandable to all audiences and by teachers, curriculum developers, and assessment writers. Organization includes the following components:

- The content and skills in the standards should be organized in a way that is easy for teachers to understand and follow;
- The format and wording should be consistent across grades;
- The expectations for student learning should be clearly and precisely stated for each grade; and,
- The standards should use the appropriate terminology of the field but be as jargon free as possible.

B. PANEL MEMBERSHIP

The EOC's cyclical review of the 2015 South Carolina College-and Career Ready Standards for Mathematics was conducted from April 2021 to October 2021. The national review was conducted in April and May 2021. The state review was conducted in September and October 2021.

The national review team members consisted of recognized leaders in education that have participated in the review/development/writing of national and state standards and/or development of cognitive processes. Materials shared as part of the national review included 2019 and 2021 SC READY and End-of-Course student performance in mathematics, the Revision of Bloom's Taxonomy of Educational Objectives[1], and the Profile of the South Carolina Graduate[2]. Members of the team received the materials for the review in early April and continued their review process through May. After an independent review period, the members of the panel participated in a telephone conference call in May, which produced a set of findings listed later in this document. Members of the national review panel included:

- Dr. Nicholas Cluster, Assistant Professor, South Carolina State University
- Dr. Ed Dickey, Distinguished Professor Emeritus, University of South Carolina
- Dr. Renee Jefferson, Professor, The Citadel
- Dr. Karen Karp, Professor, Johns Hopkins University
- Dr. DeAnn Huinker, Professor, University Wisconsin

For the state panel review, the EOC contacted all school district superintendents and instructional leaders in the state as well as the members of S.C. Senate Education and House Education Committees. The EOC and South Carolina State Board of Education members were also invited to submit for nominations for the state review panel. Approximately 154 names were submitted to the EOC. The state review panel consisted of 35 individuals representing mathematics teachers, teachers of English Language Learners and exceptional education, parents, representatives of business/industry and community members. Also, in attendance, as observers, were representatives from the South Carolina Department of Education's (SDE) Division of Standards and Learning. The state panel conducted its review virtually via Zoom.

The panel members worked over three days to compose individual responses to the standards review and then develop consensus as a group on a set of findings listed later in this document. This process was conducted by having individuals placed in one of three teams each reviewing standards from either elementary, middle or high school. The panel used as reference materials 2019 and 2021 SC Ready and End of Course student performance in mathematics, the Revision of Bloom's Taxonomy of Educational Objectives[3], and the Profile of the South Carolina Graduate[4]. The state panel reviews were conducted September 13, 27 and October 4, 2021.

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[1] *Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives. Anderson, L.W., Krathwohl, D.R., et al. (2001).*

[2] *https://ed.sc.gov/about/profile-of-sc-graduate/*

[3] Ibid., 4.

[4] Ibid., 4.

Rainey Knight, EOC Director of Strategic Innovation, facilitated the review process. The task force reached consensus on insights and specific recommendations about the 2015 South Carolina College-and Career Ready Standards for Mathematics.

Members of the task force included:

Name	County/District	Position
Nikki Cassidy	Chesterfield	Parent, Community
Suzanne Mercer-Clardy	Beaufort	Business/Industry
Stewart Cooper	Lexington	Parent, Business/Industry
Ketara Daniels	Orangeburg County School District	Teacher
Christy Everett	Horry	Parent, Business/Industry
Maja Fall	Gaffney	Parent
Eileen Fleming-Patonay	North Myrtle Beach	Business/Industry
Natasha Green	Lexington Richland 5	Parent, Teacher
Susan Garmendia	Pickens	Teacher
Rebecca Gunnlaugsson	Kershaw	Parent, Business/Industry
Jessie Hamm	York School District 3	Parent, Teacher
Jennifer Heilbronn-Johnson	York School District 4	Teacher
Robert Hucks	Horry	Parent, Business/Industry
Tanika Johnson	Lexington Richland 5	Teacher
Lukas Hopper	York School District 3	Parent, Teacher
Rachel Jones	Pickens	Exceptional Education Teacher
Rhonda Jordon	Chesterfield	Parent, Business/Industry
Shaunta Mack	Williamsburg	Parent, Teacher
Ozell Newman	Horry	Parent, Community
Amanda Painter	Gaffney	Community
Lori Ricard	Newberry	Teacher
Tacadra Rountree	Lexington Richland 5	Teacher, English Language
Valerie Sawyer	Darlington County School District	Teacher, English Language
Christopher Skipper	Horry	Teacher
Jodie Srutek	Beaufort	Parent
Beth Sidwell	York School District 4	Teacher
Khaleelah Stroman	Aiken School District	Parent, Teacher
Dr. Ben Sinwell	Anderson School District 4	Parent, Teacher
Kimberly Smith	Beaufort	Teacher
Sheela Tarangapadi-Narayanan	Williamsburg	Teacher
Brittany Terry	York School District 3	Parent, Teacher
Sharon Thornwell	Georgetown	Teacher
Dr. Jennifer Wise	Lexington 2	Teacher
Charles Watson	Chesterfield	Parent, Business/Industry
Lisa-Anne Williams	York School District 3	Parent, Teacher

C. THE STANDARDS DOCUMENT

The 2015 South Carolina College-and Career Ready Standards for Mathematics are organized by grade levels for grades kindergarten through twelfth grade to include standards and key concepts.

The South Carolina Department of Education describes the standards as written below.

The standards represent the culminating outcomes that describe what students should know and be able to do when they leave our public school system.

The content standards and the process standards work together to enable all students to develop the world-class knowledge, skills, and life and career characteristics identified in the Profile of the South Carolina Graduate as outlined below.

- Knowledge is supported by the rigorous K – 12 grade level and course content standards,
- Skills are identified in the SCCCR Mathematical Process Standards, and
- Life and career characteristics are identified in the South Carolina Portrait of a College- and Career- Ready Mathematics Student.

Each grade level and course is divided into key concepts that organize the content into broad categories of related standards. Neither the order of key concepts nor the order of individual standards within a key concept is intended to prescribe an instructional sequence. Each key concept contains standards that define what students will understand and be able to do. [5]

An example of third grade Mathematics key concept and standards is shown below.

Key Concept	**Standards**
Number Sense-Fractions	**The student will:**
	3.NF.1 Develop an understanding of fractions (i.e., denominators 2,3,4,6,8,10) as numbers. a. a fraction 1/b (called a unit fraction) is the quantity formed by one part when a whole is partitioned into b equal parts; b. fraction equivalence can be represented using set, area, and linear models; c. whole numbers can be written as fractions eg, 4 = 4/1 and 1 = 4/4; d. fractions with the same dominator or numerator can be compared by reasoning their size based on the same whole number

The complete set of 2015 South Carolina College- and Career-Ready Standards for Mathematics can be found at the link below.

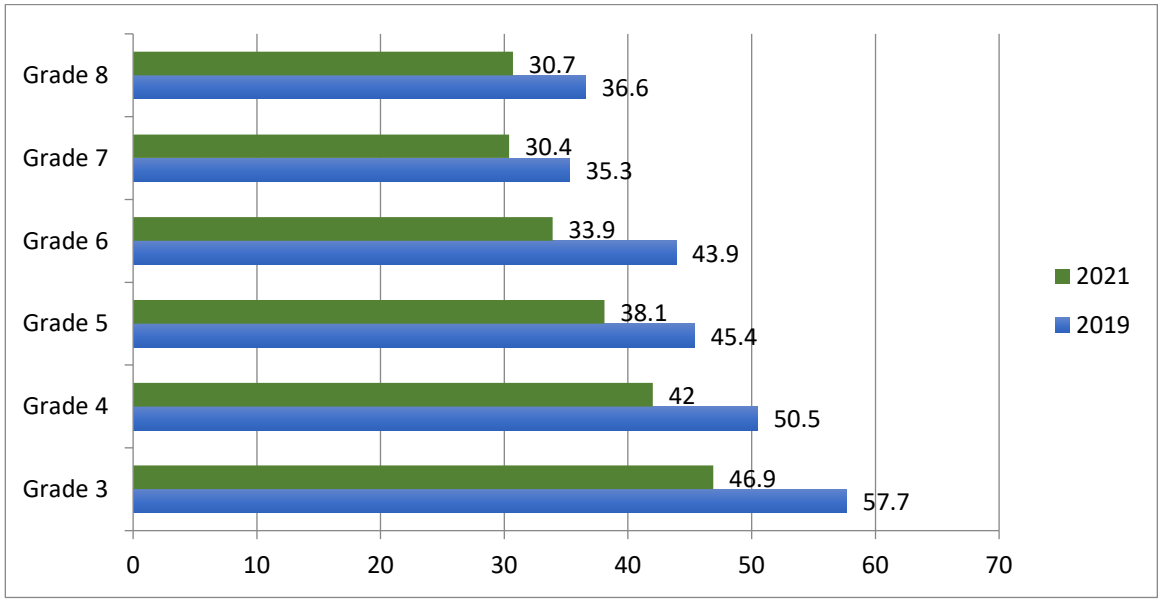
https://ed.sc.gov/instruction/standards-learning/mathematics/standards/scccr-standards

[5] https://ed.sc.gov/instruction/standards-learning/mathematics/standards/scccr-standards-for-mathematics-final-print-on-one-side/

II: Student Performance in Mathematics

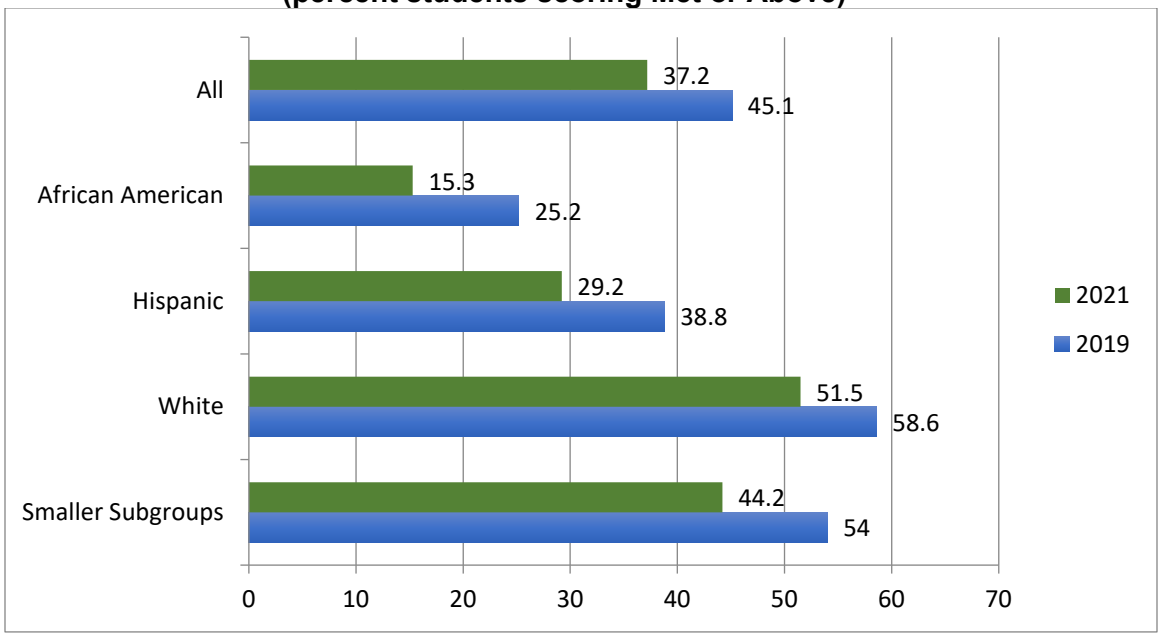
The 2015 South Carolina College-and Career Ready Standards for Mathematics were adapted using national frameworks for mathematics and followed a similar process to what is outlined in the Standards Operating Procedure. Since the standards provide the foundation for the assessment of student learning which occurs following the teaching of the standards, a thorough review should include an evaluation of student performance. Unfortunately, too few students in South Carolina have reached the grade level expectations in Mathematics shown in 2019 and this fact was exacerbated with the pandemic beginning in the spring 2020 and continued in 2020-21. Chart 1 documents the percentage of students scoring Met and Above on the SC Ready assessment for grades 3-8 in 2019 and 2021. Chart 2 shows the same data by subgroups of students across all grade levels. Chart 3 shows students scoring a "C" or better on the End-of-Course test in Algebra 1 for all students in 2019 and 2021 and by subgroups in 2019 and 2021.

Chart 1
SC Ready Mathematics 2019 and 2021
(percent students scoring Met or Above)



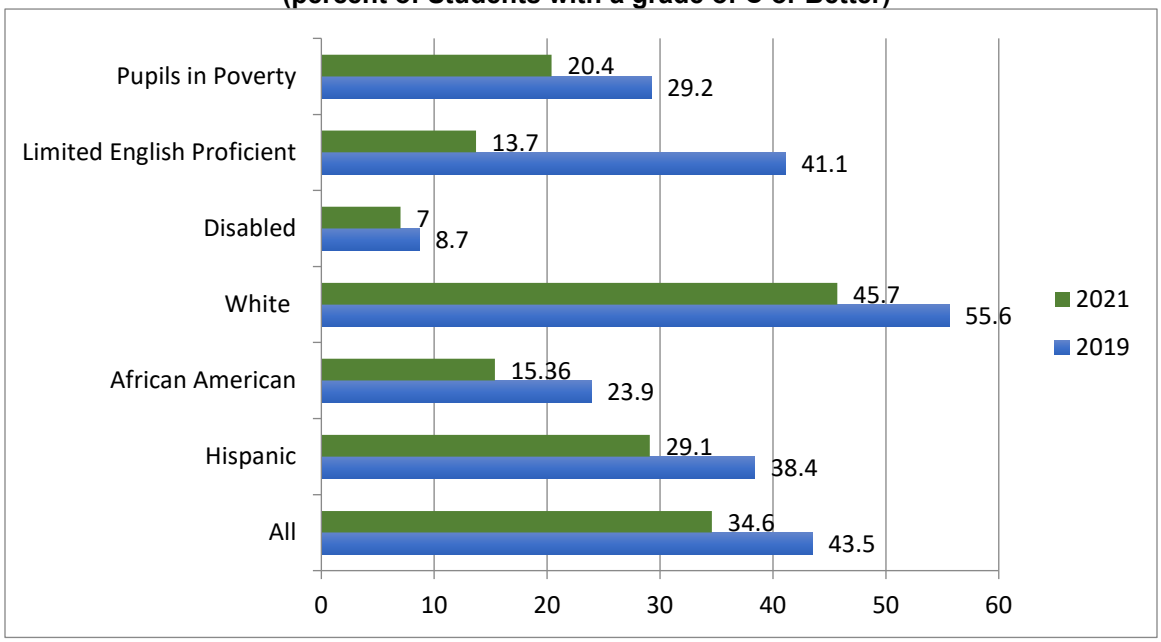
Source: South Carolina Department of Education, https://ed.sc.gov/data/test-scores/state-assessments/sc-ready/

Chart 2
SC Ready Mathematics 2019 and 2021
All Students, By Subgroup
(percent students scoring Met or Above)



Source: South Carolina Department of Education, https://ed.sc.gov/data/test-scores/state-assessments/sc-ready/

Chart 3
End of Course Algebra 1
2019 and 2021
(percent of Students with a grade of C or Better)



Source: South Carolina Department of Education, https://ed.sc.gov/data/test-scores/state-assessments/end-of-course-examination-program-eocep/2019/

Of particular concern is the decrease in the percentage of African American students who did not met standards in 2019 and 2021. In elementary/middle grades only 15.3 percent met grade level standards and in high school only 15.4 percent of African American students met grade level standards. Of equal concern is the drop in scores for Limited English Language students from 41.1 percent to 13.7 percent (a decrease of 27.4 percentage points) in high school.

IV: FINDINGS

The discussion below summarizes the reviews of the national and state panels of the 2015 South Carolina College-and Career Ready Standards (K-12).

A: COMMENDATIONS FROM STATE AND NATIONAL PANELS

1. Overall, the reviewers noted standards address essential content and skills of mathematics.

2. The vertical progression of content and skills in middle school standards (grades 6-8) is accomplished.

3. Some of the standards require students to demonstrate learning at higher levels of Revised Bloom's taxonomy.

4. The standards appear to be of consistent style and formatting.

5. Calculus course is well organized and specific as to student learning.

B: FINDINGS OF THE NATIONAL REVIEW TEAM

1. Revisions to the South Carolina College and Career Ready Standards (K-12) should be reviewed against the lens of the National Council of Teachers of Mathematics (NCTM) Catalyzing Change[6] documents.

2. The standards should include statistical thinking in all grades. Currently in elementary and middle grades there is too much emphasis on data displays as end products and not enough on supporting the development of content/skills that are the foundation of statistical thinking. By third grade, students should have an introduction to the investigative process, i.e., formulate a statistical investigative question, collect data, analyze data and interpret data as recommended by GAISE II, 2020[7].

   Currently, students can graduate with little exposure to the content/skills in statistical thinking. The guidelines for data science thinking should be included in a math course sequence for all high school students. See Appendix A.

3. Consider changing language of using "standards algorithm" to include other strategies for students to solve problems.

[6] https://www.nctm.org/change/

[7] https://hdsr.mitpress.mit.edu/pub/cqncbp3l/release/3

4. For students in advanced middle grade math classes, care should be taken to include mastery of geometry and measurement, data analysis and statistics/probability as these topics are important for success in high school mathematics and college and career.

5. The South Carolina Process Standards should be reviewed against a national and international process skill framework such as the Mathematical Practices in the 2025 NAEP Mathematics Framework[8] and the 2021 PISA Mathematics Framework[9]. The intent and meaning of the process skills needs to be clarified for teachers to explicitly shown the connection between the intent of the process skills and content.

6. Algebra I standards place an inordinate emphasis on algebraic symbol manipulation. Consider reviewing NCTM Catalyzing Changes in High School Mathematics[10] essential concepts for Algebra I to distill those standards, which are essential to the content for Algebra I.

7. To ensure greater equality and access for all students, the Foundation of Algebra and Intermediate Algebra should be eliminated, and all students only offered Algebra I. These two courses currently allow students, primarily those with low math skills, to obtain credit for Algebra I over a two-year period. As a result, these students only have the opportunity of two (2) years (instead of three) of high school to obtain math skills at higher levels.

8. Alternate pathways for high school math course sequences should be considered. Alabama has recently realigned its course sequence and required all students as freshmen to enroll in Geometry/Data Analysis. See Appendix A.

9. Standards are aligned in the elementary grades; however, the standards do not build upon one another to develop a deeper understanding of mathematical concepts/ideas or to develop a more complex application of concepts/ideas. Rather as the elementary standards progress through the grade levels, students are asked to simply add larger numbers or for students to work with or move from 2-digit to 3-digit manipulation.

10. Elementary standards (K-5) overemphasize skills rather than conceptual learning. Revisions should consider the inclusion of real-world problems/situations, especially in geometry and measurement/data.

11. The alignment from grade 5 to grade 6 should be reviewed. Student learning expectations are greatly increased in grade 6 with the introduction of new math concepts and greater complexity. Grade 5 should include an introduction to build on these new concepts.

10. The majority of the math standards focus on knowledge and comprehension. In the revision process, asking for explanations, justifications, interpretations, and applications should raise the cognitive level. In addition, students should be required to explain and justify answers orally and in writing using mathematical language. The recommendation for writing should be included in the assessment design.

11. Standards should be limited to and prioritize essential skills at each grade level/course in

[8] https://www.nagb.gov/news-and-events/news-releases/2019/release-20191121-governing-board-approves-updates-mathematics-framework.html

[9] https://www.oecd.org/pisa/sitedocument/PISA-2021-mathematics-framework.pdf

[10] https://www.nctm.org/change/

order for teachers to be able to adequately address the depth of mathematical knowledge in a given school year.

C. FINDINGS FROM THE STATE LEVEL REVIEW TEAM

1. The Process Skills for Mathematics should be revised using a national perspective such as the Mathematical Practices in the 2025 NAEP Mathematics Framework[11]. Process skills should be embedded in the standards.

2. The standards and indicators should be measurable and clearly articulate the expectations for student learning and results. Teachers should have no doubt as to what should be taught or what students should be able to do as a result (e.g. 6PR3.f, 8Fld, ASE2, A.NRNS.3 A1.NQ.1, and A2.ASE.3).

3. The standards and indicators need to be refined so that they are manageable and measurable in a year-long course. Of particular concern noted was Algebra I course, fifth grade and sixth grade.

4. Revisions to the Mathematics standards should include combining or clearly linking the key concepts/standards and support documents so that teachers have a one single authoritative source for planning and assessments.

5. Any revision process should include a focus on creating robust support documents to include the following recommendations:
   a) Provide examples or guidance regarding how a particular standard or indicator might be assessed at grade level.
   b) Release test items no longer used in test forms for SC Ready and End-of-Course.
   c) Explicitly define terms used in the standards. Many of the terms are vague or used interchangeably or imprecisely in the field. Creating a set of shared South Carolina definitions would ensure that educators are talking about the same content/skill.

6. The role of technology should be more prominent in the standards and specific examples should be provided.

7. Standards should include more concrete examples for teachers such as referencing number lines, models, manipulatives, etc.

8. A review should include a close examination of standards that could be deleted and/or combined (e.g., ATO.4 & ATO.8; ATO.5).

9. Standards and/or support documents need to include more real-world examples for making mathematics relevant.

10. Standards need to be more specific as to what a standards algorithmic approach looks like as well as provide opportunities for students to use a variety of strategies to solve a

[11] https://www.nagb.gov/news-and-events/news-releases/2019/release-20191121-governing-board-approves-updates-mathematics-framework.html

problem.

11. Standards for statistical literacy in high school are almost all limited to the Probability and Statistics course. Many students do not take this course in high school and thus are not exposed to these mathematics concepts. Some of the graduation standards are included in the course. The SDE should use the Gaise II Report[12] in developing a data science course. If a data science course is not required in the high school math sequence, then standards of data science should be included in the math courses in a high school sequence.

12. Some standards are not written in teacher friendly language (e.g., PC.FBF.4, and PC.AR.EI8).

13. Standards should be revised for consistency and continuity in math language and K-12 vocabulary.

14. Assessments in math should include students justifying their answers in written form as well as introducing performance tasks as appropriate.

15. Additional time to teach math was a concern among all grade levels.

16. The high school math course sequence should be revised to include:
    a. the elimination of Algebra Foundations and Intermediate Algebra for purposes of equity and opportunity access for all students and
    b. a data science course in the sequence of courses for students not on pathway to Calculus. See Appendix A.

[12] https://hdsr.mitpress.mit.edu/pub/cqncbp3l/release/3

V. EOC RECOMMENDATIONS

The recommendations listed below are based on the detailed review of the 2015 South Carolina College and Career-Ready Standards for Mathematics and are supported by the evidence and detailed comments that appear in the national and state panel findings included in this report.

1. Revisions to the South Carolina College and Career Ready Standards (K-12) should be reviewed against the lens of the National Council of Teachers of Mathematics (NCTM) Catalyzing Change[13] documents. These documents have distilled the essential content and skills for grade level mathematics and high school mathematic courses. The documents can assist in prioritizing standards, allowing more time with fewer standards in a given school year, and articulating standards progressively through the grade levels.

2. Consider the use of defining language when using "standards algorithm" and include other strategies for students to solve problems

3. For students in advanced middle grade math classes, care should be taken to include mastery of geometry and measurement, data analysis and statistics/probability as these topics are important for success in high school mathematics as well as for college and career.

   By third grade, students should have an introduction to the investigative process, i.e., formulate a statistical investigative question, collect data, analyze data and interpret data as recommended by GAISE II, 2020.[14]

4. The South Carolina Process Standards should be reviewed against national and international process skill frameworks such as the Mathematical Practices in 2025 NAEP Mathematics Framework[15] and the 2021 PISA Mathematics Framework[16]. The intent and meaning of the process skills needs to be clarified for teachers to explicitly show the connection between the intent of the process skills and math content. The process skills should be embedded in the content standards.

5. Several issues were raised among the national and state panels regarding high school mathematics courses, both in sequence and content. Recommendations for changes to content and sequence are:

   a. To ensure equality and opportunity access for all students, the Foundations of Algebra and Intermediate Algebra should be eliminated. All students would instead take Algebra I. Foundations and Intermediate Algebra currently allow students, primarily those with lower math skills, to obtain credit for Algebra I over a two-year period. As a result, these students are limited to two (2) years (instead of three) of high school to obtain math courses at higher levels.

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[13] https://www.nctm.org/change/

[14] https://hdsr.mitpress.mit.edu/pub/cqncbp3l/release/3

[15] https://www.nagb.gov/news-and-events/news-releases/2019/release-20191121-governing-board-approves-updates-mathematics-framework.html

[16] https://www.oecd.org/pisa/sitedocument/PISA-2021-mathematics-framework.pdf

b. Alternate pathways for high school math course sequences should be considered. Alabama has recently realigned its course sequence and requires all students as freshmen to enroll in Geometry/Data Analysis. See Appendix A.

c. Standards for statistical literacy in high school are almost all limited to the Probability and Statistics course. Many students do not take this course in high school and thus are not exposed to these mathematics concepts. Some of the graduation standards are included in the course. The SDE should use the Gaise Report II[17] in developing a data science course. If a data science course is not required in the high school math sequence, then standards of data science should be included in the math courses in a high school sequence. See Appendix A.

6. The majority of the math standards focus on knowledge and comprehension. In the revision process, math standards that ask for explanations, justifications, interpretations, and applications should be included to raise the cognitive level. Students should be required to explain and justify answers orally and in writing using mathematical language. The recommendation for student responses should be included in the assessment design. In addition, where appropriate, performance-based items should be considered as part of the mathematics state assessment.

7. Revisions to the mathematics standards should include combining or clearly linking the key concepts/standards and support documents so that teachers have a single authoritative source for planning and assessments.

8. The role of technology should be made more prominent in the standards and specific examples should be provided.

9. Standards should include more concrete examples for teachers such as referencing number lines, models, manipulatives, etc.

10. Standards need to include more real-world examples for making mathematics relevant.

11. Standards should be written in teacher friendly language

12. Standards should show consistency and continuity in math language and K-12 vocabulary.

13. A copyeditor should be used to ensure the standards document is clear, concise and consistent for teacher-readability as well for the expectations for student learning.

[17] https://hdsr.mitpress.mit.edu/pub/cqncbp3l/release/3

Appendix A.

Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
Grade 7 Mathematics	*Grade 8 Mathematics*	*Geometry with Data Analysis*	*Algebra I with Probability*	*Algebra II with Statistics*	Specialized course
Grade 7 Mathematics **OR** *Accelerated Grade 7 Mathematics*	*Grade 8 Mathematics*	*Geometry with Data Analysis* **AND** *Algebra I with Probability* (concurrently)	*Algebra II with Statistics*	*Precalculus*	*AP Calculus* **OR** Additional specialized course
				Mathematical Modeling **OR** *Applications of Finite Mathematics*	*Precalculus* **OR** Other additional specialized course
Accelerated Grade 7 Mathematics	*Accelerated Grade 8 Mathematics*	*Geometry with Data Analysis*	*Algebra II with Statistics*	*Precalculus*	*AP Calculus* **OR** Additional specialized course
				Mathematical Modeling **OR** *Applications of Finite Mathematics*	*Precalculus* **OR** Other additional specialized course
Accelerated Grade 7 Mathematics	*Grade 8 Mathematics* **OR** *Accelerated Grade 8 Mathematics*	*Geometry with Data Analysis*	*Algebra I with Probability*	*Algebra II with Statistics*	Specialized course

Source: 2019 Alabama Course of Study Mathematics (https://www.alsde.edu/sec/sct/COS/2019%20Alabama%20Course%20of%20Study%20Mathematics.pdf) that includes accelerated courses for grades 7 and 8, a Geometry with Data Analysis course required for ALL grade 9 students in high school followed by a "Algebra I with Probability" OR "Algebra II with Statistics" course in grade 10 and then multiple options for grades 11 and 12.

The SC Education Oversight Committee is an independent, non-partisan group made up of 18 educators, business persons, and elected leaders. Created in 1998, the committee is dedicated to reporting facts, measuring change, and promoting progress within South Carolina's education system.

ADDITIONAL INFORMATION

If you have questions, please contact the Education Oversight Committee (EOC) staff for additional information. The phone number is 803.734.6148. Also, please visit the EOC website at www.eoc.sc.gov for additional resources.

Paper Title The Relationship Between School Climate and School Performance

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The Relationship between School Climate and School Performance

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In collaboration with the South Carolina Education Oversight Committee and the South Carolina Department of Education

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April 2, 2010

The Relationship between School Climate and School Performance

Background

In 2007, a study was conducted of 32 elementary schools in South Carolina designated as achievement gap-closing schools based upon a 4-year history of high performance on report card indices by historically underachieving students at the identified schools (DiStefano, Monrad, May, McGuiness, & Dickenson, 2007). An important finding of this research was that gap-closing schools differed from other elementary schools on key climate indicators as measured by the state's school climate surveys in 2005. For example, teachers in gap-closing schools expressed more favorable opinions of the schools, particularly in the area of home-school relationships. Students in gap-closing schools were more satisfied with the social-physical environment than students in the other schools. Similarly, parent survey differences indicated that parents in gap-closing schools tended to be more active in the schools as volunteers and rated the schools higher in their efforts to engage parents.

Given the intriguing findings of this study, University of South Carolina (USC) faculty and staff employed at the South Carolina Educational Policy Center in collaboration with the South Carolina Department of Education (SCDE) and South Carolina Education Oversight Committee (SC EOC), decided to pursue state-wide research focused on school climate's relationship with school performance and school improvement. Students and parents at selected grades (typically grades 5, 8 and 11) along with teachers at every public school within the state complete an annual survey to assess the school's learning environment, home-school relationship, and social and physical environment related to the school using a series of Likert-scale items. The resulting data set provides a unique opportunity to examine the dimensions of school climate on a state-wide basis and the relationship of these dimensions to a variety of student and school outcome measures.

In previous work, the 2006 and 2007 school climate survey data for all schools in the state were analyzed to identify factors underlying the school climate surveys for teachers, students, and parents (Monrad, May, DiStefano, Smith, Gay, Mindrila, Gareau, & Rawls, 2008). Additionally, these factor structures were used to create clustered groups of schools for all organizational levels (elementary, middle, and high schools) using identified dimensions of

school climate. Cluster membership differentiates schools with the most positive school climate from those with the least positive school climate. Unlike many other socioeconomic factors affecting school and student performance, school climate issues can be addressed at the school, district, and state levels as a component of a school's overall improvement efforts. Identifying clusters of schools based on school climate factors in the current research allows the opportunity to relate school climate factors and educational outcome variables.

[Some sections have not been included in the subcommittee packet. Interested parties may retrieve the full paper from the AERA Online Paper Repository.

Data Sources

South Carolina is one of only a few states to include climate data from surveys of students, teachers, and/or parents on their school report cards. The current SC school climate survey instrumentation was developed in response to the requirement of the Education Accountability Act (EAA) of 1998. The act required, among other things, a school report card. The specific variables and data elements to be included were selected by the General Assembly's Education Oversight Committee (EOC), working in collaboration with SCDE and the State Board of Education. The inclusion of school climate data from "evaluations of the school by parents, teachers, and students" on the report cards was a requirement of the state's accountability legislation. Separate surveys were constructed for parents, teachers, and students, and each survey has over 40 items.

Students and parents at selected grades (typically grades 5, 8 and 11) along with teachers at every public school within the state complete an annual survey to assess the school's learning environment, home-school relationship, and social and physical environment. Three summative items from each survey are included on school report cards. However, the surveys consist of many items, and relationships among these items may provide information about the multidimensional nature of climate, according to student, parent, and teacher perspectives. Each survey is briefly described below.

Student Survey

The 43-item 2008 student survey includes questions organized into three areas: *Learning Environment*, measuring students' perceptions about the learning context (18 items); Social *and Physical Environment* measuring students' thoughts about building cleanliness, appearance of the grounds, classroom management/ behavior, school safety, and relationships with other teachers/students (17 items); and *Home and School Relations* measuring the relationship between schools and parents (8 items). Students respond to each item using a 4-point Likert scale: 1=Disagree, 2=Mostly Disagree, 3=Mostly Agree and 4=Agree.

Teacher Survey

There are 69 items on the 2008 teacher survey. While the items differ somewhat from the student survey, the three scales hypothesized for the students are also hypothesized for teachers. There are 26 items included on the *Learning Environment* scale, 16 items on the *Social and Physical Environment* scale; and 11 items on the *Home and School Relations* scale. In addition, teachers were administered a *Working Conditions* scale, consisting of 13 items. Teachers responded to each item using a 4-point Likert scale: 1=Disagree, 2=Mostly Disagree, 3=Mostly Agree, 4=Agree. A fifth option, 5 =Don't Know, was recoded as missing in the analyses.

Parent Survey

The 2008 Parent Survey consists of 54 items arranged into different sections with varying formats. The survey includes 21 Likert scale questions on three scales (*Learning Environment, Home-School Relations,* and *Social and Physical Environment*). Parents responded to each item using a 4-point Likert scale: 1=Strongly Disagree, 2= Disagree, 3= Agree, 4=Strongly Agree. A fifth option, 5=Don't Know, was recoded as missing in the analyses.

The remaining 33 items on the parent survey are organized into four sections of varying length and format. These sections are labeled "*Parent Participation,*" "*Parent Responsibilities,*" "*Parent Obstacles to Involvement"* and overall "S*chool Ratings*." This study utilizes only the section with 21 Likert scale items similar to items from the teacher and student surveys.

Before analyses, each dataset was examined. Duplicate cases were removed from each dataset, as well as cases having more than 25% of the responses missing within each scale. For cases with 25% or less missing data on each section of the survey, missing item responses were imputed. Missing item data were replaced with the average of the individual's responses for other items on the same scale, thereby maximizing sample sizes for analyses.

To gauge school climate, most statistical analyses in the current study were conducted at the school level and considered organizational level differences. Table 1 indicates the number of elementary, middle, and high schools included in the 2006, 2007, and 2008 teacher, student, and parent data sets.

Table 1

Number of Elementary, Middle and High Schools in the 2006-2008 Teacher, Student, and Parent Data Sets

	Elementary Schools			Middle Schools			High Schools		
	2006	2007	2008	2006	2007	2008	2006	2007	2008
Teacher data	620	622	630	273	290	292	207	208	205
Student data	619	620	623	270	285	288	202	205	199
Parent data	623	623	627	273	289	291	204	207	203

State Report Card Variables

Each year South Carolina's public schools are evaluated using the state report card to provide information about how the state's public schools are performing. The report card provides school level information for a variety of variables, including characteristics about the school and its programs, faculty, and student achievement.

The following report card variables were extracted from SCDE's 2008 state report card file and used in subsequent analyses. These indicators were chosen since they were considered to be those most strongly influenced by programs, approaches, and leadership at the school level, and thus, a school would have some ability to impact scores on these indicators:

- student attendance rate
- percentage of students required to repeat grade levels
- percentage of students out-of-school because of suspensions or expulsions for violent and/or criminal offenses
- teacher attendance rate
- percentage of teachers not having full teacher certification
- percentage of teachers returning from the previous school year

Schools and Participants

A unique feature of the current study was the availability of a large statewide data set. The numbers of surveys completed by each participant group from 2006 to 2008 reflect high participation (see Appendix A). Survey responses from students, parents, and teachers were arranged into elementary, middle, and high school databases using school organizational level definitions from the EOC's Accountability Manual and implemented by SCDE through its school report cards.

Results

EFA = Exploratory Factor Analysis
CFA = Confirmatory Factor Analysis

Confirmatory Factor Analysis

Confirmatory analytic procedures were employed to validate the teacher, student and parent factor structures yielded by EFA. The three CFA models were analyzed in terms of model fit, parameter estimates and factor correlations for all three years of data.

Appendix B includes the teacher, student, and parent factor solutions and provides the 2008 factor loadings for all items These parameter estimates were all statistically significant and of moderate to strong magnitude. They are also very consistent across years; their values varied only within the 0.01 to 0.03 range.

The teacher solution has six climate factors: working conditions/leadership, home-school relationship, learning environment, resources, physical environment, and safety. Standardized factor loadings ranged between 0.84 and 0.50, sharing between 0.78 and 0.39 of the variance in the observed variables.

The student solution has four climate factors: learning environment, social-physical environment, home-school and safety. In 2008 the highest factor loading was 0.84 and the lowest loading was 0.45. The student climate factors explained between 0.61 and 0.32 of the variance in all the subordinated observed variables.

The parent model also consists of four climate factors: learning environment, social and physical environment, teacher care and support, and home-school relationship. Loading values ranged between 0.89 and 0.68, and the overall variance explained by each climate factor ranged between 0.70 and 0.59.

In summary, examination of factor loadings shows that the selected teacher, student, and parent items are strong indicators of the corresponding climate factors. These estimates show very little or no variation across years, illustrating that the relationships observed between factors and items are not sample dependent.

Both the analysis of model fit and the examination of factor loadings confirm the results of precedent EFA. Results were remarkably consistent across years, thus providing proof of reliability for the teacher, student, and parent measurement models, and increasing the generalizability of the findings.

As shown in the correlation matrices in Appendix C, the climate factors in each solution are strongly or moderately correlated to each other. The strongest factor correlations are among the parent factors, and ranged between 0.71 and 0.86. The student climate factors are moderately correlated, with Pearson coefficients ranging from 0.50 to 0.68. Similarly, the teacher factors show moderate correlations that vary within the 0.69 to 0.45 range.

Correlation Analysis Among Achievement, Survey, and Non-Survey Report Card Variables

Spearman correlations between the survey factor scores, the six non-survey contextual measures, and each of the five outcome indicators are presented in Tables 3 to 5. Inspection of these tables reveals that the survey predictor variable most consistently associated with achievement outcomes was the teacher factor score for home-school relationships. Teacher home-school relationships correlated with school-level ELA achievement 0.69 at the elementary level and 0.65 at the middle school level. Comparable values for math were 0.70 and 0.66. For the high schools, the association between the high school HSAP, an exit examination, and the teacher factor score for home-school relationships was 0.64.

A striking finding in this study was the number of survey factors with moderate to strong correlations with the outcome measures. For the elementary schools (Table 5), all 14 factor scores correlated significantly ($p < 0.05$) for both ELA and math. For middle schools, 13 of 14 factors correlated significantly ($p < 0.05$) for both ELA and math. At the high school level, 11 of 14 factors correlated significantly ($p < 0.05$) with the high school exit examination. Across the three organizational levels in Tables 3 to 5, two of the survey factors consistently had correlations near 0.50 or higher with student achievement: Teacher Home-School Relationships and Teacher Instructional Focus. In addition, Teacher Safety, Student Safety, and Parent Social-Physical Environment were correlated with achievement 0.40 or higher in the elementary and middle schools, and only slightly lower for high schools: 0.41, 0.38, and 0.35, respectively.

In general, the non-survey report card variables had somewhat lower correlations with student achievement than did the survey variables. Student attendance rate, student retention rate, the percentage of teachers returning from the prior year, and percentage of teachers teaching without "full certification" were the non-survey variables most consistently related to achievement across the organizational levels. The correlations for these four variables were generally stronger for middle and high schools than for elementary schools.

Table 3

Spearman Correlations of Factor Scores and Report Card Variables with School Achievement for Elementary Schools

Predictor	**Elementary ELA/N**			**Elementary Math/N**		
Factor Score for Teacher Working Conditions	0.37	**	603	0.38	**	603
Factor Score for Teacher Home-School	0.69	**	603	0.70	**	603
Factor Score for Teacher Instructional Focus	0.48	**	603	0.50	**	603
Factor Score for Teacher Resources	0.33	**	603	0.34	**	603
Factor Score for Teacher Physical Environment	0.22	**	603	0.27	**	603
Factor Score for Teacher Safety	0.50	**	603	0.53	**	603
Factor Score for Student Learning Environment	0.24	**	614	0.27	**	614
Factor Score for Student Social-Physical	0.43	**	614	0.47	**	614
Factor Score for Student Home-School	0.38	**	614	0.40	**	614
Factor Score for Student Safety	0.45	**	614	0.48	**	614
Factor Score for Parent Learning Environment	0.42	**	585	0.44	**	585
Factor Score for Parent Social-Physical	0.52	**	585	0.53	**	585
Factor Score for Parent Teacher Care and Support	0.23	**	585	0.24	**	585
Factor Score for Parent Home-School Relationships	0.39	**	585	0.40	**	585
Student Attendance Rate	0.36	**	629	0.36	**	629
Student Retention Rate	-0.23	**	629	-0.30	**	629
% of Out-of School Student	-0.11	**	629	-0.14	**	629
Teacher Attendance Rate	0.03		627	0.05		627
% of Teachers Without Full Teacher Certification	-0.20	**	627	-0.23	**	627
% of Teachers Returning From the Previous Year	0.34	**	596	0.35	**	596

Legend: * $p < 0.05$ ** $p < 0.01$

Table 4

Spearman Correlations of Factor Scores and Report Card Variables with School Achievement for Middle Schools

Predictor	**Middle School ELA/N**			**Middle School Math/N**		
Factor Score for Teacher Working Conditions	0.30	**	277	0.35	**	277
Factor Score for Teacher Home-School	0.65	**	277	0.66	**	277
Factor Score for Teacher Instructional Focus	0.50	**	277	0.54	**	277
Factor Score for Teacher Resources	0.29	**	277	0.32	**	277
Factor Score for Teacher Physical Environment	0.27	**	277	0.31	**	277
Factor Score for Teacher Safety	0.46	**	277	0.49	**	277
Factor Score for Student Learning Environment	0.15	*	284	0.21	**	284
Factor Score for Student Social-Physical	0.34	**	284	0.40	**	284
Factor Score for Student Home-School	0.21	**	284	0.28	**	284
Factor Score for Student Safety	0.47	**	284	0.50	**	284
Factor Score for Parent Learning Environment	0.35	**	272	0.36	**	272
Factor Score for Parent Social-Physical	0.42	**	272	0.42	**	272
Factor Score for Parent Teacher Care and Support	-0.03		272	-0.02		272
Factor Score for Parent Home-School Relationships	0.24	**	272	0.24	**	272
Student Attendance Rate	0.48	**	292	0.42	**	292
Student Retention Rate	-0.48	**	293	-0.51	**	293
% of Out-of School Student	-0.08		293	-0.10		293
Teacher Attendance Rate	0.06		292	0.06		292
% of Teachers Without Full Teacher Certification	-0.50	**	291	-0.51	**	291
% of Teachers Returning From the Previous Year	0.44	**	267	0.49	**	267

Legend: * $p < 0.05$ ** $p < 0.01$

Table 5

Spearman Correlations of Factor Scores and Report Card Variables with School Achievement for High Schools

Predictor	**High School ELA/N**		
Factor Score for Teacher Working Conditions	0.34	**	196
Factor Score for Teacher Home-School Relationships	0.64	**	196
Factor Score for Teacher Instructional Focus	0.51	**	196
Factor Score for Teacher Resources	0.29	**	196
Factor Score for Teacher Physical Environment	0.16	*	196
Factor Score for Teacher Safety	0.41	**	196
Factor Score for Student Learning Environment	0.12		196
Factor Score for Student Social-Physical Environment	0.35	**	196
Factor Score for Student Home-School Relationships	0.09		196
Factor Score for Student Safety	0.38	**	196
Factor Score for Parent Learning Environment	0.29	**	168
Factor Score for Parent Social-Physical Environment	0.35	**	168
Factor Score for Parent Teacher Care and Support	0.05		168
Factor Score for Parent Home-School Relationships	0.25	**	168
Student Attendance Rate	0.33	**	207
Student Retention Rate	-0.49	**	207
% of Out-of School Student Suspensions/Expulsions	-0.06		207
Teacher Attendance Rate	0.07		207
% of Teachers Without Full Teacher Certification	-0.47	**	205
% of Teachers Returning From the Previous Year	0.44	**	193

Legend: * $p < 0.05$ ** $p < 0.01$

Discussion

This study identified dimensions of school climate and compared the solutions across organizational levels for students, parents, and teachers to determine if school dimensions of climate were similar from elementary to high school. While many characteristics of school are thought to change as students progress, it was interesting to note that the factor structures for school climate were essentially stable for all survey groups regardless of organizational level.

Further, this study used school-level indicators of climate to determine how much variance the climate factors and selected report card variables could explain in the key achievement outcome variables. Teacher Home-School Relationships was easily the most potent climate predictor of achievement outcomes at all three organizational levels. Student attendance rate and the percentage of teachers with full certification were important non-survey report card indicators across all three organizational levels.

It should be emphasized that while the constructs were similar across organizational levels, the levels of school climate favorability were not. Elementary school factor score means were generally higher than middle or high school means. But, the stability of the factor solutions across organizational levels allowed for a common factor analytic model to represent students, parents, and teacher datasets.

The finding that factors were similar in definition across the three types of surveys (parent, teacher, and student) is consistent with dimensions identified with prior research on school climate from the Consortium on Chicago School Research (CCSR). The CCSR used information from principals, teachers, and students across over 200 schools to identify "five essential supports for school improvement" (Sebring et al., 2006). The CCSR found the important supports to be: leadership, professional capacity (e.g., knowledge, skills, and disposition of faculty), parent-community ties, climate, and instruction. Similar dimensions were identified with the SC analyses. The leadership and instructional focus factors were found in both the SC teacher dataset and the CCSR analyses. The professional capacity factor identified by CCSR was similar to the social-physical factor in the SC dataset. Also, both the parent and teacher datasets identified factors of climate and relationship between home and school (professional-community ties). The consistency between the two studies lends support to the existence of these latent dimensions of climate.

In the South Carolina analyses, perceived safety was an important construct for all three response groups. It is noteworthy that the safety items loaded on a separate factor apart from other social and physical climate items. Teachers and students viewed safety as distinct from social relationships at the school (e.g., students getting along well together) or from the physical climate (e.g., clean hallways and restrooms). The South Carolina instrument does not currently include items that directly measure social safety, such as the absence of bullying. This is an important area for future research and potential modification of the instrument.

Our work with the school climate surveys and other non-survey report card indicators over the past several years has led to a better understanding of their relationship to both school achievement and to poverty. We have begun to think of poverty, not only as an indicator of parental income, but also as: a) the attitudes of parents, students, and teachers about schooling, b) the perceived and real levels of support for and focus on the learning environment, and c) the attendance rates and other indicators of time-on-task afforded to students. Schools with large concentrations of poor students often have fewer highly qualified teachers and administrators, higher teacher turnover, lower student attendance, higher student suspensions, and parents less likely to be actively participating in and supportive of the school and its learners. The clarification of this constellation of relationships is an essential step in developing the goals, strategies, and programs necessary to effectively address educational improvement. It is for these reasons that we have focused upon variables that could be addressed by school communities.

Scholarly Significance

Wang, Haertel, and Walberg (1997) conducted a meta-analysis using a database consisting of 11,000 statistical findings and determined that instruction and climate affect learning as much as student characteristics. Their work supports "the idea that climate is a real factor in the lives of learners and that it is measurable, malleable and material to those that work and learn in schools" (Freiberg, 1999, p. 17). There is a compelling body of literature providing support for the importance of school climate. Compared to other barriers which are not within the locus of control of schools, such as high child poverty and low state funding, negative school climate factors can be improved. Although there is a growing literature dealing with the assessment of school climate, efforts to systematically improve it have been limited. Changing school climate "requires explicit, targeted, and aligned change efforts at the leverage points" (McGuigan, 2008, p. 112). Results from this study may be used to foster such efforts by providing greater insight about how climate and report card variables impact the prediction of selected accountability outcomes. The processes of teaching and learning are fundamentally related and the identification of specific school climate factors that are most related to learning outcomes provides stakeholders with valuable information in designing interventions for overall school improvement.

The results of this study may be used to identify factors of climate and school report cards that are alterable as well as highly related to accountability outcomes. Results indicated that schools with the poorest climate, as defined by negative, below average factor scores, did worst on achievement outcomes; schools in successively more favorable climate groups showed progressively higher achievement outcomes. Therefore, with an increased focus on accountability and academic improvement nationwide, the current research provides support for an increased attention to school climate as a critical dimension for school leaders to focus school improvement efforts. By evaluating the practices at the school-level to determine which are promoting positive school climate, schools may also see improvement in achievement outcomes.

The current work provides a framework for evaluating school climate data as well as providing direction for the potential application of school climate data for use in school improvement. For example, an extension of the current work includes utilizing the climate data to develop multi-year school climate profiles that could provide low-performing schools with a practical tool to use in indentifying critical areas for school improvement. Assessment and

evaluation efforts could be tailored to identify school climate needs and measure implementation of targeted strategies to improve climate and achievement outcomes. The current school climate research provides a starting point to begin narrowing the gap between research, policy, and the practice of implementing and evaluating approaches that includes school climate as one important facet of school improvement.

Limitations of the Study and Conclusions

This study represents an analysis of relationships among climate factors, non-survey report card variables, and measures of achievement in South Carolina. While utilizing large data samples, the outcome measures are specific to South Carolina's curriculum and accountability standards. Thus, the findings may or may not generalize to educational systems in other locations.

Furthermore, this was an associative study of archival cross-section data, not an experimental study designed to measure the impact of an intervention. Correlation is not necessarily causation. While the relationships reported here can be a starting point for examining potential cause and effect, more sophisticated studies of program effectiveness are necessary to establish such an etiology. However, this study provided information about school climate factors and the consistency of these factors across organizational levels. The large statewide sample is a unique characteristic of this study: most investigations do not have access to such a large sample across organizational levels.

Understanding school climate and the non-survey performance and report card variables examined in this study can benefit school-community leaders and policy makers as they seek to improve student learning. For teachers, a better school climate can help foster a positive working environment by reducing absenteeism and stress, lowering teacher turnover rates, and increasing job satisfaction. For students and parents, the crucial importance of attendance and engagement in a supportive learning environment is validated. For researchers, the analyses can point the way toward structuring future studies into the relationship among student learning and the concerns of teachers, parents, administrators and other stakeholders in the community.

School climate provides a critical backdrop for efforts to improve schools. Within the context of a poor school environment, even the most well-documented reform strategy is unlikely to succeed.

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Appendix A

2006 - 2008 Teacher, Student, and Parent Survey Counts by Stage in the Analysis

	Teacher			Student			Parent		
Stage of analysis	2006	2007	2008	2006	2007	2008	2006	2007	2008
Original file from South Carolina Department of Education	44,592[1]	44,980	45,493	136,419	135,008	137,918	69,495	64,896	68,764
After listwise deletion of *don't know* or *not applicable*	39,261	39,463	39,879	136,419[2]	135,008[2]	137,918[2]	37,084	34,764	37,648
After removing duplicates	39,173	39,463	39,879	136,280	135,008	137,814	36,781	34,764	37,560
After imputation[3]	35,599	36,537	36,445	132,440	132,476	135,808	35,067	34,260	35,884

[1] Two records with extraneous characters were deleted.

[2] Student surveys did not have a *don't know* option; so, this stage is not applicable.

[3] Respondents missing more than 25% of any subscale were deleted. Missing values for the remaining surveys were imputed by individual subscale mean.

Appendix B

Teacher, Student, and Parent 2008 School Climate Factor CFA Loadings

Teacher Climate Factors	2008 Loading
Working Conditions/Leadership	
The school leadership makes a sustained effort to address teacher concerns.	0.86
I feel supported by administrators at my school.	0.85
The school administration provides effective instructional leadership.	0.85
I am satisfied with the learning environment in my school.	0.82
My decisions in areas such as instruction and student progress are supported.	0.81
The faculty and staff at my school have a shared vision.	0.81
The school administration communicates clear instructional goals for the school.	0.80
I feel comfortable raising issues and concerns that are important to me.	0.79
I am satisfied with my current working conditions.	0.79
Teachers at my school are recognized and appreciated for good work.	0.78
Teachers at my school are encouraged to develop innovative solutions to problems.	0.77
The school administration sets high standards for students.	0.76
The level of teacher and staff morale is high at my school.	0.75
Teacher evaluation at my school focuses on instructional improvement.	0.74
The school administration arranges for collaborative planning and decision making.	0.71
The rules for behavior are enforced at my school.	0.69
Rules and consequences for behavior are clear to students.	0.65
School administrators visit classrooms to observe instruction.	0.59
Teachers respect each other at my school.	0.56
Home-School Relationship	
I am satisfied with home-school relations.	0.84
Parents at my school are interested in their children's schoolwork.	0.81
Parents at my school support instructional decisions regarding their children.	0.80
Parents attend school meetings and other school events.	0.79

Teacher Climate Factors (continued from previous page)	2008 Loading
Home-School Relationship (continued)	
Parents attend conferences requested by teachers at my school.	0.77
Parents participate as volunteer helpers in the school or classroom.	0.76
Parents are involved in school decisions through advisory committees.	0.73
Parents at my school understand the school's instructional programs.	0.72
Students at my school behave well in the hallways, in the lunchroom, and on school grounds.	0.67
Students at my school behave well in class.	0.66
Students at my school are motivated and interested in learning.	0.66
Parents at my school know about school activities.	0.63
Parents at my school are aware of school policies.	0.63
Learning Environment	
Teachers at my school focus instruction on understanding, not just memorizing facts.	0.78
Teachers at my school have high expectations for students' learning.	0.78
Teachers at my school effectively implement the State Curriculum Standards.	0.74
Effective instructional strategies are used to meet the needs of low achieving students.	0.74
Student assessment information is effectively used by teachers to plan instruction.	0.73
My school provides challenging instructional programs for students.	0.73
Instructional strategies are used to meet the needs of academically gifted students.	0.63
My school offers effective programs for students with disabilities.	0.56
There is a sufficient amount of classroom time allocated to instruction in essential skills.	0.53

Teacher Climate Factors (continued from previous page)	2008 Loading
Resources	
Our school has sufficient computers for instructional use.	0.71
Computers are used effectively for instruction at my school.	0.71
There are sufficient materials and supplies available for classroom and instructional use.	0.71
Our school has a good selection of library and media material.	0.63
There is sufficient space for instructional programs at my school.	0.57
I have sufficient space in my classroom to meet the educational needs of my students.	0.55
I have access to reliable communication technology, including phone, fax, and e-mail.	0.55
My class sizes allow me to meet the educational needs of my students.	0.50
Physical Environment	
The hallways at my school are kept clean.	0.87
The grounds around my school are kept clean.	0.83
The bathrooms at my school are kept clean.	0.80
The school building is maintained well and repaired when needed.	0.79
Safety	
I feel safe at my school during the school day.	0.92
I feel safe at my school before and after school hours.	0.89
I feel safe going to or coming from my school.	0.85

Student Climate Factors	2008 Loading
Learning environment	
Teachers work together to help students at my school.	0.68
My teachers help students when they do not understand something.	0.68
My teachers spend enough time helping me learn.	0.66
My teachers want me to understand what I am learning, not just remember facts.	0.59
My teachers give homework assignments that help me learn better.	0.57
The textbooks and workbooks I use at my school really help me to learn.	0.56
My teachers praise students when they do a good work.	0.56
My classes are interesting and fun.	0.56
My teachers expect students to learn.	0.54
My teachers do a good job teaching me mathematics.	0.53
My teachers give tests on what I learn in class.	0.49
My teachers do a good job teaching me English language arts.	0.47
My teachers expect students to behave.	0.45
Social-Physical Environment	
Students at my school behave well in the hallways, in the lunchroom, and on school grounds.	0.65
Students at my school behave well in class.	0.63
Broken things at my school get fixed.	0.58
The bathrooms at my school are kept clean.	0.59
The hallways at my school are kept clean.	0.63
I am satisfied with the social and physical environment at my school.	0.56
Teachers and students get along well with each other at my school.	0.63
Students from different backgrounds get along well at my school.	0.57
The grounds around my school are kept clean.	0.61
Students at my school believe they can do a good work.	0.49

Student Climate Factors (continued from previous page)	2008 Loading
Home-School Relationship	
I am satisfied with home-school relations.	0.59
Parents volunteer and participate in activities at my school.	0.57
Parents are welcomed at my school.	0.62
My parent helps me with my homework when I need it.	0.56
Parents at my school know their children's homework assignments.	0.59
My school informs parents about school programs and activities.	0.65
My parent knows how well I am doing in school.	0.60
My parent knows what I am expected to learn in school.	0.64
Safety	
I feel safe going to or coming from my school.	0.68
I feel safe at my school during the school day.	0.84
I feel safe at my school before and after school hours.	0.82

Parent Climate Factors	2008 Loading
Learning Environment	
I am satisfied with the learning environment at my child's school.	0.85
My child's teachers encourage my child to learn.	0.84
My child's school has high expectation for student learning.	0.79
My child's teachers provide extra help when my child needs it.	0.78
My child's teachers give homework that helps my child learn.	0.74
Social-Physical Environment	
I am satisfied with the social and physical environment at my child's school.	0.86
My child feels safe at school.	0.81
My child's teachers care about my child as an individual.	0.79
Students at my child's school are well behaved.	0.75
My child's school is kept neat and clean.	0.68
Teacher Care and Support	
My child's teachers tell me how I can help my child learn.	0.89
My child's teachers contact me to say good things about my child.	0.83
My child's teachers invite me to visit my child's classroom during the school day.	0.79
Home-School Relationship	
I am satisfied with the home-school relations at my child's school.	0.85
My child's school includes me in decision-making.	0.79
My child's school gives me information about what my child should be learning in school.	0.79
My child's school treats all students fairly.	0.79
My child's school considers changes based on what parents say.	0.78
My child's school returns my phone calls or e-mails promptly.	0.75
The principal at my school is available and welcoming.	0.69
My child's school schedules activities at times that I can attend.	0.68

Appendix C

2008 Teacher, Student, and Parent Factor Correlations

Teacher Factor Correlations

	Working Conditions/ Leadership	Home-School Relationship	Learning Environment	Resources	Physical Environment
Working conditions/ leadership	*	*	*	*	*
Home-school relationship	0.64	*	*	*	*
Learning environment	0.63	0.55	*	*	*
Resources	0.69	0.60	0.57	*	*
Physical environment	0.55	0.48	0.46	0.53	*
Safety	0.54	0.47	0.45	0.52	0.48

Student Factor Correlations

	Learning Environment	Social-Physical Environment	Home-School Relationship
Learning Environment	*	*	*
Social-Physical Environment	0.68	*	*
Home-School Relationship	0.68	0.66	*
Safety	0.56	0.53	0.50

2021

SC Palmetto Assessment of State Standards (SC PASS)

Evidence of Alignment for Grades 4 & 6

SC EDUCATION OVERSIGHT COMMITTEE

PO Box 11867 | 227 Blatt Building | Columbia SC 29211 | WWW.SCEOC.ORG

Evidence of Alignment for South Carolina Palmetto Assessment of State Standards (SC PASS) in Science: Grade 4 and Grade 6

An Independent Alignment Study Conducted for the South Carolina Department of Education by Education Oversight Committee Staff for the Purpose of Peer Review

Context of the SC PASS Alignment Study

The SC PASS Science tests are designed to measure student performance on the South Carolina Academic Standards and Performance Indicators for Science (henceforth "SC Science Standards"), which were approved for implementation by the State Board of Education (SBE) and by the Education Oversight Committee (EOC) in 2014. The SC Science Standards are comprised of integrated, grade-level science standards and performance indicators for Kindergarten through Grade 8 as well as for the high school science courses of biology, chemistry, physics, and earth science.

The standards document is organized into four or five Academic Standards per K–8 grade level, each of which is further subdivided into one or two Conceptual Understandings. In turn, each Conceptual Understanding is operationalized by up to eight Performance Indicators that specify what students can do to demonstrate knowledge of the intended conceptual understanding. Standards are identified by the grade level ("K" for Kindergarten, 1-8 for first through eighth grade, or "H" for high school), an indicator of the scientific domain ("B" for Biology, "C" for Chemistry, "E" for Earth Science, "EC" for Ecology, "L" for Life Science, "P" for Physical Science, or "S" for the Science and Engineering Practices), and a number for the standard itself. For example, Standard 6.P.3 is the third science standard in sixth grade, which is a Physical Science standard. Conceptual understandings are indicated by adding sequential letters to the standard (e.g., 6.P.3A and 6.P.3B) with the related Performance Indicators numbered sequentially as the final term in the identifier (e.g., 6.P.3A.1 through 6.P.3A.6 and 6.P.3B.1 through 6.P.3B.2).

Per the Consolidated State Plan that the SC Department of Education (SCDE) has submitted to and has been approved by the US Department of Education (USDE), the SC Science Standards are assessed via the SC PASS in Grade 4 and Grade 6. Items for the SC PASS are developed according to a development plan that is submitted to the Contractor, Data Recognition Corporation, by SCDE. The Contractor provides information about the standard that the item is meant to measure, the depth of knowledge (DOK) at which it is intended to measure it, and how each distractor was formulated.

After SCDE provides feedback, and requests and approves revisions, the items are presented for review at annual meetings of the Item Review Committees and Bias/Sensitivity Review Committees. Both committees are constituted of expert educators in the state. Content item committee members are provided with secure access to all items for review and trained on alignment, depth of knowledge, and item technical quality. Bias and sensitivity item committee members are provided with secure access to all items for review and trained on bias and sensitivity and universal design. During the meetings, committee members review each item and provide written feedback before items are discussed with the whole group. The Contractor facilitates training and documents all decisions, changes, and concerns

during the meetings. Following the committee meetings, the Contractor and the SCDE content specialist reconcile the recommended edits. The Contractor incorporates these changes and send final edited items to the SCDE.

After all the edits have been approved, the SCDE creates sets of field test items. Each field test set for grades four and six is comprised of six items. The items are embedded on the operational test form and administered to a representative sample of students. Items selected to appear on forms must not only meet psychometric qualities for excellence, but they must also meet technical quality in terms of content and conventions of good item writing and construction. The Contractor's content specialists recheck to see that each item meets technical quality for well-crafted items, including having only one clearly correct answer, having wording that is clear and concise, having grammatical correctness, being appropriate for the range of difficulty, and being free of any content that might be offensive, inappropriate, or biased. The Contractor further ensures that items selected for operational forms meet psychometric guidelines of having *p*-values within the recommended range of 0.30 to 0.85, having positive item-total correlations (point-biserials) greater than or equal to 0.20, and having differential item functioning (DIF) flags better than "C" (items with a DIF flag of "B" should be considered carefully and, when included, balanced among favored gender and ethnicity groups).

The present study provides evidence of alignment for the SC PASS Science Grade 4 and Grade 6 assessments as described in *A State's Guide to the U.S. Department of Education's Assessment Peer Review Process* (USDE, 2018). The evidence presented within this report builds on the evidence collected by SCDE and the Contractor through the item development, review, and field testing processes described prior. Specifically, this report contains "results of an independent alignment study that is technically sound (i.e., method and process, appropriate units of analysis, clear criteria) and documents adequate alignment, specifically that each assessment is aligned to its test blueprint, and each blueprint addresses [the] depth and breadth of the State's academic content standards" (USDE, 2018, p. 48).

Research Questions

The present study seeks to answer the following research questions:

1. To what extent do the test forms and test items for the Science SC PASS reflect the test design and test blueprint?
2. To what extent do test forms show balance across the science domains used for Science SC PASS scoring and reporting purposes (earth science, life science, and physical science)?
3. To what extent do the test forms and test items reflect the depth and breadth of the SC Science Standards?
4. To what extent do Science SC PASS items integrate disciplinary content with science and engineering practices?
5. Do the Science SC PASS items range from low to high cognitive complexity (i.e., depth of knowledge or DOK) and provide enough items across the range of cognitive complexity?

Alignment Review Methods

EOC Staff conducted and facilitated an alignment study workshop in Columbia, SC, on August 3, 2021. Fourteen teachers with experience teaching fourth- or sixth-grade science in one of 13 different South Carolina school districts were invited to participate in the alignment study as an expert review panel. Due

to unanticipated circumstances such as illness and travel delays, 12 teachers from 11 districts ultimately participated in the study in two teams, with one team reviewing the SC PASS Science Grade 4 assessment and one team reviewing the SC PASS Science Grade 6 assessment. Panelists possessed multiple years of experience teaching science. Ten members of the expert panel had experience teaching science at the grade level of that assessment items they reviewed, all but one of whom in the most recent school year. The other two panelists had experience in lead or supervisory roles over teachers at the grade level reviewed. All invited panelists were identified by SCDE or by district leaders as possessing suitable knowledge and experience to be well-qualified for participation in the alignment study.

Workshop participants were financially supported for 1.5 days of effort, which included participation in the alignment study workshop on August 3 and approximately four hours of effort in advance of the workshop. Participants' advance work included training videos and exercises designed to prepare them for their duties on the day of the alignment study (the text of the email containing advance materials has been included as Appendix A). To support participants' advance work, EOC Staff were made available for consultation by phone or email. The alignment study workshop also began with a brief discussion of and opportunity for questions about the advance work materials and concepts and skills addressed by them. Debriefing of items rated independently during advance work was used for initial calibration purposes. The alignment study was designed so that all items would be independently rated by two participants and initial discrepancies resolved through discussion before comparing the expert panelists' identified standards and DOK levels with those intended by the test developer.

SCDE prepared notebooks with printed copies of all reviewed test materials and had computers with secure access to live test items so that participants could see and interact with technology-enhanced items. Printouts of reviewed test items were arranged in random order and had the intended standard alignment and DOK removed so as not to bias participant reviews. EOC Staff prepared data collection forms (see Appendix B) on which participants were to record the aligned standard Performance Indicator and identified DOK, as well as comments to indicate the criteria and evidence on which they based their identifications. Expert panelists identified the Science Standard Performance Indicator that they believe is being assessed by each item reviewed, with an opportunity to identify a secondary Performance Indicator as the content area context for items that primarily measure one of the Science and Engineering Practices. Panelists also identified the DOK level of the item for comparison to the intended DOK.

Based on the Science Standard Performance Indicators and DOK levels identified by the expert review panel, EOC Staff compared the collection of items used by the test forms reviewed to the blueprint for those assessments (see Appendix C). Note that, although the items are created to align with specific Performance Indicators, the blueprint identifies the number of items that are meant to assess each Academic Standard. Therefore, the findings of this report will discuss agreement and alignment both at the Performance Indicator level, as well as at the Academic Standard level, which is more general. The Alignment Study Workshop consisted of the following stages:

Stage 1 – Independent Review of Items

Expert panelists began by independently reviewing the specific items to which they had been assigned. Panelists were instructed to identify the Performance Indicator most directly assessed by the item and, if the item in question directly assesses a Science and Engineering Practice, a secondary Performance Indicator which represents the grade-level content that serves as the context within which the practice in question is assessed. Panelists also identified the DOK level at which the Performance Indicator is assessed

by the item reviewed. Participants were instructed to add brief notes in the comments area of the data collection form to record any specific aspects of the item's design, phrasing, or the cognitive processes required to respond correctly to the item, that helped them select the specific Performance Indicator(s) and DOK level identified.

Stage 2 – Discussion and Reconciliation of Ratings

After independent item review, pairs of panelists who had reviewed the same items met to compare the Performance Indicators and DOK levels that they identified and came to consensus on a final identification of aligned Performance Indicators and DOK levels. Each panelist was paired with three different fellow panelists during Stage 2 to expose them to multiple ways of analyzing items and to minimize the influence of any potential bias that could be introduced within the dynamics of a single dyad. During reconciliation, panelists referred to the notes they took during independent rating and discussed their interpretation of the items and the cognitive processes required for students to make a correct response until they found agreement. Pairs of panelists were asked to record the Performance Indicators and DOK levels on which they found agreement along with comments to specify the specific reasoning or evidence for the final decisions made.

Across all 95 items reviewed, pairs of expert raters demonstrated initial agreement on 57 items (or 60%) at the Performance Indicator level, and on 72 items (or 76%) when examined at the Academic Standard level. Pairs of panelists also demonstrated initial agreement on the identified DOK level for 74 items (or 78%). After discussion, pairs of panelists came to 100% agreement for all items on both the aligned Performance Indicator and DOK level. More detailed results are discussed forthcoming in the findings and discussion for each of the research questions.

Stage 3 – Discussion and Reconciliation of Pair Ratings with Design Intent

After all pairs or panelists had found consensus on the aligned Performance Indicators and DOK levels, panelists were given the metadata for the items to indicate the Performance Indicator and DOK level intended for the items reviewed. Panelist pairs then examined any Performance Indicator or DOK level for which their consensus decision disagreed with the Performance Indicator and DOK level intended for the item. Panelists were instructed not to consider the information provided in the metadata as the "correct" alignment for the item. Instead, panelists were advised that discussions could lead them to one of three equally legitimate outcomes: (a) that the Performance Indicator and DOK level identified in the metadata is more appropriate for the item than those identified by the panelists, (b) that the Performance Indicator and DOK level identified by the panelists is more appropriate for the item than those identified in the metadata, or (c) that both sets of Performance Indicators and DOK levels are equally appropriate for the item.

Across all 95 items reviewed, panelists demonstrated initial agreement with SCDE and Developer intent on 61 items (or 64%) at the Performance Indicator level, and on 76 items (or 80%) when examined at the Academic Standard level. Panelists also demonstrated initial agreement on the intended DOK level for 62 items (or 65%). After consideration and discussion, pairs of panelists came to agreement with the intended aligned Performance Indicator for 87 items (or 92%), and with the intended Academic Standard for 90 items (or 95%). Panelists demonstrated final agreement with the intended DOK level for 89 items (or 94%). More detailed results are discussed forthcoming in the findings and discussion for each of the research questions.

Stage 4 – Data Integration and Analysis

EOC Staff integrated and analyzed the data collected from the Alignment Study Workshop and from the documents and reference materials provided by SCDE to answer the five research questions of the present study. Panelists' comments and notes were also qualitatively analyzed to contribute to the recommendations that follow. Findings are discussed next, organized by research question.

Findings of the Alignment Study

Research Question 1 – Reflection of Test Design and Blueprint

When comparing the Academic Standard and DOK level assessed by the reviewed items to the approved test blueprint, EOC Staff considered the final identifications made by the expert panelists after the conclusion of Stage 3 of the Alignment Study Workshop.

For the Grade 4 SC PASS Science test, the blueprint requires that from eight to eleven items assess each Academic Standard. Per the findings of the expert panelists (see Table 1), Academic Standard 4.E.2 is underrepresented by one item. This difference can be attributed to a single item that was intended to measure 4.E.2, but which the panelists identified as a more appropriate measure of the Science and Engineering Practices (4.S.1), though the panelists did identify 4.E.2 as the secondary Academic Standard representing the content area context of the item in question. The items also closely match the levels of cognitive complexity intended during the development of the Grade 4 SC PASS Science test, with one more item than intended being identified at DOK 1 by the expert panelists.

Table 1.
Grade 4 SC PASS Items per Academic Standard by DOK Level

	DOK 1	DOK 2	DOK 3	Total Items
Academic Standard	**# (%)** [a]	**# (%)** [a]	**# (%)** [a]	**# (%)** [b]
4.S.1	1 (9%)	8 (73%)	2 (18%)	11 (24%)
4.E.2	2 (29%)	5 (71%)	—	7 (16%)
4.E.3	1 (13%)	7 (88%)	—	8 (18%)
4.P.4	—	8 (80%)	2 (20%)	10 (22%)
4.L.5	1 (11%)	5 (56%)	3 (33%)	9 (20%)
Total:	**5 (11%)**	**33 (73%)**	**7 (16%)**	**45 (100%)**

Note: Academic Standards and DOK levels indicated reflect those identified by expert panelists after final discussion and reconciliation. Panelists demonstrated almost perfect agreement with the intended Academic Standard of the item as measured by Cohen's kappa (κ = 0.94 for 4.S.1, κ = 0.92 for 4.E.2, κ = 0.85 for 4.L.5, and κ = 1.00 for 4.E.3 and 4.P.4). Panelists demonstrated substantial agreement with the intended DOK level of items (κ = 0.88 for DOK 1, κ = 0.62 for DOK 2, and κ = 0.73 for DOK 3).

[a] Percentages shown indicate the percent of the total items for the given Academic Standard (i.e., total items in the row) that were identified at the indicated DOK level. [b] Percentages shown indicate the percent of all items on the test that were identified to assess the indicated Academic Standard.

For the Grade 6 SC PASS Science test, the blueprint requires that from nine to twelve items assess each Academic Standard. Per the findings of the expert panelists (see Table 2), the items on the test form match the requirements of the blueprint. The complexity of the items on the Grade 6 test form do not match the distribution indicated by the blueprint, with DOK 1 being overrepresented and DOK 3 being underrepresented. It should be noted that the proportion of items at each of the DOK levels was not added to the blueprint until August 2020, suggesting that the items used on the test reviewed were developed, piloted, and selected before this requirement was in place.

Table 2.
Grade 6 SC PASS Items per Academic Standard by DOK Level

	DOK 1	DOK 2	DOK 3	Total Items
Academic Standard	**# (%)** [a]	**# (%)** [a]	**# (%)** [a]	**# (%)** [b]
6.S.1	1 (8%)	8 (67%)	3 (25%)	12 (22%)
6.E.2	2 (22%)	7 (78%)	—	9 (16%)
6.P.3	3 (27%)	7 (64%)	1 (9%)	11 (20%)
6.L.4	2 (15%)	11 (85%)	—	13 (24%)
6.L.5	—	10 (100%)	—	10 (18%)
Total:	**8 (15%)**	**43 (78%)**	**4 (7%)**	**55 (100%)**

Note: Academic Standards and DOK levels indicated reflect those identified by expert panelists after final discussion and reconciliation. Panelists demonstrated almost perfect agreement with the intended Academic Standard of the item as measured by Cohen's kappa (κ = 0.89 for 6.S.1, κ = 0.95 for 6.P.3, κ = 0.94 for 6.L.5, and κ = 1.00 for 6.E.2 and 6.L.4). Panelists demonstrated almost perfect agreement with the intended DOK level of items (κ = 0.84 for DOK 1 and DOK 2, and κ = 0.85 for DOK 3).

[a] Percentages shown indicate the percent of the total items for the given Academic Standard (i.e., total items in the row) that were identified at the indicated DOK level. [b] Percentages shown indicate the percent of all items on the test that were identified to assess the indicated Academic Standard.

Expert panelists and EOC Staff noted that the test forms reviewed contained the number of technology-enhanced items indicated on the blueprint (see Appendix C). In addition, panelists noted that test takers are required to employ the Science and Engineering Practices throughout the assessment and that use of the practices were not limited to the items designed to assess that Academic Standard (i.e., 4.S.1 and 6.S.1). Therefore, we conclude that the test items and forms reviewed adequately reflect the intent of the test design and test blueprint.

Research Question 2 – Balance Across Science Domains

The science domains assessed by the Grade 4 and Grade 6 SC PASS are displayed in Table 3. The distribution of SC PASS items across the science domains seems appropriate given the relative focus put on these domains in the Science Standards at the grade levels assessed. The number and proportion of items for each Science Domain on the Grade 4 and Grade 6 SC PASS Science test forms are similar to the number and proportion of individual Performance Indicators listed for those domains in the SC Science Standards document. Therefore, we conclude that the test items and forms reviewed test forms show adequate balance across the science domains used for Science SC PASS scoring and reporting purposes.

Table 3.
Number and Proportion of SC PASS Items and Performance Indicators by Science Domain

	Grade 4 Items	Grade 4 PIs	Grade 6 Items	Grade 6 PIs
Science Domain	**# (%)** [a]	**# (%)** [b]	**# (%)** [a]	**# (%)** [b]
Earth Science	15 (33%)	12 (33%)	9 (16%)	7 (18%)
Life Science	9 (20%)	7 (19%)	23 (42%)	14 (37%)
Physical Science	10 (22%)	8 (22%)	11 (20%)	8 (21%)
Science and Engineering Practices	11 (24%)	9 (25%)	12 (22%)	9 (24%)

Note: PIs = Performance Indicators. Assessed domains reflect Academic Standards identified by expert panelists after final discussion and reconciliation.

[a] Percentages shown indicate the percent of all items on the test that were identified to assess the indicated Science Domain. [b] Percentages shown indicate the percent of all PIs listed in the SC Science Standards for the indicated grade level that are associated with the indicated Science Domain.

Research Question 3 – Depth and Breadth of the SC Science Standards

As discussed, each Academic Standard listed in the SC Science Standards is further codified in multiple Performance Indicators that indicate what a student can do to demonstrate knowledge of the Conceptual Understanding under which they fall. If the SC PASS Science assessments reflect the depth and breadth of the SC Science Standards they are meant to measure, then the items are expected to be distributed somewhat evenly across the Performance Indicators and at DOK levels that reflect the complexity of the Academic Standards and Performance Indicators assessed.

Table 4.

Number of Grade 4 Performance Indicators Assessed per Academic Standard by DOK Level

		DOK 1	DOK 2	DOK 3	Total PIs
Academic Standard	**# of PIs**	**# (%)**	**# (%)**	**# (%)**	**# (%)**
4.S.1	9	1 (11%)	7 (78%)	2 (22%)	9 (100%)
4.E.2	5	2 (40%)	4 (80%)	—	5 (100%)
4.E.3	7	1 (14%)	6 (86%)	—	7 (100%)
4.P.4	8	—	5 (63%)	2 (25%)	6 (75%)
4.L.5	7	1 (14%)	5 (71%)	3 (43%)	6 (86%)
Total:	**36**	**5 (14%)**	**33 (92%)**	**7 (19%)**	**33 (92%)**

Note: PIs = Performance Indicators. The PIs, Academic Standards, and DOK levels indicated reflect those identified by expert panelists after final discussion and reconciliation. Percentages shown indicate the percentage of all PIs listed in the SC Science Standards for the indicated Academic Standard(s).

Table 4 indicates the number of Performance Indicators associated with each Grade 4 academic Standard as well as the number and proportion of Performance Indicators that are assessed by items identified at various DOK levels. The assessment form reviewed assesses 92% of the Grade 4 Performance Indicators (i.e., 33 out of 36 PIs are assessed). Each Performance Indicator was assessed by zero, one, or two SC PASS items (M = 1.3, SD = 0.6). Two of the Grade 4 Academic Standards (4.E.2 and 4.E.3), both in the Earth Science domain, were not assessed by any items at DOK 3.

Table 5.

Number of Grade 6 Performance Indicators Assessed per Academic Standard by DOK Level

		DOK 1	DOK 2	DOK 3	Total PIs
Academic Standard	**# of PIs**	**# (%)**	**# (%)**	**# (%)**	**# (%)**
6.S.1	9	1 (11%)	7 (78%)	3 (33%)	9 (100%)
6.E.2	7	2 (29%)	5 (71%)	—	7 (100%)
6.P.3	8	3 (38%)	7 (88%)	1 (13%)	8 (100%)
6.L.4	7	2 (29%)	7 (100%)	—	7 (100%)
6.L.5	7	—	6 (86%)	—	6 (86%)
Total:	**38**	**5 (14%)**	**33 (92%)**	**7 (19%)**	**37 (97%)**

Note: PIs = Performance Indicators. The PIs, Academic Standards, and DOK levels indicated reflect those identified by expert panelists after final discussion and reconciliation. Percentages shown indicate the percentage of all PIs listed in the SC Science Standards for the indicated Academic Standard(s).

Table 5 indicates the number of Performance Indicators associated with each Grade 6 academic Standard as well as the number and proportion of Performance Indicators that are assessed by items identified at various DOK levels. The assessment form reviewed assesses 97% of the Grade 6 Performance Indicators (i.e., 37 out of 38 PIs are assessed). Each Performance Indicator was assessed by from zero to up to three

SC PASS items (*M* = 1.5, *SD* = 0.7). Three of the Grade 6 Academic Standards (6.E.2, 6.L.4, and 6.L.5), which includes both standards in the Life Science domain, were not assessed by any items at DOK 3.

Based on these analyses, we conclude that although the test forms and test items adequately reflect the depth and breadth of the SC Science Standards, there are opportunities to improve the degree to which the SC PASS Science assessments reflect the higher levels of cognitive complexity implied by the Academic Standards assessed. It is recommended that each Science Domain assessed include at least one item that assesses students at DOK 3.

Research Question 4 – Integration of Science and Engineering Practices

The SC Science Standards include the Science and Engineering Practices (SEPs) as the first Academic Standard for each Grade Level and High School Course. In addition, each Performance Indicator has an aspect of the SEPs embedded within its description of what a student can do to demonstrate knowledge of the Conceptual Understandings and Academic Standards associated with the other Science Domains. This element of the design of the SC Science Standards reflects the document's exhortation that "the Science and Engineering Practices are *not* to be taught in isolation" (p. 2, emphasis in original).

Review of the panelists' notes and comments during the Alignment Study Workshop indicated that they paid particular attention to the SEPs in their analysis and review of items. Expert panelists considered the SEPs that students must use to respond correctly to the item as a basis for some of their final decisions about which Performance Indicator an item assesses. Analysis of their comments and notes taken during their discussions suggest that Science SC PASS items integrate disciplinary content with science and engineering practices very effectively. This integration is a strength of the SC PASS assessment system.

Research Question 5 – Range of Cognitive Complexity

Per the findings related to Research Question 1, SC PASS items adequately reflect the intended cognitive complexity represented by the test design and blueprint (see Table 1 and Table 2). Per the findings related to Research Question 3, the SC PASS sufficiently reflects the depth and breadth of the SC Science Standards with an opportunity to improve the degree to which items reflect the higher levels of cognitive complexity implied by the standards (see Table 4 and Table 5). The SC PASS Science tests do have items across the range of DOK levels, but care should be taken to ensure that Performance Indicators which describe more complex performances of understanding be assessed with more complex items. Based on our analyses, we conclude that Science SC PASS items range appropriately from low to high cognitive complexity, provide enough items across the range of cognitive complexity, and that an opportunity exists to match the cognitive complexity of items more closely to the cognitive complexity of the Performance Indicators and Academic Standards they assess.

Conclusion and Recommendations

The Grade 4 and Grade 6 SC PASS Science assessments demonstrate adequate alignment. Specifically, the test forms reviewed are adequately aligned to their respective test blueprints, and each blueprint addresses the depth and breadth of the SC Science Standards.

- **Recommendation 1:** Work to ensure that each Science Domain includes at least one item that assess students at DOK 3.
- **Recommendation 2:** Match the cognitive complexity of items more closely to the cognitive complexity of the Performance Indicators and Academic Standards they assess.

The Grade 4 and Grade 6 SC PASS Science assessments integrate disciplinary content with Science and Engineering Practices (SEPs) very well. Specifically, the SEPs are integrated into both the SC Science Standards and their associated support documents to facilitate SCDE's goal that the SEPs be embedded into Science teaching and learning and not be taught in isolation. The SC PASS test items reflect this integration of SEPs and Science Domains appropriately.

- **Recommendation 3:** Continue efforts to integrate SEPs into Science teaching and learning throughout the State.

Appendix A:
Email Containing Advance Materials for Alignment Study Participants

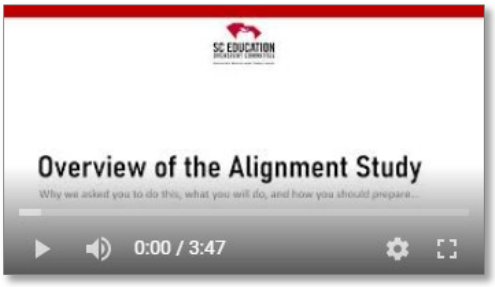
Good day, SC PASS Science Alignment Study participants,

This email serves as the official kick-off for your participation in the Alignment Study. Before proceeding to the materials below, please check these quick logistical details:

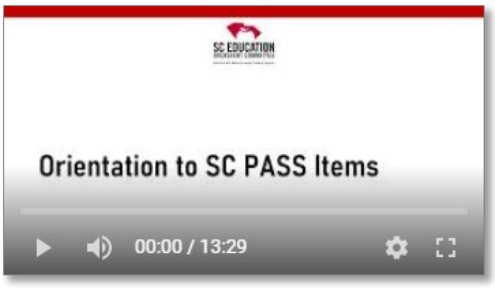
- Please complete **this form** to place your lunch order no later than **Friday, July 23**.
  (*Note that if you do not place an order by the deadline, then a turkey sandwich will be selected for you.*)
- Remember that you must have a vendor number with the state to be compensated for your efforts on this project. If you have not yet done so, please do this as soon as possible.
  (*If you do not have a vendor number, then you would have received an email from the EOC Deputy Director, Dana Yow, with instructions. Please contact Dana at danay@eoc.sc.gov if you have any questions about this.*)
- You will be eligible for reimbursement of milage for your travels to the alignment study if you live **more than 10 miles away** from the Olympia Learning Center.
  (*Note that this is a change from what was mentioned in a previous email. We have received new guidance from the state that permits us to pay milage for shorter distance trips.*)
- On the day of the Alignment Study, you will be asked to sign a non-disclosure agreement since you will be reviewing secure test items. This agreement is very similar to the non-disclosure language you sign whenever you serve as a proctor for a state achievement test.
  (*Although none of the materials contained in this email are protected, the test items that you will review on August 3 are secure test items that have not been released to the public.*)

watch this video introduction (https://youtu.be/HBp1MU7TUL8) or read this transcript before proceeding.

Advance Work Materials for Completion Before the Alignment Study



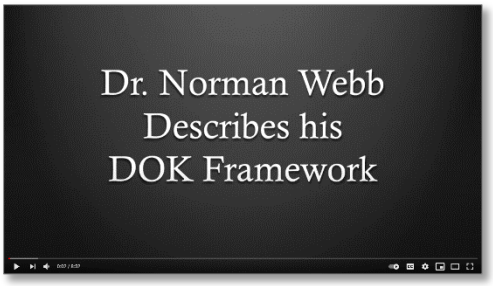
linked here; https://youtu.be/7aiAmOthDHY) that gives an overview of the alignment study

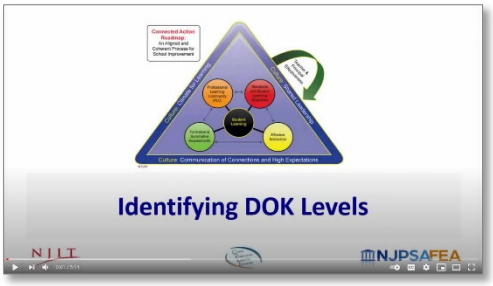


linked here; https://youtu.be/_7FIobA8dnQ) that gives an orientation to SC PASS Science items and how they align with the SC Academic Standards and Performance Indicators for Science. The additional items referenced in this video appear below:

- Sample Item 1 – This is the first sample item presented in the video (at about 3:12)
- Sample Item 2 – This is the second sample item presented in the video (at about 5:32)
- Practice Item 1 – This is the first item presented for your independent practice (7:53)
- Practice Item 2 – This is the second item for your independent practice (10:15)
- SC Academic Standards and Performance Indicators for Science – The Science standards to which the test items align
- SC PASS Grade 4 Science Released Items – Fourth grade released items for additional practice
- SC PASS Grade 6 Science Released Items – Sixth grade released items for additional practice

3. Refamiliarize yourself with the SC Academic Standards and Performance Indicators for Science and make any notes to support your work during the alignment study





linked here, https://youtu.be/qFXU6_TYIjc, and linked here; https://youtu.be/5u7hchcdTDo) for some decent explanations of Webb's Depth of Knowledge

linked here; https://youtu.be/QobZ9kJwSFs). While viewing this video, you may wish to refer to the following items:

- WebbAlign Quick Reference Sheet – This contains the official definitions of the four DOK levels used by the SC Department of Education
- Sample Item 3 – The first sample item presented in this video (at about 0:45)

- Sample Item 4 – The second sample item in this video (at about 1:43)
- Practice Item 3 – The first independent practice item in this video (2:39)
- Practice Item 4 – The second independent practice item (3:55)
- SC PASS Grade 4 Science Released Items – Fourth grade released items for additional practice
- SC PASS Grade 6 Science Released Items – Sixth grade released items for additional practice

linked here; https://youtu.be/_tAuQkWDiUI) on how to reconcile discrepancies among raters and what evidence to record for the standard indicators and DOK you identify

Contact Us

During your advance work, if you have any questions for us or would like something clarified, feel free to reach contact us.

- For general questions about the event or logistics, please contact Hope Johnson-Jones, Administrative Coordinator, at hjones@eoc.sc.gov
- For questions about the content of these videos or the tasks that you will be asked to do for this alignment study, please contact Matt Lavery, Director of Research, at mlavery@eoc.sc.gov
    - You may also use this link to schedule a quick online meeting or phone call with me to discuss any questions that you might have.

Thank you all for all that you do for students,

Matthew R Lavery, Ph.D. (*he/him/his*)
Director of Research
SC Education Oversight Committee
PHONE: 803.734.8827
CELL: 407.520.1240
E-MAIL: mlavery@eoc.sc.gov

reduce the carbon footprint of email communications, it is not necessary to send acknowledgement or thanks for this message unless specifically requested. Know that your comments or questions regarding the content of this email are always welcome. Thank you.

Appendix B:
Data Collection Forms

SC EDUCATION OVERSIGHT COMMITTEE
Reporting facts. Measuring change. Promoting progress.

2019-20 4th Grade Science Standard Alignment Committee (August 3, 2021)

Reviewer: ***<Reviewer01>*** Initial: _____

Items to Review: ***1-5, 26-30, 36-40***

ITEM #	STANDARD ALIGNMENT	DOK	NOTES
	Primary Secondary		
	Primary Secondary		
	Primary Secondary		
	Primary Secondary		
	Primary Secondary		

SC EDUCATION OVERSIGHT COMMITTEE
Reporting facts. Measuring change. Promoting progress.

GROUP - 1
2019-20 4th Grade Science Standard – (Pairs)
Alignment Committee (August 3, 2021)

Reviewers: ***<Reviewer01>, <Reviewer02>*** Initials: ____/____

Items to Review: ***1-5***

ITEM #	STANDARD ALIGNMENT	DOK	NOTES
	Primary Secondary		
	Primary Secondary		
	Primary Secondary		
	Primary Secondary		
	Primary Secondary		

SC EDUCATION OVERSIGHT COMMITTEE
Reporting facts. Measuring change. Promoting progress.

GROUP - 1
2019-20 4th Grade Science Standard – (PAIRS + SCDOE)
Alignment Committee (August 3, 2021)

*Reviewers: <**Reviewer01**>, <**Reviewer02**>* Initials:____/____

Items to Review: ***1-5***

ITEM #	STANDARD ALIGNMENT	DOK	NOTES
	Primary Secondary		
	Primary Secondary		
	Primary Secondary		
	Primary Secondary		
	Primary Secondary		

Appendix C:
SC PASS Science Test Blueprint

South Carolina Department of Education Office of Assessment

South Carolina Palmetto Assessment of State Standards Science (SCPASS)
Test Blueprint for Science Grades 4 and 6
2020-2021

- Items on the science assessments will cover a range of difficulty levels.
- The science assessments will have two to four technology enhanced (T.E.) items.
- The Science and Engineering Practices (Standard 1) items will be embedded throughout the assessment.

Grade	Number of Standards	Number of Items	Item per Standard
4	5	45	8 to 11
6	5	55	9 to 12

DOK Level	Min/ Max (%)
1	5 to 10
2	65 to 80
3	10 to 20

Updated August 2020