



Ohio

Standards and Assessment Committees Report

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STANDARDS AND ASSESSMENT COMMITTEES REPORT

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English Language Arts, Science and Social Studies Standards and Assessments Review Committees Discussion Summary

Introduction

The Academic Standards and Assessment Review Committees were created in 2014 by the Ohio legislature through the passage of House Bill 487. Since January 2015, the committees have met to review the standards and assessments in four key academic areas. Committee reviews will continue as Ohio's assessments are changing, and the input of committee members is essential to ensuring rigorous and valid academic standards and assessments.

The purpose of this document is to: (1) explain the legislative mandate to create the committees; (2) provide an overview of the review process that was followed and the role of the Ohio Department of Education in providing administrative support to the committees; (3) provide committee feedback summaries; and (4) suggest considerations for the future of the committees.

Legislative Requirement and Purpose

HB 487 requires the creation of academic standards and assessment review committees for the subject areas of English language arts, mathematics, science and social studies.

The legislation states each subject area committee is comprised of the following members: 1) three experts who are residents of Ohio and who primarily conduct research, provide instruction, currently work in, or possess an advanced degree in the committee's subject area; 2) one expert shall be appointed by each of the following: the president of the Senate, the speaker of the House of Representatives, and the governor; 3) one parent or guardian appointed by the president of the Senate (or the speaker of the House, depending on the committee); 4) one educator who is currently teaching in a classroom appointed by the speaker of the House of Representatives (or the president of the Senate, depending on the committee); 5) the chancellor of the Ohio Board of Regents (since renamed the Ohio Department of Higher Education) or the chancellor's designee; and 6) the state superintendent, or the superintendent's designee, who shall serve as the chairperson of the committee.

Each committee was legislatively charged to review the academic content standards for its respective subject area to ensure that such standards are clear, concise and appropriate for each grade level and promote higher student performance, learning, subject matter comprehension and improved student achievement. Each committee also was charged to review whether the standards for its respective subject area promote essential knowledge in the subject, lifelong learning, the liberal arts tradition, college and career readiness and whether the standards reduce remediation. In addition, each committee was charged to determine whether the assessments for its respective subject area are appropriate and meet the established academic content standards.

Finally, the legislation also requires the Ohio Department of Education to provide administrative support for each committee.

Process

In January 2015, prior to committees starting their standards and assessment reviews, the department provided a comprehensive orientation that covered topics such as ethics, Ohio Sunshine Laws, the Open Meetings Act, the legislative charge for the committees, standards-based education history, academic content standards overview, academic content standards development history, and an overview of resources and tools available for reviews. The department also used the orientation to establish a baseline of understanding regarding the history of the academic content standards, which were adopted by the State Board of Education in June 2010, and the multifaceted standards development process.

This session was conducted with committee members from all content subject areas meeting together. Following this portion of the day, each subject area committee met separately. Department of education officials provided an overview of the format of the standards document and gave direction to committee members on how to use the resources and tools.

From February to early June 2015, each respective committee convened for standards reviews. The first round of meetings occurred in February and March. During round one, committee members were introduced to the standards rubrics to use when conducting their reviews and were asked to provide comprehensive feedback on each standard using the rubric. Members reported their findings to the full committee. The committee agreed upon a plan to continue to review the next assigned sections of the standards on their own time in preparation for the next round of meetings.

Round two meetings, conducted in April and May, included oral reports on findings from individual reviews of the standards. The committees engaged in robust discussions based on their reviews and agreed upon assignments for “homework.”

During mid-June 2015, the committees convened to recap the overall standards review process and to prepare for the assessment review process. In summary, much of the recap conversation centered on the difficulty of trying to determine whether standards promote “lifelong learning, the liberal arts tradition and college and career readiness,” while looking at early grades standards (K-6). In preparation for the assessment reviews, the department oriented committee members to the assessment reviews and provided them with opportunities to practice the review process.

The tasks of the Academic Standards and Assessment Review Committees includes an annual review of each assessment required by law for grades 3 through 8 and high school. In June and July 2015, the department provided times for each committee member to review the assessments respective to their content areas and to provide feedback. These tests include the following for each content area:

English language arts: One test at each grade in grades 4-8, English language arts I and II end-of-course tests for high school. (The Ohio Achievement Test for reading was administered for the last time to grade three students.)

Mathematics: One test at each grade in grades 3-8, algebra I or integrated math I, geometry or integrated math II.

Science: Grades 5, 8 and the physical science end-of-course test for high school.

Social studies: Grades 4, 6 and American history and American government for high school.

During the June standards and assessment committee meeting, Ohio Department of Education staff members presented to committee members the process used by committees in the development of assessment items for all state tests. Staff members also presented the review process, the rubrics for collecting the feedback, the process for discussion of their reviews and the secure nature of reviewing the items.

Prior to being given access to the assessments, committee members were required to sign confidentiality agreements. Committee members were provided two weeks during the months of June and July to come to the department to complete the reviews. Time was available between 9 a.m. and 4 p.m. Monday through Friday during the weeks of June 22-26 and July 20-24. Committee members scheduled times during these windows to review the assessments in a secure environment at the department and were reminded that if not kept confidential, the tests would lose their value and could not be used again.

During the review of the assessment items, each committee member had access to both the online version and a paper version of the online test. Other resources, such as test specifications, answer keys and item rubrics, also were available as support materials. Department staff members were made available to provide support to the committee members.

Each committee member completed a rubric, the test items were organized by the reporting categories for each content area and test. The committee members focused their reviews around two areas: alignment and community expectations.

Alignment:

Yes – The items in the Reporting Category are appropriate for the subject and address the corresponding content standards/evidence statements.

Partially – The items in the Reporting Category are appropriate for the subject and address the corresponding content standards/evidence statements with some exceptions (please provide evidence of items that do not meet the content standards).

No – The items in the Reporting Category are not appropriate for the subject and do not address the corresponding content standards/evidence statements.

Community Expectations:

Yes – The items in the Reporting Category meet the Fairness and Sensitivity Guidelines.

Partially – The items in the Reporting Category generally meet the Fairness and Sensitivity Guidelines with some exceptions (please provide evidence of items that do not meet the Fairness and Sensitivity Guidelines).

No – The items in the Reporting Category do not meet the Fairness and Sensitivity Guidelines.

During the committee meetings in late July and August, the committees met in executive sessions to discuss their reviews of the assessments. An overview of that discussion is provided within the appendices of this report.

In August 2015, the committees met in executive sessions to protect the content of the assessments. Members discussed their findings related to the assessment reviews.

Future Considerations

The Standards and Assessment Review Committee members provided the department with invaluable and thoughtful feedback on Ohio's New Learning Standards and the associated assessments.

Department leadership and staff appreciate the time, effort and expertise that went into the reviews of each member.

The feedback will be utilized as part of a larger body of feedback being used to guide the department as it continues to support the existing standards and prepares English language arts, mathematics, science and social studies assessments for the 2015-2016 school year and beyond.

The department looks forward to continuing to support the work of the committees as they prepare the Standards Review Discussion Summary and continue the assessment review in 2016.

Section I: English Language Arts Review

English Language Arts Standards Review

Summary of Common Themes

Overview

The Standards and Assessment Committee for English language arts is comprised of four members: a high school English instructor, a director for a virtual academy, a parent representative, and a representative from the Ohio Department of Higher Education.

Ohio's Learning Standards for English Language Arts are unique in the way in which they are structured. The standards are organized by strands: Reading, Writing, Speaking and Listening, and Language. When reviewing the standards document against the 10-question rubric, committee members were able to review the entire scope of the standards from K-12. This was a more acceptable approach when compared to the science, social studies and math standards because the standards' expectations progress with each successive grade.

Standards Review for Reading K-12

The committee members began this process by reviewing the Reading strand. Within this strand they were charged with reading and reviewing the standards for reading literature, reading informational text and the standards associated with the K-5 foundational skills. To ensure that they understood the questions asked, as well as the organization of the standards document, the work was broken up into sections in order to elicit discussion and clear up any questions that may arise. After reviewing this strand, the committee noted that it was helpful to review it in this manner before doing the rest of the work independent of any discussion. One reviewer found it helpful to look for commonalities within the standards, and she found that those presented were helpful for any possible discourse. One reviewer expressed excitement for the standards, noting that they were beneficial for the students, and as a teacher, they added room for flexibility.

Standards Review for Writing K-12

The committee was next charged with reviewing the Writing strand for kindergarten through grade 12. In general, they found that the writing standards were well scaffolded, and they met most of the criteria presented within the review rubric. They noted in a discussion that they are strong standards; however, with regard to the range of writing, there is room for interpretation. They liked the organization of the document, and they felt prepared and comfortable with the review process after having time to review the reading strand.

Standards Review for Speaking and Listening K-12

When reviewing the Speaking and Listening strand for kindergarten through grade 12, the committee members independently noted that the standards met all of the criteria put forth in the review rubric. One of the reviewers liked that the standards incorporated early supports about norms for speaking and listening in group settings. Another reviewer noted that the standards gave students the opportunity to demonstrate mastery of the skills. This same reviewer further noted and agreed with the previous reviewer that the speaking and listening standards' incorporation of early supports helped foster the idea that this is a lifelong skill. This reviewer also believed that the standards held students accountable for their own learning in the fact that they must come to class prepared with prepared questions and have answers in their minds. This was met with agreement by the other committee members who also believed that this set of standards pushed students in a positive direction with respect to their overall education. At the higher level, the members believed that the standards prepared students to have engaging, civil, democratic conversations where they can read between the lines and would be unafraid to express an opinion in a public forum. They believed that these skills were equally beneficial for the lower grades as well.

Standards Review for Language K-12

The Language strand was the final strand in the standards document reviewed by the committee members. Generally, they independently agreed that the Language standards met the requirements of the rubric. One of the reviewers thought it was great that the standards focused on how the students used grammar and vocabulary. Another member commented that the vocabulary section stood out with respects to struggling readers to help students pinpoint ways to extract difficult terms from the text to study. In final open thoughts about the Language strand, one member expressed how important it was that all of the members understood that the English language is a living language that changes and, as a result, would require all of them to learn new words.

Reading K-12

Statements commonly made for reading that recurred across multiple rubric elements included:

- The progressions are clear across the grade levels.
- There is great emphasis on analysis and providing textual evidence.

Note: Not all elements of the rubric were addressed – few comments in some places.

Comments by specific rubric element, with examples:

1. Clear and concise

- The members thought the topics and the standards were clear and concise for reading literature and reading informational text.
 - The fundamental skills provided in the standards develop an essential skill and knowledge base for learners; the standards' emphasis on learners' abilities to discern main topics/ideas and connections/relationships between individuals, events, and ideas is clear and strong.
 - At high school: The concept of "citing" needs more clarity. There are no specifics about learning to cite within widely accepted citing conventions, e.g. APA, MLA.
 - Time development of these skills is critical. The scaffolding allows for a deeper understanding and analysis and allows for skills—real skills to develop.
- One thought was that it partially met the criteria in K-1.
 - When are we teaching them [students] how to quote and what is a reliable/credible source; not sure how we differentiate this for this grade.
 - The standards are clear and concise; however, the underlying assumptions impacting achievement are not present. If the goal is growth and if the goal is on mastery at a distinct level, then success is defined differently.

2. Grade-level appropriate

- Most felt the standards were grade-level appropriate.
 - The integration of multiple modes of accessing literature in this grade band is strong. The incorporation of multimedia expands the learners' understanding of literature in various forms of presentation.
- One voiced concern about reading informational text at the early grades K-1.
 - The excessive emphasis on informational texts at K-1 levels may/could impact the joy of reading the good stories.

3. Higher student performance, learning and improved student achievement

- All reviewers felt the standards promoted higher student performance, learning and improved student achievement.

- Throughout the grade bands, learners move from citing one source of textual evidence to citing multiple pieces of textual evidence, and by grade 8, identifying the evidence that most strongly supports an analysis of what the text says.

4. Supports subject matter comprehension

- All reviewers felt the standards supported subject matter comprehension.

5. Promotes essential knowledge in the subject

- Most believed the standards promoted essential knowledge in the subject.
- One raised a question about special populations.
 - The expectation of some populations are out of reach. If one considers that students with dyslexia aren't identified until grade 3; it is unrealistic that these kids can identify phonemes and meet standards without interventions.

6. Promotes lifelong learning

- All reviewers agreed that the standards promoted lifelong learning.
 - Within Craft and Structure, it is not overtly stated that learners be able to discern researcher/author bias within informational texts. While the standards (6.) identify author's point of view, it is important for lifelong learners to understand the effect that has on informational texts. For example, learners should be able to identify indicators of author bias in informational texts.

7. Promotes the liberal arts tradition

- The reviewers' reports supported the idea that the standards promoted the liberal arts tradition.
 - The study of literature is central to the liberal arts tradition. Accessing literature in multiple forms strengthens learners' understanding and contextualization of literature.

8. Promotes college and career readiness

- The reviewers' reports supported the idea that the standards promoted college and career readiness.
 - A learner's ability to cite sources in a widely accepted convention, e.g. APA, MLA, is an important aspect of college readiness, and is not specifically stated in the standards.

9. Reduce the need for remediation

- The reviewers' reports supported the idea that the standards reduce the need for remediation.

10. Meets the definition of a standard

- The reviewers' reports supported the idea that the standards met the definition of a standard as defined in the supplemental material.

Writing K-12

Statements commonly made for Writing that recurred across multiple rubric elements included:

- The standards are scaffolded well.
- The standards are aligned to what students will need to be career or college ready.

Note: Not all elements of the rubric were addressed – there are few comments in some places.

Comments by specific rubric element, with examples:

1. Clear and concise

- The members thought the topics and the standards were clear and concise for writing.

- Overall having the specifics would be helpful.
- Scaffolding was done well and will create strong writers over time.
- There were a few concerns with the specifics.
 - While the standards are clear and concise, this is likely an area in which professional development for educators in interpreting and implementing the standards is needed.
 - There are skills needed to be successful with technology that not all districts teach or provide.

2. Grade-level appropriate

- Most felt the standards were grade-level appropriate.
 - The standards are developmentally appropriate and well scaffolded.
 - The standards allow for guidance and support from adults at the earlier levels.
 - The standards make it easier to pinpoint how and what to teach.

3. Higher student performance, learning and improved student achievement

- All reviewers felt the standards promoted higher student performance, learning and improved student achievement.
 - At each level, standards require additional complexity and/or more independent work.
 - 11th and 12th bring together all skills previously learned.
- The standard allows for higher student performance but because it is written in a flexible way, continued growth will depend on the teacher monitoring and setting individual goals.

4. Supports subject matter comprehension

- Most reviewers felt the standards supported subject matter comprehension.
- One stated the standards were not explicit on the use of academic language in working with students. It would be helpful to explicitly state what the students should know and describe the difference between opinion writing, informative writing texts and narratives as well as research methods, source types and evidence categories as well as reflection and revision.

5. Promotes essential knowledge in the subject

- All believed the standards promoted essential knowledge in the subject.
- One reviewer was not convinced that the writing standards in English language arts are necessary for all career paths.

6. Promotes lifelong learning

- All reviewers agreed that the standards promoted lifelong learning.

7. Promotes the liberal arts tradition

- The reviewers' reports supported the idea that the standards promoted the liberal arts tradition.
 - The standards strengthen writing, which is critical to the liberal arts tradition.

8. Promotes college and career readiness

- The reviewers' reports supported the idea that the standards promoted college and career readiness.
 - Building habits of independent writing is critical for college and many careers.

9. Reduce the need for remediation

- The reviewers' reports supported the idea that the standards reduce the need for remediation as long as they were implemented correctly and there was close monitoring.

- There was a concern that while the standards promote high student performance and achievement, many students may not be able to catch up to the standards if they were already behind.

10. Meets the definition of a standard

- The reviewers' reports supported the idea that the standards met the definition of a standard as defined in the supplemental material.

Speaking and Listening K-12

Statements commonly made for Language that recurred across multiple rubric elements included:

- Provided scaffolding that enables students build on skills.
- Speaking and Listening skills in the standards are essential for college and career success and life skills

Note: Not all elements of the rubric were addressed – few comments in some places.

Comments by specific rubric element, with examples:

1. Clear and concise

- The members thought the topics and the standards were clear and concise for language.

2. Grade-level appropriate

- Most felt the standards were grade-level appropriate.
 - Elements seemed ambitious, yet attainable.
 - The topics begin to hold students accountable for the future by coming prepared to class. Standards call for students to prepare questions, answers and discussions before class and then they can discuss when it is time to come back together.
 - The standards are effectively sequenced in progressively challenging skill sets to continue student growth and development in essential Speaking and Listening skills. Requiring students to be prepared is a strength of these standards.
- A member commented, “The appropriateness is contingent on starting the standards model from kindergarten. Without the luxury of the scaffolding, the reviewer questions the grade-level appropriateness.

3. Higher student performance, learning and improved student achievement

- All reviewers felt the standards promoted higher student performance, learning and improved student achievement.
 - The standards scaffolded skills each year.
 - The preparation behind comprehension and collaboration dovetailed nicely with the presentation standards.
 - Loved that the students are being asked to SUPPORT evidence at a young age.
 - These standards are very strong. For example, Grade 9-10, Standard 3 focuses on developing student abilities to evaluate a speaker's point-of-view, reasoning, use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence. This skill set moves beyond ELA skills to support other learning and development for students, specifically in the social sciences and in developing an engaged citizenry.

4. Supports subject matter comprehension

- All reviewers felt the standards supported subject matter comprehension.

- The ability to have a meaningful conversation about texts both reinforces and requires subject matter comprehension.
- By the time students reach fifth grade, they must be able to organize ideas and support them.
- Students collaborate early on in education with question and answer opportunities to “show what you know.”
- Students are given a wide range of opportunities for collaboration and discussion topics.

5. Promotes essential knowledge in the subject

- Most believed the standards promoted essential knowledge in the subject.
 - Yes, the ability to organize and convey information orally is critical for communication and reinforces writing/reading skills.
- Some of this may be beyond what some students need depending on the path.

6. Promotes lifelong learning

- All reviewers agreed that the standards promoted lifelong learning.
 - Yes, although not as directly as comprehension/collaboration. In order to present/organize ideas, students must be able to process/synthesize (critical for lifelong learning).
 - Prepares students life beyond college and career – everyday relationships.
- The 6-8 grade bands are really being pushed by these standards...I say “pushed” in the most positive way possible. I think that the Speaking and Listening component is one of the most important sets of standards because every student needs to do this in order to be successful. Asking them to adapt their speech to specific contexts/tasks is not easy, but will make my job as a high school teacher much easier.
- 9-12 students are on the cusp of adulthood and having to know what someone is saying and how to respond. These standards do a great job preparing them for real-world applications of speaking and listening. As I tell my students almost daily, no matter your profession, you WILL have to speak and listen to others. If you don’t, you won’t be successful.

7. Promotes the liberal arts tradition

- All reviewers agreed that the standards promoted the liberal arts tradition.
 - There is room for flexibility, and the student is able to choose topics that may be more of an interest.

8. Promotes college and career readiness

- The reviewers’ reports supported the idea that the standards promoted college and career readiness.
 - The ability to effectively present information orally is important in college and critical in careers, as is the ability to analyze context and determine appropriate ways of communicating.
 - Yes! The discussion skills students are building will serve them well in college classrooms and careers.

9. Reduce the need for remediation

- The reviewers’ reports supported the idea that the standards reduce the need for remediation as long as they are implemented.
 - Early prep is key for this topic, and the standards scaffold nicely from year to year.
 - While Speaking and Listening skills are not assessed in determining a student’s need for remediation in college, the ability to effectively access information from multiple sources, including discussions with peers is essential to postsecondary success. Thinking beyond the need for academic remediation, one of the critical factors in postsecondary student success is the ability to

access and share information aurally and verbally. These skills are essential to develop critical thinking abilities and skills.

10. Meets the definition of a standard

- The reviewers' reports supported the idea that the standards met the definition of a standard as defined in the supplemental material.

Language K-12

Statements commonly made for Language that recurred across multiple rubric elements included:

- Provided scaffolding that enables students to build on skills.
- Created strong foundations for growth is evident.

Note: Not all elements of the rubric were addressed – few comments in some places.

Comments by specific rubric element, with examples:

1. Clear and concise

- The members thought the topics and the standards were clear and concise for language.
 - The examples were helpful.
 - There is good scaffolding.
- One member thought it was slightly unclear in K-5.
 - Students need to know WHAT a verb, noun, etc. is in K-2, but they do not know what it is called until grade 3?

2. Grade-level appropriate

- Most felt the standards were grade-level appropriate.
 - Good scaffolding is provided at each level to assist students in moving forward.
 - Extended time frames help standards be interpreted as appropriate for students.
 - The standards aligned appropriately for each grade to spiral to the next grade.

3. Higher student performance, learning and improved student achievement

- All reviewers felt the standards promoted higher student performance, learning and improved student achievement.
 - The standards highlight the importance of looking back at the text to know the meaning of words.
- One reviewer mentioned because the standards are written flexibly, continued growth will depend upon teacher monitoring.

4. Supports subject matter comprehension

- All reviewers felt the standards supported subject matter comprehension.

5. Promotes essential knowledge in the subject

- Most believed the standards promoted essential knowledge in the subject.
 - All build strong foundations
 - Vocabulary is one of the foundations of literature.

6. Promotes lifelong learning

- All reviewers agreed that the standards promoted lifelong learning.

- Very strong, specifically grades 11-12 standard 1.a.
- In order to be a successful writer/reader, the parts of speech must be learned at an early age. This is also important in the speaking aspect even though we may not adhere to strict rules of language, we still need to communicate.
- One reviewer thought some of the more sophisticated grammatical issues may not be essential.

7. Promotes the liberal arts tradition

- All reviewers agreed that the standards promoted the liberal arts tradition.

8. Promotes college and career readiness

- The reviewers' reports supported the idea that the standards promoted college and career readiness.
 - The idea of consulting reference materials is important to the standards. Students live in a digital age, but it is imperative that for student to access dictionaries, reference materials, etc., for assistance and a way to check for understanding.

9. Reduce the need for remediation

- The reviewers' reports supported the idea that the standards reduce the need for remediation as long as they are implemented.

10. Meets the definition of a standard

- The reviewers' reports supported the idea that the standards met the definition of a standard as defined in the supplemental material.

English Language Arts Assessment Review

Summary of Common Themes

Overview

The Standards and Assessment Committee for English Language Arts is comprised of four members: a high school English instructor, a director for a virtual academy, a parent representative and a representative from the Ohio Department of Higher Education.

In the summer of 2015, the Standards and Assessment Committee was charged with reviewing testing items from the spring 2015 administration of the Partnership for Assessment of Readiness for College and Career (PARCC) test. The committee reviewed grades 4-10 assessment items and recorded their findings on a rubric that questioned if the items in the reporting category were appropriate for the subject and content standards, as well as if the items met community expectations. The items presented in the assessment rubric were derived from two separate assessments: the performance-based assessment and the end-of-year assessment.

The performance-based assessment, administered in early spring, assessed information presented after 75 percent of the school year and focused on reading comprehension and writing when analyzing a text. Within the performance-based assessment, committee members reviewed items associated with: the Literary Analysis Task, the Narrative Task, and the Research Simulation Task. With the Literary Analysis Task, students were required to read and answer questions centered around two literary passages that share a connection. The Narrative Task required students to read a passage, answer comprehension questions, and compose a piece of writing that is tied to and draws on the passage. Finally, the Research Simulation Task required students to answer a series of questions and synthesize information from multiple sources in order to compose an analytic essay. Within each of these tasks, the items were categorized and grouped by associated standards. One of the first categories, Reading Literature and Reading Information, assessed how well students could demonstrate comprehension and draw evidence from grade-level, complex literary and informational texts. The Reading Vocabulary category assessed whether students were able to use context to determine meaning of words and phrases. The Written Expression category presented items that assessed how well students could produce clear and coherent writing in which the development, organization and style was appropriate to the task, purpose and audience. The final category, Knowledge of Language and Conventions assessed how well students could demonstrate effective application of conventions and other essential elements of language. The final portion of the review presented items from the end-of-year assessment. The end-of-year assessment was administered after 90 percent of the school year was completed and presented items that assessed how well students could demonstrate comprehension and draw evidence from grade-level, complex literary and informational texts. The end-of-year assessment also assessed whether students were able to use context to determine meaning of words and phrases.

General Comments

Overall, the committee's reviews reflected that the items met the alignment criteria, as well as community expectations, but they made mention of a few items that should be considered for future item development. Most of the concerns from the committee members came from the writing prompts contained in the performance-based assessments for the earlier grades. Several members commented that in the earlier grades (grades 4-5), the prompts were too sophisticated and required too much of the student. As the grade levels progressed, one member noted that the same standard was being assessed within the writing prompt and offered little variety. Other general comments about the assessment focused on the lack of consideration for diverse learners.

Assessments Review

1. The items in each of the reporting categories align to the standards.

- Overall, the committee's review reflected alignment to the standards across all grade levels.

2. The items in each of the reporting categories are grade-level appropriate.

- Across the board, the members noted that the items were grade-level appropriate; however, there were a few areas noted in their rubrics that were only partially aligned.
- The majority of the committee felt that the early grade assessments were appropriate for the subject and content standards for both the performance-based assessments, as well as for the end-of year assessments; however, the essays were difficult.
- A note of concern from one of the members was that the number of sources required to compose an essay was too much and would not be supported by the time allowed.
- One reviewer commented that while the items aligned, the task required too much for a grade 5 student. They have to analyze multiple informational texts by answering a series of questions and synthesizing information from multiple sources in order to write an analytic essay.
- Two committee members noted that across all grade levels, the two-part items did not do a good job assessing the standards and expressed concerns regarding the scoring of two-part items. They noted that the choices were not strong enough to support Part A.
- The committee felt that the middle grades and high school (grades 6-10) assessments were appropriate for the subject and content standards.

3. The items in each of the reporting categories meet community expectation (fairness and sensitivity guidelines).

- A high number of items on the grade four end-of-year assessment were deemed appropriate and met community expectations.
- One reviewer commented that the items should be conscious of the types of students who take the test (e.g., rural students may not have a clear understanding of some of the information presented in the passages.).

4. Comments about the technology and functionality of the tests

- Several members on the committee expressed that the scrolling tool was inefficient and made navigating the information on the assessment more difficult than it should have been.
- Multiple committee members expressed that the video on the grade six assessment was not needed to understand the items, so it should have been removed.

Section II: Science Review

Science Standards Review

Overview

The Academic Standards and Assessment Review Committee for Science was comprised initially of six people. These included a university faculty member specializing in science education; a representative of the Ohio Department of Higher Education, formerly known as the Ohio Board of Regents; a high school biology teacher; a senior analytical chemist and former college chemistry department chair; an educational consultant specializing in STEM education; and a parent.

Ohio's Learning Standards and Model Curriculum for Science are a Web-based resource that provides information and support on “how” to plan, develop, implement and evaluate instruction directly aligned to standards. It includes *Content Elaborations* and *Expectations for Learning* that incorporate additional information on teaching strategies through the examples for the classroom; *Visions into Practice* and *Instructional Strategies*.

In their review of *Ohio's Learning Standards for Science K-12*, the committee was asked to examine the content statement, the description, the *Content Elaboration* and the *Expectations for Learning* (the cognitive demands). The content statement, description and elaboration define what is being taught, and the *Expectations for Learning* illustrate the process of science and how the content could be taught. The standards and model curriculum are strongly linked and were considered together during the process. All elements of the standards were reviewed using a rubric with 10 criteria (see Appendix C). There was some initial discussion regarding the target audience for the standards document. Although intended for educators, the committee expressed that it was important for parents to understand the standards as well.

In the rubric, standards were defined as a level of attainment, regarded as a goal or measure of adequacy of the essential academic content and skills that students are expected to know and be able to do at each grade level. Reviewers' comments varied on whether or not *Ohio's Learning Standards for Science* met the definition of a standard. Some reviewers stated this element did meet the definition of a standard while others stated that it did not. The content topics were deemed appropriate, with recommendations provided to clarify or enhance specific content. Some of the content of the *Visions into Practice* were identified as high-quality examples of learning opportunities for students. Other content identified in *Ohio's Learning Standards for Science* was unclear, misrepresented or misplaced. While all portions of the rubric were addressed, some reviewers did not review the standards for all courses, and in some cases, reviewers chose not to comment because they felt the particular criterion was not a good fit for the grade level.

Summary of Common Themes for Kindergarten through Grade 8

The committee began by examining *Ohio's Learning Standards for Science* for kindergarten through grade 8. This part of the review focused on the three elements for these grade levels: Earth and space science, life science, and physical science. Each element contains a series of content statements. The committee generally found that the elements for kindergarten through grade 8 either met or partially met the rubric criteria. Committee members were consistent with their comments, and there were some statements frequently made that recurred across multiple rubric criteria and grade levels. These comments generally included recommendations for clarifying or enhancing specific content, specific examples of how the standards provided learning opportunities for students, and (for grades 5-8) specific examples of how the grade-level content helped to prepare students for college and careers. For grades 6-8, one reviewer expressed concerns about the difference between historical versus observational science, especially as related to the Earth science and life science content at these grade levels. Other reviewers did not share this concern. There was some disagreement regarding the level and complexity of the *Visions into Practice* activities. Some committee members stated that the activities were too complex for the grade level, while others expressed that the activities encouraged students to engage with content and would support student achievement.

Rubric criteria: Are the elements clear, concise and grade-level appropriate?

The committee generally stated that the elements for grades kindergarten through 8 met the rubric criteria to be clear, concise and grade-level appropriate. The committee found most elements to be clear and concise, but some reviewers stated that some elements were not: *“This element is a statement that I believe is not very clear and concise. My reasoning is that it does not truly elaborate on what should be taught.”* Some committee members made recommendations to clarify or enhance specific content, and these are included in the appendix. The committee found most elements to be grade-level appropriate, but some reviewers expressed concerns about the *Visions into Practice* activities and that teachers without a strong science background might find the activities difficult to interpret. One reviewer stated, *“Again, the statements are grade-level appropriate, but my concern is the Visions into Practice activities not being grade-level appropriate,”* while another stated that taking learning to a deeper level was a goal of standards: *“Yes, The ESS 7th grade standard is more complex than in earlier grades and builds on grades K- 6 standards related to weather and atmosphere. This standard takes ESS learning to a deeper level, a goal of standards.”* One reviewer expressed that taken individually the elements were grade-level appropriate, but taken together may not be, given the amount of [middle school] content and time limitations.

Rubric criteria: Do the elements promote higher student performance, learning, improved student achievement and support subject matter comprehension?

The committee generally stated that the elements for grades kindergarten through 8 met the rubric criteria to promote higher student performance, learning, improved student achievement and support subject matter comprehension. Many responses continued upon themes stated in the previous section and are included in the appendix. One reviewer noted that improving student achievement is dependent on the instructor.

Some reviewers expressed that it was difficult to know if the elements for K-8 would promote student achievement: *“The element introduces kindergarteners to the weather and sun, moon and stars. Not sure how anyone can know if this will promote higher student performance and improved student achievement. If teachers find time in their day to include, science, I think student achievement in science will improve.”*

One reviewer stated that the inclusion of scientific inquiry supports comprehension for both science and mathematics: *“Yes, scientific inquiry and investigation, collection of data and analysis of data strongly support subject matter comprehension. (Use appropriate mathematics with data to construct reasonable explanations.)”* Several reviewers noted that they were reviewing the standards prior to seeing the assessments and that seeing the assessments alongside the standards would have made it easier to evaluate these criteria.

Rubric criteria: Do the elements promote essential knowledge in the subject and promote lifelong learning?

The committee generally made fewer comments to address these rubric criteria. Many responses continued upon themes already stated in previous sections and are included in the appendix. Several examples of how the standards promote essential knowledge were included. One reviewer noted that promoting essential knowledge is the responsibility of the teacher: *“The standards do not necessarily incorporate the essential knowledge but statements. The essential knowledge, I believe, is the responsibility of the individual teacher.”* Several reviewers stated that they were not sure how to tell if the standards promote lifelong learning, and there were many responses of “N/A” for this criterion. Two reviewers noted that promoting lifelong learning depends on student interests: *“It promotes it, yes, but does not include the fact that all students have different tastes and they should be able to decline lifelong learning in any area that they are not interested in.”*

Rubric criteria: Do the elements promote the liberal arts tradition, promote college and career readiness and reduce the need for remediation?

The committee generally made fewer comments to address these rubric criteria. Many responses continued upon themes already stated in previous sections and are included in the appendix. Some reviewers stated that

it was difficult to evaluate these criteria because the science content for each grade level is only a portion of a 13-year process and that any learning could contribute to promoting the liberal arts tradition. Most responses for promoting college and career readiness and reducing the need for remediation were “N/A” or “undetermined,” also stating that it was too early to tell for grades K-2.

Rubric criterion: Do the elements meet the definition of a standard?

Reviewer’s comments varied on whether or not *Ohio’s Learning Standards for Science* met the definition of a standard. Some reviewers stated that the elements for K-8 met the definition of a standard while others indicated it did not.

Comments by specific rubric criteria with examples. The comments shown reflect the views of individual committee members and may not reflect a group consensus.

K-2 Grade Band

1. Clear and concise

- “As I read the statements no one can disagree that they are not good statements. My concern is the expectations that the vision into classroom: classroom examples are at times too advanced for this grade level. Ex. Explain, draw, journal and photograph what happens to local living and non-living environments over the course of the year. 1st grade?”

2. Grade-level appropriate

- “Again, the statements are grade-level appropriate but my concern is the visions into practice activities not being grade-level appropriate.”

3. Higher student performance, learning and improved student achievement

- “The visions into practice examples include a variety of strategies that encourage students to engage with the content. Research shows that high levels of classroom engagement lead to improved student achievement.”
- “The element introduces kindergarteners to the weather and sun, moon, and stars. Not sure how anyone can know if this will promote higher student performance and improved student achievement. If teachers find time in their day to include science, I think student achievement in science will improve.”

4. Supports subject matter comprehension

- “Support of subject matter comprehension depends upon instructor.”

5. Promotes essential knowledge in the subject

- “The standards do not necessarily incorporate the essential knowledge but statements. The essential knowledge, I believe, is the responsibility of the individual teacher.”
- “Learning about the atmosphere and water in the atmosphere, e.g., clouds, promotes essential ESS [essential] knowledge.”

6. Promotes lifelong learning

- “This element provides students with baseline learning from which to build.”
- “It promotes it, yes, but does not include the fact that all students have different tastes and they should be able to decline lifelong learning in any area that they are not interested in.”

7. Promotes the liberal arts tradition

- Connections between science and other content areas
- “Science is 1 component of liberal arts education.”

8. Promotes college and career readiness

- “All science learning promotes college and career readiness.”
- “My opinion is that it’s too early to tell. However, any learning will help prepare students for college (academic learning).”

9. Reduce the need for remediation

- “Remediation is both a collective classroom possibility or an individual possibility so to me to evaluate these statements as to help reduce the need for remediation? No (NA)”

10. Meets the definition of a standard

- “Yes, basic science knowledge all students should know and be able to do.” “To me these are statements and not standards.”

3-5 Grade Band

1. Clear and concise

- “If the teacher is not going to use the word mass in teaching this element, then mass should not be included as part of the element. The words amount of matter can be substituted for mass in the statement. The amount of change in movement of an object is based on the amount of matter in the object and the amount of force exerted.”

2. Grade-level appropriate

- “Yes, fifth grade students are studying life science through the lens of ecosystems—how organisms are a part of food webs for survival. The food webs demonstrate interdependency for food for survival for all organisms. This is grade-level appropriate.”
- “This reviewer feels that matter and energy are abstract concepts that would be grade-level appropriate for grade 4—not grade 3. Moving all PS [physical science] content up one grade level would be helpful for student maturity levels and for comprehension of the material.”

3. Higher student performance, learning and improved student achievement

- “This review criteria seems to be misplaced in my mind. All content, to me, will promote this in some manner but not realized until later in the educational process. Also, without seeing the evaluation tool this statement cannot be completed.”

4. Supports subject matter comprehension

- “Yes, scientific inquiry and investigation, collection of data and analysis of data strongly support subject matter comprehension. (Use appropriate mathematics with data to construct reasonable explanations.)”
- “The definition in the list include “skills and knowledge that are deemed to be essential in leading to success in school, higher education, careers and adult life.” By this definition only partial.”

5. Promotes essential knowledge in the subject

- “The broad definition of essential knowledge stated could be answered as yes for any educational theme. The essential knowledge, to me, is not really spelled out in the standards.”
- “Yes, through inquiry and investigation the hands-on learning projects in the Model Curriculum promote essential knowledge of light and sound properties.”

6. Promotes lifelong learning

- “Most all content in science, in my mind can promote lifelong learning. Much depends upon the students interests.”
- “Yes, this introduction to astronomy promotes lifelong learning about the Earth and our solar system.”

7. Promotes the liberal arts tradition

- “Yes, scientific discoveries of the Earth’s living history impacts many other content areas including history, geology and archeology.”

8. Promotes college and career readiness

- “The career connections with green jobs, energy, transportation and building industry are where job growth is occurring in the 21st century. This is valuable information for college and career readiness.”
- “The process of 12-13 yrs of education collectively should promote college and career readiness so any single part of that process would be partial in this promotion.”

9. Reduce the need for remediation

- Nearly all responses were “N/A,” “undetermined,” or “cannot say” for this grade band.

10. Meets the definition of a standard

- “Yes, all students should know and understand the history of living organisms and how they have evolved over time due to changes in the environment and other factors.”
- “Again, the definition of a standard as given states the attainment regarded as a goal or measure of adequacy and skills expected to know so the element by state definition is not a standard.”

6-8 Grade Band

1. Clear and concise

- “This element is a statement that I believe is not very clear and concise. My reasoning is that it does not truly elaborate on what should be taught. Composition? Properties?”

2. Grade-level appropriate

- “Yes, The ESS 7th grade standard is more complex than in earlier grades and builds on Grades K- 6 standards related to weather and atmosphere. This standard takes ESS learning to a deeper level, a goal of standards.”
- “As stated previously I believe that there is too much content for this grade. These individual elements are grade appropriate but taking all science elements I believe is not grade-level appropriate.”

3. Higher student performance, learning and improved student achievement

- “Yes, the element promotes students to recall and describe scientific facts, to apply their knowledge and create solutions to practical problems and to use reasoning skills to analyze and apply their knowledge in new situations.”
- “...Standard approach also fails to address the many examples of polystrate fossils that transverse numerous layers that were supposedly formed over millions of years. Again, this is historical science that is filled with assumptions and speculations. Time would be better spent focusing on operational science.”

4. Supports subject matter comprehension

- “Yes, the Life Science element supports subject matter comprehension through the opportunity for connections to be made to interesting and pressing 21st century world issues. This requires students to research, collect and use data, and draw and defend their conclusions based on the analysis of their scientific data and learning.”
- “Again there are more applications of cells than environmental. I don’t see how all cells coming from preexisting cells best relates to the cleaning of the environment. Why not begin to discuss tissue cloning using how cells come from pre-existing to help burn patients.”

5. Promotes essential knowledge in the subject

- “Partially; on p.167 the use of geologic history is quite speculative and is not observable science. Other areas of current applications that form the basis of modern society are more important as noted above.”
- “Yes, these standards challenge students to add new knowledge concerning matter and the flow of energy to existing knowledge they have gleaned in earlier grades about matter and energy.”

6. Promotes lifelong learning

- “Yes, the model curriculum proposes the idea of inviting content experts into the classroom in person or virtually for students to learn about related Earth Science careers, e.g., geologist, Ag scientist/specialist, environmentalist etc. Connecting content with careers and demonstrating to students how professionals apply this learning in their daily jobs promotes lifelong learning and may influence students to pursue science-related careers.”

7. Promotes the liberal arts tradition

- “Yes, when science is integrated with other content areas, it promotes the liberal arts traditions.”

8. Promotes college and career readiness

- “Yes, the element promotes comparing, designing, analyzing and predicting based on learning gleaned through inquiry. This provides a strong foundation for future learning at the college level.”

9. Reduce the need for remediation

- Most responses were “N/A,” “undetermined,” or “cannot say” for this grade band.

10. Meets the definition of a standard

- “Yes, all seventh-grade students need to understand cycles of matter and flow of energy transfer within the biotic component of ecosystems.”
- “These elements are not constructed as standards but as statements.”

High School

Physical Science

For the purpose of this review, standards were defined as a level of attainment regarded as a goal or measure of adequacy of the essential academic content and skills that students are expected to know and be able to do at each grade level. The content topics were deemed appropriate with recommendations provided to clarify or enhance specific content. “*The content is much more narrow and specific.*” It was stated that the content supported essential knowledge and served as a gateway for STEM and medical career options. Most indicated the content was grade-level appropriate, but some subject matter could easily slip into college level. Reviewers’ comments varied on whether or not *Ohio’s Learning Standards for Science* met the definition of a standard. Some reviewers felt this element did meet the definition of a standard while others felt that it did not. It was indicated that the standards were a “*step up from the previous standards.*” The narrative of the standards felt like a summary text book that lacks objectives, vocabulary lists and level of attainment of content and skills of science.

Important content can inadvertently be omitted due to use of a narrative format which is not user friendly to plan an entire course. The committee wanted more *Visions into Practice* to illustrate high-quality examples of learning opportunities for students along with more career connections. Reviewers noted that some content identified in *Ohio’s Learning Standards for Science* was unclear, misrepresented or misplaced. Reviewers did not address all portions of the rubric.

Biology

For the purpose of this review, standards were defined as a level of attainment regarded as a goal or measure of adequacy of the essential academic content and skills that students are expected to know and be able to do at each grade level. The standards were defined as clear but not concise. Evolution is the strong backbone of the course and position papers from the National Science Teachers Association were deemed good additions to the standards. It was stated that the content was grade-level appropriate and would support knowledge required for many careers, especially in health care. Reviewers’ comments varied on whether or not *Ohio’s Learning Standards for Science* met the definition of a standard. Some reviewers felt this element did meet the definition of a standard while others felt that it did not. It serves as a guide, not a directive, because it lacks the levels of attainment for content and skills. The content topics were deemed appropriate with recommendations provided to clarify or enhance specific content. More *Visions into Practice* need to be provided to illustrate high-quality examples of learning opportunities for students. More career connections also need to be developed. Some reviewers noted that other content identified in *Ohio’s Learning Standards for Science* was unclear, misrepresented or misplaced. One reviewer stated that the standards lacked in-depth study of the six biological kingdoms and lab skills such as dissection. Another indicated the basic science is very good except for the historical science references. Reviewers did not address all portions of the rubric.

Chemistry

For the purpose of this review, standards were defined as a level of attainment regarded as a goal or measure of adequacy of the essential academic content and skills that students are expected to know and be able to do

at each grade level. The content topics were deemed appropriate with recommendations provided to clarify or enhance specific content. It was communicated that the content was much more robust than the 2002 standards. The learning sequence building on past courses and knowledge is very clear and well explained. The narrative format of the standards serves as a guide for building a high school chemistry course but lacks clear learning objectives. More real-world examples need to be provided. Science is an important topic for college and career readiness. Chemistry is a key subject for study in medicine and engineering.

Physics

For the purpose of this review, standards were defined as a level of attainment regarded as a goal or measure of adequacy of the essential academic content and skills that students are expected to know and be able to do at each grade level. The content topics were deemed appropriate with recommendations provided to clarify or enhance specific content. Reviewers' comments varied on whether or not *Ohio's Learning Standards for Science* met the definition of a standard. Some reviewers felt this element did meet the definition of a standard while others felt that it did not. The standards are presented as a description of content or topics that would help guide a physics teacher in preparing a course syllabus. A reviewer noted that levels of attainment are not mentioned. The narrative form is different from the bulleted list format of the K-8 standard statements. More *Visions into Practice* need to be provided to illustrate high-quality examples of learning opportunities for students. Physics is a key course in preparation for engineering and higher-level STEM study. Some reviewers indicated that other content identified in *Ohio's Learning Standards for Science* was unclear, misrepresented or misplaced. Reviewers did not address all portions of the rubric.

Environmental Science

For the purpose of this review, standards were defined as a level of attainment regarded as a goal or measure of adequacy of the essential academic content and skills that students are expected to know and be able to do at each grade level. The content topics were deemed appropriate with recommendations provided to clarify or enhance specific content. Reviewers indicated that the topics needed content objectives and a vocabulary list. Reviewers also indicated that real-world applications were well illustrated in this course. The *Visions into Practice* section was considered "quite good overall." A good variety of challenging exercises are suggested. More examples of integrated activities with economic connections could be provided, such as oil spills and climate change. The subtopics included in *Global Environmental Problems and Issues* also are topics included in liberal arts courses such as sociology, philosophy, psychology, social studies and environmental science. Some reviewers indicated that other content identified in *Ohio's Learning Standards for Science* was unclear or misrepresented. One reviewer felt interpretations of climatic records, which go beyond recorded human history, are especially fraught with large uncertainties and speculations. Reviewers thought some good resources were found in the *Instructional Strategies and Resources* section, like Byrd Polar Research and *Project Wet*. Reviewers did not address all portions of the rubric.

Physical Geology

For the purpose of this review, standards were defined as a level of attainment regarded as a goal or measure of adequacy of the essential academic content and skills that students are expected to know and be able to do at each grade level. Reviewers had questions about the prerequisites for this course. Reviewers stated the content topics were deemed appropriate (with recommendations provided to clarify or enhance specific content) for grades 11-12 courses, so students would have completed content addressed in physical science and biology. It was felt that the subject matter promoted career connections especially in relation to energy use. This was an opportunity to create projects to include human and economic implications.

Reviewers indicated a focus could be on how to protect property and people in natural disasters. Reviewers felt the standards for the course were well written. Some reviewers indicated that other content identified in *Ohio's Learning Standards for Science* was unclear, misrepresented or misplaced. When looking at the properties of minerals, one reviewer stated that flame tests are no longer used and are outdated, and there are newer techniques that are better. Reviewers did not address all portions of the rubric.

Physical Science Comments by Specific Rubric Criteria with Examples

The comments shown reflect the views of individual committee members and may not reflect a group consensus.

1. Clear and concise

- The formatting of the high school standards was not considered “user friendly.”
 - “This is a textbook not a set of standards.”
 - “Great Cliff Notes content summary but lacks the clarity of a content objective list.”
 - “All topics need content objectives and content vocabulary lists.”
 - “Important content can be inadvertently omitted due to use of a narrative format which is not user friendly to plan an entire course.”

2. Grade-level appropriate

- Most felt the content was grade-level appropriate, but some subject matter could easily slip into college level. (No additional comments provided.)

3. Higher student performance, learning and improved student achievement

- “Subject matter is becoming much more narrow and specific.”

4. Support subject matter comprehension

- “The element supports subject matter comprehension. However, the Instructional Strategies and Resources examples are not numerous or highly specific. More examples would be helpful.”

5. Promote essential knowledge in the subject

- “The Content Elaboration of the subject matter promotes essential knowledge.”

6. Promote lifelong learning

- “For those interested pursuing knowledge and current knowledge in physical science.”

7. Promote the liberal arts tradition

- “Science is an important part of the liberal arts tradition.”

8. Promote college and career readiness

- “Science is an important topic for college and career readiness. The physical sciences are important gateway courses for study in the engineering and health care.”
- “This is a high level science for high school students that promotes college and career readiness.”

9. Reduce the need for remediation

- “This is a high level science for high school students. It should greatly reduce the need for college remediation.”

10. Meet the definition of a standard

- “No, this element does not meet the definition of a standard. This element is presented in narrative form as a summary of main topics or ideas that a teacher should introduce during the course. Levels or attainment are not indicated. Only topics are indicated.”

Biology Comments by Specific Rubric Criteria with Examples

The comments shown reflect the views of individual committee members and may not reflect a group consensus.

1. Clear and concise

- “Basic concepts are generally very good except as noted in specific examples with ventures into speculative historical science and potential problems with the improper use of molecular data.”

- “Basic science is very good except for the excursion into historical science. In this case (cells) it significantly detracts from the material presented. The primary purpose appears to be to push the issue of origins which is religious/philosophical in nature.”
- “Good projects for *Visions into Practice*”
- “Specific elements of this content were not concise and needed clarity.”

2. Grade-level appropriate

- Most indicated the content was grade-level appropriate.

3. Higher student performance, learning and improved student achievement

- “This topic (heredity) provides students with the background knowledge and understanding of heredity to prepare for an AP/college-level biology course.”
- “Higher and improved compared to which standard? Not sure how to respond to this question. The content of the standard seems mostly appropriate for high school.”

4. Support subject matter comprehension

- The element supports subject matter comprehension.
- ” Yes. This reviewer believes that the theory of evolution serves as the backbone of biology and that it is critically important students study the theory of evolution in order to understand the study of biology.”

5. Promote essential knowledge in the subject

- The subject matter may promote essential knowledge.
- “Yes. Heredity focuses on the explanation of genetic patterns of inheritance, which builds on MS [middle school] fundamental learning of inheritance.”

6. Promote lifelong learning

- The subject matter may promote lifelong learning.
- “Yes. Learning about heredity promotes lifelong learning that can help one learn more about him/herself and about inherited traits of animals and plants.”
- Responses were varied: yes, partially and no response.

7. Promote the liberal arts tradition

- The subject matter may promote the liberal arts tradition.
- “Science is an important element in the liberal arts tradition.”
- Responses were varied: yes, partially and no response.

8. Promote college and career readiness

- It is critically important that high school students are provided guidance and information related to college majors and careers to help them prepare for their adult lives. This reviewer recommends that Career Connections be developed for each HS science topic area to show students that what they are learning in science is directly related with what people need to know and be able to do at advanced levels in careers related with that science topic.
- Science is an important topic for college and career readiness. Life science is an important course for students in Ohio as preparation for careers in health care fields and engineering.

9. Reduce the need for remediation

- I personally believe that these standards, however good as they may be, are not inclusive enough for students to be prepared for college-level Biology. Where is an in-depth study of the 6 Biological kingdoms? How about lab skills such as dissection and lab practical? Ask any current college Biology student if they need to understand how to prepare for not only dissection but the all-important lab practical. College Biology still includes many lab practicals. Also, college biology includes much material on the 6 Biological kingdoms and if a student is not prepared they will need remediation.

10. Meet the definition of a standard

- No, this element does not meet the definition of a standard. This element is presented in narrative form as a summary of main topics or ideas that a teacher should introduce during the course. Levels of attainment are not indicated. Only topic are indicated.

Chemistry Comments by Specific Rubric Criteria with Examples

The comments shown reflect the views of individual committee members and may not reflect a group consensus.

1. Clear and concise

- “The element is not concise”
- “Overall a good summary of the most important concepts of general chemistry.”
- “Each section suffers from a lack of clearly defined learning objectives.”
- “Too much material at too high a level for a non-AP high school chemistry course.”
- “Looks like a college prep course.”

2. Grade-level appropriate

- Most communicated the content was grade-level appropriate or made no comment. (No additional comments provided)

3. Higher student performance, learning and improved student achievement

- “The learning sequence building on past courses and knowledge is very clear and well explained.”
- “Student achievement involves much more than a listing of topics. The element provides a guide for content to include in a high school chemistry course.”

4. Support subject matter comprehension

- The element supports subject matter comprehension.
- “The *Visions in Practice* does not include many examples for hands-on, minds-on learning.”

5. Promote essential knowledge in the subject

- The subject matter may promote essential knowledge.
- “Element provides challenging learning of chemistry.”

6. Promote lifelong learning

- The subject matter may promote lifelong learning.
- “Impossible to tell.”

7. Promote the liberal arts tradition

- The subject matter may promote the liberal arts tradition.
- Science is an important element in the liberal arts tradition.
- An individual who understands and is interested in the concepts of chemistry is more likely to continue learning in that discipline throughout life.

8. Promote college and career readiness

- “It is critically important that high school students are provided guidance and information related to college majors and careers to help them prepare for their adult lives.”
- Science is an important topic for college and career readiness. Chemistry is a key subject for study in medicine and engineering. See text for comments about specific parts of the element.”
- “Yes, excellent career connections statement.”

9. Reduce the need for remediation

- Most indicated this element would reduce the need for remediation.
- “Yes, this is highly valuable content to prepare for college and greatly reduce the need for remediation.”

10. Meet the definition of a standard

- “No, the element does not meet the definition of a standard. The element is a description of content or topics that would help guide a chemistry teacher in preparing a course syllabus. Levels of attainments are not mentioned. The narrative form of the element is different from the bulleted list format of the K-8 standards statement.”
- Some indicated the element met the definition of a standard. (No additional comments provided.)

Physics Comments by Specific Rubric Criteria with Examples

The comments shown reflect the views of individual committee members and may not reflect a group consensus.

1. Clear and concise

- Reviewers found the element clear and concise.
- Reviewers stated the element is not concise.

2. grade-level appropriate

- Most felt the content was grade-level appropriate or made no comment. (No additional comments provided.)

3. Higher student performance, learning, and improved student achievement

- “Difficult to say. A reference achievement level is needed and even then, the ability of a standard to promote performance is questionable. Certainly a standard can provide a reference for what a student should know and be able to do after completing a course of study.”

4. Support subject matter comprehension

- “*Visions in Practice* provide experiments that are clearly related to the Content Elaboration and Course Description.”
- “*Visions in Practice* does not include many examples for hands on, minds on learning.”

5. Promote essential knowledge in the subject

- The subject matter may promote essential knowledge.

6. Promote lifelong learning

- The subject matter may promote lifelong learning.
- “Difficult to say.”

7. Promote the liberal arts tradition

- The subject matter may promote the liberal arts tradition.
- “Science is an important element in the liberal arts tradition.”

8. Promote college and career readiness

- “Yes. It is critically important that high school students are provided guidance and information related to college majors and careers to help them prepare for their adult lives. This reviewer recommends that Career Connections be developed for each HS science topic area to show students that what they are learning in science is directly related with what people need to know and be able to do at advanced levels in careers related with that science topic.”
- “Physics is a key course in preparation for engineering and higher level STEM study.”

9. Reduce the need for remediation

- “This challenging course reduces the need for remediation for physics-related science college courses.”
- Others had no comment or stated that it was difficult to predict.

10. Meet the definition of a standard

- Some reviewers indicated the element met the definition of a standard.
- “No, the element does not meet the definition of a standard. The element is a description of content or topics that would help guide a physics teacher in preparing a course syllabus. Levels of attainments are

not mentioned. The narrative form of the element is different from the bulleted list format of the K-8 standard statements.”

Environmental Science Comments by Specific Rubric Criteria with Examples

The comments shown reflect the views of individual committee members and may not reflect a group consensus.

1. Clear and concise

- Reviewers found the element clear and concise.
- Reviewers stated the element is not concise.
- “Topic needs content objectives and a content vocabulary list.”

2. Grade-level appropriate

- Most felt the content was grade-level appropriate or made no comment.
- “A number of good examples are given under Vision into Practice on pp. 311-312. Under Instructional Strategies and Resources the Risk Assessment material is a great resource. While it is overly simplistic to reach a wider range of students it is a great starting point and one of the most important topics in addressing potential issues in chemical use, food, medicine, and the environment. NSTA SciPacks may be very good but you need to buy it before you can really review it. I understand these resources are not free to develop, but I think there may be a better way to balance out the financial issues vs. the review issues before purchasing.”

3. Higher student performance, learning and improved student achievement

- “Yes. This integrated science course scaffolds and builds on 8th Grade Earth and space science and physical science concepts.
- “Impossible to tell. Student achievement depends on much more than a set of standards.”

4. Support subject matter comprehension

- The element supports subject matter comprehension.
- “Yes. This integrated science course supports subject matter comprehension.”

5. Promote essential knowledge in the subject

- The subject matter may promote essential knowledge. No quotes provided for the criteria.

6. Promote lifelong learning

- The subject matter may promote lifelong learning.
- “Yes. The topic/element of Earth’s Resources are frequently written about in daily newspapers, discussed in daily news and photographed and shown daily on Internet sites—alternate energy, air pollution, water pollution, solid the hazardous waste, wildlife and wilderness management. They are topics that impact the lives of many people and all living things. Therefore, they promote lifelong learning for most people.”
- “Only for those who are interested in pursuing additional knowledge in highly specific areas of earth systems.”

7. Promote the liberal arts tradition

- The subject matter may promote the liberal arts tradition.
- “Yes. The subtopics included in Earth’s Resources are also topics included in liberal arts courses such as sociology, philosophy, psychology, social studies, environmental science, etc.”

8. Promote college and career readiness

- “Yes. It is critically important that high school students are provided guidance and information related to college majors and careers to help them prepare for their adult lives. This reviewer recommends that Career Connections be developed for each HS science topic area to show students that what they are

learning in science is directly related with what people need to know and be able to do at advanced levels in careers related with that science topic.”

- “Science is an important element of college and career readiness.”

9. Reduce the need for remediation

- “Yes. This is highly valuable content to prepare for college and greatly reduce the need for remediation.”
- Others had no comment or stated that it was impossible to tell.

10. Meet the definition of a standard

- Reviewers indicated that the element met the definition of a standard.
- Reviewers indicated that the element did not meet the definition of a standard.

Physical Comments by Specific Rubric Criteria with Examples

The comments shown reflect the views of individual committee members and may not reflect a group consensus.

1. Clear and concise

- A reviewer communicated the standards were clear and concise.
- “No, the element is not concise.”
- “Partial. This reviewer would prefer an alphanumeric sentence outline rather than a narrative. This would help ensure that all content in the standards is instructed. It would be very easy to inadvertently omit planning and instructing some material due to the narrative format.”

2. Grade-level appropriate

- Most indicated the content was grade-level appropriate.
- “No. It appears to me the primary reason to push an absolute age of the earth into Ohio science classroom is to promote a secular humanist worldview because the science is weak and a wider view of determined ages are very discordant. This portion of the Physical Geology course could be removed or reduced to give more time to cover the vast array of other topics built on firmer observational science like Bowen's Reaction Series or Seismic Waves.”

3. Higher student performance, learning and improved student achievement

- “Yes. This element promotes extensive mineral investigation, experimentation and observation using technology. It provides opportunities for students to integrate geology, chemistry, physics and Earth science as a scientist does in hands-on research and investigations.”
- “No. Glacial Geology is a content area filled with inconsistencies and unfounded speculations. ...” (Full content of quote can be found in Appendix C – Science: Science Standards Review Committee Member Rubrics)

4. Support subject matter comprehension

- “Yes. This element focusing on minerals supports comprehension of the integration of sciences through hands-on, mind-on research and scientific investigation.”
- “Yes. This element includes a Career Connection that supports subject matter comprehension. Students are connected with Ohio businesses in designing and building an Eco-House and identifying companies that manufacture qualifying materials. Students conduct career interviews, participate in work place visits. They explore company websites and collect data and information. Great career connection for students!”

5. Promote essential knowledge in the subject

- “Yes. This element strongly promotes subject matter, knowledge through integrating content of different areas of science to provide opportunities for students to discover science through research, use of technology and hands-on learning.”

6. Promote lifelong learning

- “Yes. This element promotes lifelong learning by providing student with opportunities to research, inquire and experiment which develops a “questioning mindset.”
- “Difficult to say.”

7. Promote the liberal arts tradition

- “Science is an important part of the liberal arts tradition.”
- “Yes. The study of the history of the formation of the Earth has a direct correlation with philosophy and history. The integration of the study of geology with related science areas of chemistry, physics and environmental promotes the liberal arts tradition.”

8. Promote college and career readiness

- “Yes. It is critically important that high school students are provided guidance and information related to college majors and careers to help them prepare for their adult lives. This reviewer recommends that Career Connections be developed for each HS science topic area to show students that what they are learning in science is directly related with what people need to know and be able to do at advanced levels in careers related with that science topic.”
- “Undetermined No Career Connections Statement.”

9. Reduce the need for remediation

- “Yes. This element definitely reduces the need for remediation.”
- “Difficult to say.”

10. Meet the definition of a standard

- “Yes. Science knowledge and understanding of the formation and history of Earth is important and valuable knowledge for all students.
- Some reviewers indicated this element did not met the definition of a standard.

Science Assessment Review

Summary of Common Themes

Overview

The Academic Standards and Assessment Review Committee for Science was comprised initially of six people. These included a university faculty member specializing in science education; a representative of the Ohio Department of Higher Education, formerly known as the Ohio Board of Regents; a high school biology teacher; a senior analytical chemist and former college chemistry department chair; an educational consultant specializing in STEM education; and a parent.

In their review of *Ohio's Learning Standards for Science K-12*, the committee was asked to examine the content statement, description, content elaboration, and expectations for learning (the cognitive demands). The content statement, description and elaboration define *what* is being taught, and the expectations for learning illustrate the process of science and *how* the content could be taught. This is the foundation for Ohio's aligned assessments.

The committee reviewed grade 5, grade 8 and physical science tests that were available and administered in the spring of 2015. These tests were created by a collaborative effort between the Ohio Department of Education and the American Institutes for Research. Once items were developed for the test, they were reviewed by a content advisory committee, a fairness and sensitivity committee and a range finding committee.

The Academic Standards and Assessment Review Committee generally found that the test items in each of the reporting categories were grade-level appropriate, aligned and complex with several graphs, tables and charts. The test lacked simple conceptual questions and had quite a bit of redundancy. The test could be shortened.

The items in each of the reporting categories met community expectations (fairness and sensitivity guidelines). A question about the technical equity of delivering the test across the districts was raised. The committee suggested that students need training on using the electronic format prior to the testing year. The committee felt the technology provided an opportunity for students to broadly demonstrate knowledge.

Assessments Review

1. The items in each of the reporting categories align to the standards.

- The tests were well aligned but lacked simple concept questions.
- The committee members liked that questions had multiple steps with several graphs, tables and charts, but also indicated there were concerns the test lacked simple entry level questions.
- The committee liked the overall delivery and stated that it was very well done.
- There are many questions that are asked many times in different ways.
- There is quite a bit of redundancy. The tests can be shortened.
- The content areas were not equally represented throughout the grades. There is heavier emphasis on some topics. Ohio Department of Education staff noted that this is reflected in the blueprint for each assessment.

2. The items in each of the reporting categories are grade-level appropriate

- There are many questions that are asked many times in different ways. There is quite a bit of redundancy. The tests can be shortened (especially for grade 5). The bottom line question to be addressed is, do students understand the concept?
- Ohio has raised the bar in science and that is a good thing. There is a good range of items. There are many challenging items and the questions were appropriate.

3. The items in each of the reporting categories meet community expectation (fairness and sensitivity guidelines).

- The committee liked that the items did not refer to individuals by name, (e.g., “the student”, “the scientist”) but noted there were many references to women. There were few items with actual people. It would be nice to see items that depicted individuals doing science.
- The committee stated fewer questions would reduce redundancy. Asking the same thing over and over could negatively impact scores.

4. Comments about the technology and functionality of the tests.

- Technology was super! Make sure that all teachers have the opportunity to use the technology with students.
- The committee was concerned that the paper/pencil version of the test would not be equivalent to the online version, creating an equity issue for paper versus online.
- The committee expressed appreciation for the opportunity for students to broadly demonstrate knowledge.
- The committee noted the progression was more difficult and technical as one moved through the grades.

Section III: Social Studies Review

Social Studies Standards Review

Summary of Common Themes

Overview

The Standards and Assessment Committee for Social Studies was comprised of five people. These included two school district curriculum specialists, a representative of the Ohio Department of Higher Education, a middle social studies teacher and a parent.

The first task of the committee was to review *Ohio's Learning Standards: K-12 Social Studies*. It began work using a rubric for grades kindergarten through eight. The rubric included 10 criteria for review with focus on each of the four strands in the standards for these grades. The strands are history, geography, government and economics.

The next task of the committee was to review the standards in the six high school course syllabi. These include *American History*, *American Government*, *Modern World History*, *Economics and Financial Literacy*, *Contemporary World Issues* and *World Geography*. The rubrics focused on the unique topics for each of these courses. The topics are clusters of content statements (standards).

Standards Review for Grades K-8

The committee began by examining grades K-8. The reviews were performed using a rubric that included 10 criteria with focus on “four elements” for these grades. The elements were the four strands in the standards for these grades: history, geography, government and economics. Each strand contains a cluster of content statements. The committee generally found that the elements for grades K-8 either strongly met or partially met the criteria.

Grades K-2

The committee generally found the standards for grades K-2 meet the criteria. They felt that grades K-2 standards build on previous knowledge, provide a foundation for learning and promote college and career readiness. The “partial” responses were suggestions for rewording the standards for greater clarity. Some members thought a couple of content statements were a bit challenging or not appropriate for a particular grade. One reviewer for grade 2 gave a “Yes” for all four elements of a criterion stating, “With greater complexity comes higher performance to master and understand.” The few responses that the criteria were not met came from one reviewer. For a criterion in one grade, this reviewer found “...very little academic content and more a focus on ideology and attitude [and] missing some things on America (e.g., George Washington).”

Grades 3-5

The committee generally found that the standards for grades 3-5 meet the criteria. They concluded that these standards provide higher student performance, learning and improved student achievement, support subject matter comprehension, promote essential knowledge in the subject, promote lifelong learning and liberal arts tradition, promote college and career readiness, reduce the need for remediation and meet the definition of the standard. However, one reviewer commented that, “The breadth of content may be challenging for grade 4.” Another stated that it, “depends on how [the standards] are taught and presented.” And from another, “We are now building on previous knowledge yet new essential knowledge based on age is being introduced.”

Grades 6-8

The committee generally found that the standards for grades 6-8 meet the criteria. They determined that the standards support subject matter comprehension, promote essential knowledge in the subject, promote lifelong learning and liberal arts tradition, promote college and career readiness, reduce the need for remediation and meet the definition of the standard. One reviewer expressed concern that the “*Feudalism and Transitions*” topic in grade 7 contains a large amount of information over large time period.”

Standards Review for High School

The review of Ohio's Learning Standards: High School Social Studies was performed by examining the standards in six high school course syllabi: American History, American Government, Modern World History, Economics and Financial Literacy, Contemporary World Issues and World Geography. The rubrics focused on the unique topics found in each of these courses. The topics are clusters of content statements (standards). "Elements" in this summary will refer to clusters of content statements (standards) within a topic.

American History

The committee generally found the standards for *American History* meet the criteria. They determined that the standards promote lifelong learning, a liberal arts tradition and college and career readiness. It was noted in the reviews that the five content statements under the topic "Historic Documents" in the *American History* syllabus do not seem to align with the scope of the course (i.e., 1877 to the present). The addition of these standards was made in 2012 (the State Board of Education approved the standards in 2010) after Amended Substitute Senate Bill 165 was passed. This legislation required that historic documents (i.e., the Declaration of Independence, Northwest Ordinance, Federalist and Anti-Federalists Papers, U.S. Constitution, Bill of Rights and Amendments) be taught and assessed in the new tests for American history and American government. The department consulted with stakeholders and it was determined not to change the scope of the American history course with the addition of new content statements (standards). One reviewer commented, "Many, if not all, of the historical documents embedded in the course still impact the lives of U.S. citizens today." For the topic *From Isolation to World War (1930-1945)*, one reviewer wrote, "I like the how this topic creates a dichotomy between the U.S.'s level of involvement pre/post the Pearl Harbor attack." However, another observed, "Causes and progression of WWI are ignored."

American Government

The committee generally found the standards for *American Government* meet the criteria. They particularly observed that the standards promote the liberal arts tradition college and career readiness and reduce the need for remediation. For the most part, the committee felt that the standards are clear and concise. However, one reviewer noted on the topic *Basic Principles of the U.S. Constitution*, "This is a large, broad topic. It is very hard to be concise." Another reviewer, commenting on the grade-level appropriateness of the standards, wrote that it "always depends on presentation, grade level of student and the foundation of knowledge previously taught and retrained."

Modern World History

The committee generally found the standards for *Modern World History* meet the criteria. They determined the standards were grade-level appropriate, provided higher student performance, learning and improved student achievement, promote college and career readiness and reduce the need for remediation. The reviews for how the elements were clear and concise were almost evenly split between yes and partial. One reviewer commented, that the standards "Promotes higher level thinking skills." For one of the topics a reviewer commented, "Digs into the World Wars with a global lens."

Economics and Financial Literacy

The committee found the standards for *Economics and Financial Literacy* meet the criteria. They determined that the standards promote lifelong learning as well as college and career readiness, reduce the need for remediation and meet the definition of a standard. They also found that the elements are grade-level appropriate, support subject matter comprehension and promote essential knowledge in the subject. One reviewer wrote, "So much depends on personal philosophy and approach to politics and finances."

Contemporary World Issues

The committee generally found the standards for *Contemporary World Issues* meet the criteria. They determined the standards promote lifelong learning as well as college and career readiness, reduce the need for remediation and meet the definition of a standard. One reviewer wrote, "I guess it depends on what grade

the content is delivered. I think it would be more difficult to understand without background information of prior events.” Another commented, “I like the tie-ins to the economy, specifically the global economy.”

World Geography

The committee found that the standards for *World Geography* meet the criteria. They determined that the standards are grade-level appropriate, promote lifelong learning as well as college and career readiness, reduce the need for remediation and meet the definition of a standard. On the question of clear and concise, the reviewers were almost evenly split on the standards meeting or partially meeting the criterion. One reviewer commented, “Most Content Statements contain examples that would be best suited for the Model Curriculum.” There was strong agreement that the standards support subject matter comprehension, promote essential knowledge in the subject and promote lifelong learning. A reviewer wrote, “Geography, in and of itself, is essential knowledge in Social Studies.”

Overview Review of Ohio’s Learning Standards: K-8 Social Studies

The review of *Ohio’s Learning Standards: K-8 Social Studies* was performed using a rubric that included 10 criteria with focus on four elements for these grades. The elements are the four strands in the standards for these grades: history, geography, government and economics. Each strand contains a cluster of content statements. “Elements” in this summary will refer to cluster of content statements (standards) within a strand. The committee found that the elements for grades K-8 generally met the criteria.

K-2 Grade Band

Statements commonly made for K-2 that recurred across multiple rubric elements included:

- Depends on how it is taught.
- Building on previous knowledge.
- Builds a foundation of learning.
- Promotes college and career readiness.
- Reword standards for greater clarity.
- Standard might be too challenging or not appropriate for particular grade.

Note: Not all elements of the rubric were addressed – there are few comments in some places.

Comments by specific rubric element, with examples:

1. Clear and concise

- Some elements are clear and concise and others are not.
- Recommendations provided to clarify or enhance specific content.
- Example:
 - “The second sentence of Content Statement 4 could be a content elaboration in the model curriculum.”[Economics strand in grade 1] “Built on grade K foundation. Solid connection.

2. Grade-level appropriate

- Elements mostly grade-level appropriate – a few partial or not.
- Recommendations provided to clarify or enhance specific content.
- Examples:
 - “Builds on topics introduced in K and 1 and calls for in-depth use.”
 - “The progression of topics from past grades is evident.”

3. Higher student performance, learning and improved student achievement

- Elements mostly grade-level appropriate – some partial and some not.
- Examples:
 - “Expands on ideas of time and space that was originally introduced in kindergarten.”

- “Depends on how taught (Promote or ensure?), Describe, create and identify (Create, compare and contrast = good).”

4. Supports subject matter comprehension

- Elements mostly grade-level appropriate – some partial and some not.
- Examples:
 - “Time and primary sources are essential aspects of social studies.”
 - “Foundational knowledge”
[Grade K, Geography, Government, Economics strands] “No, for these 3 strands as majority of statements seem grade level inappropriate”

5. Promotes essential knowledge in the subject

- Elements mostly grade-level appropriate – a few partial or not.
- Recommendations provided to clarify or enhance specific content.
- Examples:
 - “Lays the groundwork for the interpretation of maps which is essential moving forward in each student’s educational career.”
 - “We are now building on previous knowledge yet new essential knowledge based on age is being introduced.”

6. Promotes lifelong learning

- Elements are mostly grade-level appropriate – a few partial or not.
- Recommendations provided to clarify or enhance specific content.
- Examples:
 - “Yes, provides a foundation.”
 - “All elements promote lifelong learning if taught and mastered to some degree.”

7. Promotes the liberal arts tradition

- Elements are mostly grade-level appropriate – one partial and a few not
- Recommendations provided to clarify or enhance specific content.
- Examples:
 - “Answered w/o a great deal of consideration as almost any learning would be applicable to liberal arts.”
 - “Science, history and possibly languages can be discussed.”

8. Promotes college and career readiness

- Responses mainly support elements meeting criteria.
- Examples:
 - “I answered “yes” to all as each provides a foundation of learning. Don’t know if this fully answers.”
 - “Lays a foundation for the study of history.”
 - “Inappropriate to be reviewing for in Kindergarten.”

9. Reduce the need for remediation

- Elements mostly grade-level appropriate and some not.
- Recommendations provided to clarify or enhance specific content.
- Examples:

- “There is a clear foundation of what knowledge is to be mastered but the student’s brain and the teacher’s teaching dictate if the is reality.”
- “I think that the new topic that is introduced is basic enough to avoid remediation.”
- See example above.”
- “Don’t need this for a college class prerequisite but it is foundation knowledge to build to a college class prereq [sic] situation.”

10. Meets the definition of a standard

- Elements are mostly grade-level appropriate and some not.
- Example:
 - “Very easy to follow and know what is expected. The tough part is guaranteed achievement by all learners.”

“[Economic strand] Not ‘essential academic content for Kindergarten”

3-5 Grade Band

Statements commonly made for grades 3-5 that recurred across multiple rubric elements included:

- Higher student performance, learning, and improved student achievement.
- Supports subject matter comprehension.
- Promotes essential knowledge in the subject.
- Promotes lifelong learning.
- Promotes the liberal arts tradition.
- Promotes college and career readiness.
- Reduce the need for remediation.
- Meets the definition of a standard.
- Depends on how it is taught.
- Building on previous knowledge.
- Builds a foundation of learning.
- Reword standards for greater clarity.
- Standard might be too challenging or not appropriate for particular grade.

Note: Not all elements of the rubric were addressed – there are few comments in some places.

Comments by specific rubric element, with examples:

1. Clear and concise

- Most elements are clear and concise, several are partially or not.
- Recommendations provided to clarify or enhance specific content.
- Example:
 - “Content statement 11 could be broken down into two content statements.”
 - “#22 Don’t define Tables and charts in the standard.”

2. Grade-level appropriate

- Elements mostly grade-level appropriate – a few partial or not.
- Recommendations provided to clarify or enhance specific content.
- Examples:
 - “Depends on how taught and presented. Use Model Curriculum as a guideline.”
 - “The breadth of content may be challenging for grade 4”

3. Higher student performance, learning and improved student achievement

- Responses mainly support elements meeting criteria. A few do not.
- Examples: none provided.

4. Supports subject matter comprehension

- Responses mainly support elements meeting criteria.
- Examples:
 - “Depends heavily on how assessed.”
 - “All strands contain critical social science content.”
 - No examples provided for “not” meeting the criteria.

5. Promotes essential knowledge in the subject

- Responses mainly support elements meeting criteria.
- Example:
 - “We are now building on previous knowledge yet new essential knowledge based on age is being introduced.”

6. Promotes lifelong learning

- Responses mainly support elements meeting criteria.
- Example:
 - “Very much supports lifelong learning.”

7. Promotes the liberal arts tradition

- Responses mainly support elements meeting criteria.
- Example:
 - “This is hard to dissect as all learning points to a liberal arts tradition until learning becomes very specific.”
 - No examples provided for “not” meeting the criteria.

8. Promotes college and career readiness

- Responses mainly support elements meeting criteria.
- Example:
 - “Promotes engagement and social awareness.”

9. Reduce the need for remediation

- Responses mainly support elements meeting criteria.
- Example:
 - “Not unlike other grade levels some things will be taught to mastery, some will be built upon, and some will be introduced.”

10. Meets the definition of a standard

- Responses mainly support elements meeting criteria
- Example:
 - “Very easy to follow and know what is expected. The tough part is guaranteed achievement by all learners.”
 - No examples provided for “not” meeting the criteria.

6-8 Grade Band

Statements commonly made for grades 6-8 that recurred across multiple rubric elements included:

- Supports subject matter comprehension.
- Promotes essential knowledge in the subject.
- Promotes lifelong learning.
- Promotes the liberal arts tradition.
- Promotes college and career readiness.
- Reduce the need for remediation.
- Meets the definition of a standard.
- Depends on how it is taught.
- Building on previous knowledge.
- Builds a foundation of learning.
- Reword standards for greater clarity.
- Standard might be too challenging or not appropriate for particular grade.

Note: Not all elements of the rubric were addressed – there are few comments in some places.

Comments by specific rubric element, with examples:

1. Clear and concise

- Most elements are clear and concise, several are partially and one was not.
- Recommendations provided to clarify or enhance specific content.
- Example:
 - “Concise considering it spans 2350 years.”
 - “The Feudalism and Transitions topic contains a large amount of information over large time period”

2. Grade-level appropriate

- Most elements are grade-level appropriate.
- Example: none provided.

3. Higher student performance, learning and improved student achievement

- Responses mainly support elements meeting criteria.
- Examples: None provided.

4. Supports subject matter comprehension

- Responses mainly support elements meeting criteria.
- Examples: None provided.

5. Promotes essential knowledge in the subject

- Responses mainly support elements meeting criteria; a few partial and not.
- Examples:
 - “Content Statement 12 does a great job of setting the scene for major themes like “separate but equal” and the “Jim Crow Laws.”
 - “Very little discussion of developments and progression of American Revolution or Civil War; only causes and consequences.”

6. Promotes lifelong learning

- Responses mainly support elements meeting criteria.
- Examples:
 - “Higher level more and more clear and defined.”
 - “I think the diverse nature of the subject exposes students to a wide-range of topics that may pique their interest for future exploration.”

7. Promotes the liberal arts tradition

- Responses mainly support elements meeting criteria.
- Example:
 - “Most learning promotes a liberal arts tradition.”
 - No examples provided for “not” meeting the criteria.

8. Promotes college and career readiness

- Responses mainly support elements meeting criteria.
- Example:
 - “Life skills easily noted.”

9. Reduce the need for remediation

- Responses mainly support elements meeting criteria.
- Example:
 - “Remediation and relating back will always be necessary.”

10. Meets the definition of a standard

- Responses mainly support elements meeting criteria.
- Example: none provided.

Overview Review of Ohio’s Learning Standards: High School Social Studies

The review of *Ohio’s Learning Standards* for high school social studies was performed by reviewing the standards in the six high school course syllabi: American History, American Government, Modern World History, Economics and Financial Literacy, Contemporary World Issues and World Geography. The rubrics focused on the unique topics for each of these courses. Topics are clusters of content statements (standards). “Elements” in this summary will refer to cluster of content statements (standards) within a topic. The committee found that elements for the six high school courses generally met the criteria using the unique rubrics for these courses.

American History

Statements commonly made for this course that recurred across multiple rubric elements included:

- Promotes lifelong learning.
- Promotes a liberal arts tradition.
- Promotes college and career readiness.

Note: Not all elements of the rubric were addressed – there are few comments in some places.

Comments by specific rubric element, with examples:

1. Clear and concise

- Most of elements are clear and concise, some are partially or not.
- Recommendations provided to clarify or enhance specific content.
- Example:
 - “Content statements 5 and 9 could be consolidated to ‘Enlightenment ideas, English Law and American colonists’ experiences shaped the development of the Declaration of Independence and the Constitution/Bill of Rights”

2. Grade-level appropriate

- The elements are mostly grade-level appropriate – a few partial or not.
- Recommendations provided to clarify or enhance specific content.
- Examples:

- “While the historic documents referenced relate more to the 8th grade curriculum, the students should be able to comprehend the major themes of such documents.”
- “Social politics. Progressive and controversial organizations, should be taught as such.”

3. Higher student performance, learning and improved student achievement

- Elements mostly grade-level appropriate.
- Examples:
 - “Urges students to think critically, vet sources and develop stances based on credible information.”
 - “Appears light on academic content.”

4. Supports subject matter comprehension

- Elements mostly grade-level appropriate – some partial and some not.
- Example:
 - [Element: From Isolation to World War (1930-1945)] “I like the how this topic creates a dichotomy between the US’s level of involvement pre/post the Pearl Harbor attack.”
 - [Same element] “Appears that so much content is missing here....learned later that some of it (not all) is covered in World History, however, World History is not required for graduation.”

5. Promotes essential knowledge in the subject

- Elements mostly grade-level appropriate – a few partial or not.
- Recommendations provided to clarify or enhance specific content.
- Examples:
 - “This topic [“Foreign Affairs from Imperialism to Post-World War I”] builds on ideas such as the Monroe Doctrine and Manifest Destiny and provides a lens to the political climate of the era.” [Same element]” Causes and progression of WWI are ignored.”

6. Promotes lifelong learning

- Elements mostly grade-level appropriate – a couple partial and a few undecided.
- Recommendations provided to clarify or enhance specific content.
- Examples:
 - “Many, if not all, of the historical documents embedded in the course still impact the lives of US citizens today.”
 - “Lifelong learning is promoted via higher level activities that are relevant and supported.”

7. Promotes the liberal arts tradition

- Elements mostly grade-level appropriate – some partially.
- Recommendations provided to clarify or enhance specific content.
- Example:
 - “Yes, as touches on literature, philosophy, history and may be used in cross curricular lesson planning and delivery.”
 - “Science, history and possibly languages can be discussed.”

8. Promotes college and career readiness

- Responses mainly support elements meeting criteria.
- Examples:
 - “I believe a student who participates in this course will transition well into a college-level history course.”

9. Reduce the need for remediation

- Elements mostly grade-level appropriate – no partial, one not, and a few undecided.
- Recommendations provided to clarify or enhance specific content.
- Examples:
 - “Considerable amount of new learning – “new stuff” – great content may develop a love of history if approached correctly.”

10. Meets the definition of a standard

- Elements mostly grade-level appropriate – one partial, a few not.
- Example: none provided.

American Government

Statements commonly made for this course that recurred across multiple rubric elements included:

- Promotes liberal arts tradition.
- Provides higher student performance, learning and improved student achievement.
- Promotes college and career readiness.
- Reduce the need for remediation.

Note: Not all elements of the rubric were addressed – there are few comments in some places.

Comments by specific rubric element, with examples:

1. Clear and concise

- Most of elements are clear and concise, others are partially or not.
- Recommendations provided to clarify or enhance specific content
- Example:
 - [Element: “Basic Principles of the U.S. Constitution”] “This is a large, broad topic. It is very hard to be concise.”

2. Grade-level appropriate

- The elements are mostly grade-level appropriate, others are partially or not.
- Recommendations provided to clarify or enhance specific content.
- Examples:
 - “Always depends on presentation, grade level of student and the foundation of knowledge previously taught and retrained.”
 - “Economics should be its own course - topic is much too large & complex to squeeze into this unit.”

3. Higher student performance, learning and improved student achievement

- Elements mostly grade-level appropriate, a few were partially.
- Examples:
 - “I think this topic is an essential skill for becoming an informed consumer, let alone a student learning about the US government.”
 - “The topic is “Basic Principles of the U.S. Constitution,” while the content statements include very specific Constitutional amendments.”

4. Supports subject matter comprehension

- Elements mostly grade-level appropriate.
- Examples:
 - “Civic participation is a major part of the American government.”

- “Ideology presented throughout content statements.”

5. Promotes essential knowledge in the subject

- Elements mostly grade-level appropriate, and a few partially.
- Recommendations provided to clarify or enhance specific content.
- Examples:
 - [Element: “Role of the People”] “Incredibly important standard for young adults - could be expanded to focus on specific rights and responsibilities.”
 - [Same element]” Causes and progression of WWI are ignored.”

6. Promotes lifelong learning

- Elements mostly grade-level appropriate.
- Recommendations provided to clarify or enhance specific content.
- Examples:
 - “Students will be able to relate with conflict resolution and the recognition of differences. Learning about being able to properly deal with those situations will be beneficial.”

7. Promotes the liberal arts tradition

- Elements mostly grade-level appropriate.
- Example: none provided.

8. Promotes college and career readiness

- Responses mainly support standards meeting criteria.
- Example: none provided.

9. Reduce the need for remediation

- Elements mostly grade-level appropriate.
- Recommendations provided to clarify or enhance specific content.
 - Example: none provided.

10. Meets the definition of a standard

- Elements mostly grade-level appropriate, a few partially.
 - Example: none provided.

Modern World History

Statements commonly made for this course that recurred across multiple rubric elements included:

- Grade-level appropriate.
- Provides higher student performance, learning and improved student achievement.
- Promotes college and career readiness.
- Reduce the need for remediation.

Note: Not all elements of the rubric were addressed – there are few comments in some places.

*UD/UA – Undecided/Unanswered

Comments by specific rubric element, with examples:

1. Clear and concise

- Elements almost evenly split between meeting the criteria and partially.
- Recommendations provided to clarify or enhance specific content.
- Example:
 - “There is a lot of essential knowledge from two World Wars combined into one topic.”

2. Grade-level appropriate

- The elements are mostly grade-level appropriate.
- Recommendations provided to clarify or enhance specific content.
- Examples:
 - “History and perspective on the UN, WB and the IMF too complex for HS students; especially in the time allotted?”

3. Higher student performance, learning and improved student achievement

- Elements mostly grade-level appropriate, and some partially.
- Example:
 - “Promotes higher level thinking skills”

4. Supports subject matter comprehension

- Elements mostly grade-level appropriate – some partial and UA/UD.
- Examples:
 - [Element: “Age of Enlightenment”] “also, lays a foundation for American History.”
 - [Same element] “Should be linked to teaching about the Great Awakening....not sure if that is in standards anywhere?”

5. Promotes essential knowledge in the subject

- Elements mostly grade-level appropriate, and a few partially.
- Recommendations provided to clarify or enhance specific content.
- Examples:
 - “Digs into the World Wars with a global lens.”
 - “Very high level look at causes and consequences of two world wars. Is more detail needed about each war?”

6. Promotes lifelong learning

- Elements mostly grade-level appropriate – one partial, some not.
- Recommendations provided to clarify or enhance specific content.
- Example:
 - “Cross-content connection with science in the Scientific Revolution.”

7. Promotes the liberal arts tradition

- Elements mostly grade-level appropriate, and some partially.
- Example: none provided.

8. Promotes college and career readiness

- Responses mainly support elements meeting criteria.
- Example: none provided.

9. Reduce the need for remediation

- Responses mainly support elements meeting criteria.
- Example: none provided.

10. Meets the definition of a standard

- Elements mostly grade-level appropriate.
- Example: none provided.

Economics and Financial Literacy

Statements commonly made for this course that recurred across multiple rubric elements included:

- Promotes lifelong learning.
- Promotes college and career readiness.
- Reduce the need for remediation.
- Meets the definition of a standard.

Note: Not all elements of the rubric were addressed – comments in some places.

Comments by specific rubric element, with examples:

1. Clear and concise

- The elements are mostly grade-level appropriate, some partially.
- Recommendations provided to clarify or enhance specific content.
- Example: none provided.

2. Grade-level appropriate

- The elements are mostly grade-level appropriate, a few were not.
- Recommendations provided to clarify or enhance specific content.
- Examples:
 - “So much depends on personal philosophy and approach to politics and finances.”

3. Higher student performance, learning and improved student achievement

- Elements mostly grade-level appropriate, and some partially.
- Example: none provided.

4. Supports subject matter comprehension

- Elements mostly grade-level appropriate – some partially.
- Example:
 - [Element: “Government and the Economy”] “Should there be more of an emphasis on the role of taxes?”

5. Promotes essential knowledge in the subject

- Elements mostly grade-level appropriate, and some partially.
- Recommendations provided to clarify or enhance specific content.
- Example: none provided.

6. Promotes lifelong learning

- Elements are grade-level appropriate.
- Example:
 - “So much depends on personal philosophy and approach to politics and finances.”

7. Promotes the liberal arts tradition

- Elements mostly grade-level appropriate, and some partially.
- Example: none provided.

8. Promotes college and career readiness

- Responses mainly support elements meeting criteria.
- Example: none provided.

9. Reduce the need for remediation

- Responses mainly support elements meeting criteria.
- Example: none provided.

10. Meets the definition of a standard

- Elements mostly grade-level appropriate.
- Example: none provided.

Contemporary World Issues

Statements commonly made for this course that recurred across multiple rubric elements included:

- Promotes lifelong learning.
- Promotes college and career readiness.
- Reduce the need for remediation.
- Meets the definition of a standard.

Note: Not all elements of the rubric were addressed – there are few comments in some places.

Comments by specific rubric element, with examples:

1. Clear and concise

- The elements are mostly grade-level appropriate, some partially, and one not.
- Example: none provided.

2. grade-level appropriate

- The elements are mostly grade-level appropriate, and some partially.
- Example:
 - “I guess it depends on what grade the content is delivered. I think it would be more difficult to understand without background information of prior events.”

3. Higher student performance, learning, and improved student achievement

- Elements mostly grade-level appropriate, some partially, and one not.
- Example: none provided.

4. Supports subject matter comprehension

- Elements mostly grade-level appropriate, some partially, and one not.
- Example: none provided.

5. Promotes essential knowledge in the subject

- Elements mostly grade-level appropriate, some partially, and one not.
- Recommendations provided to clarify or enhance specific content.
- Examples:
 - “I like the tie-ins to the economy, specifically the global economy.”
 - “I would suggest an update to include the recent recession.”

6. Promotes lifelong learning

- Elements mostly grade-level appropriate, some partially, and one not.
- Example: none provided.

7. Promotes the liberal arts tradition

- Elements mostly grade-level appropriate, some partially, and one not.
- Example: none provided.

8. Promotes college and career readiness

- Responses mainly support elements meeting criteria.
- Example: none provided.

9. Reduce the need for remediation

- Responses mainly support elements meeting criteria.
- Example: none provided.

10. Meets the definition of a standard

- Elements mostly grade-level appropriate.
- Example: none provided.

World Geography

Statements commonly made for this course that recurred across multiple rubric elements included:

- Grade-level appropriate.
- Promotes lifelong learning.
- Promotes college and career readiness.
- Reduce the need for remediation.
- Meets the definition of a standard.

Note: Not all elements of the rubric were addressed – there are few comments in some places.

Comments by specific rubric element, with examples:

1. Clear and concise

- The elements are evenly split between meeting and partially meeting grade-level appropriate.
- Recommendations provided to clarify or enhance specific content.
- Example:
 - “Most Content Statements contain examples that would be best suited for the Model Curriculum.”

2. Grade-level appropriate

- The elements are mostly grade-level appropriate.
- Recommendations provided to clarify or enhance specific content.
 - Example: none provided.

3. Higher student performance, learning and improved student achievement

- Elements mostly grade-level appropriate, and some partially
- Example: none provided.

4. Supports subject matter comprehension

- Elements mostly grade-level appropriate, and some partially.
- Example: none provided.

5. Promotes essential knowledge in the subject

- Elements mostly grade-level appropriate, and some partially.
- Example:
 - “Geography, in and of itself, is essential knowledge in Social Studies.”

6. Promotes lifelong learning

- Elements are mostly grade-level appropriate, and some partially.
- Example: none provided.

7. Promotes the liberal arts tradition

- Elements mostly grade-level appropriate, and some partially.
- Example: none provided.

8. Promotes college and career readiness

- Responses mainly support elements meeting criteria.
- Example: none provided.

9. Reduce the need for remediation

- Responses mainly support elements meeting criteria.
- Example: none provided.

10. Meets the definition of a standard

- Elements mostly grade-level appropriate.
- Example: none provided.

Social Studies Committee Summaries

Committee member summary analysis of the standards and assessment review

Summary Statement by Dr. Sandra Sue Goodsite

December 21, 2015

I was honored to be appointed to the Social Studies Review Committee by Senate President Farber via the recommendation of Senator Gayle Manning last spring 2015.

Please know employees from the Ohio Department of Education warmly welcomed appointed committee members to their workplace when we began our Social Studies review tasks. ODE employees guided our work with professionalism and integrity. All committee members were given a voice and permitted to reflect and question as necessary during the course of all meetings.

Throughout the process committee members expressed tweaks and small changes here and there but found few major issues with the content statements and tests we were assigned to critique. There was clear evidence that a great deal of time and thought had been put into the construction of content statements and base level learning targets at each grade level and in high school social studies subject areas prior to our requested committee work. (Reports from ODE will highlight in-depth our findings.)

However, I have great concern regarding the glaring omission of patriotism being taught via the content statements presented for our review. Example: What content statements ensure the teaching of the Pledge of Allegiance? What content statements ensure all students know their national anthem, the Star Spangled Banner?

As educators we should ensure that our students understand national pride and the patriotic foundations of our country. Students should be taught that our flag is to be respected and our Pledge of Allegiance is a cornerstone of what we stand for. Students should be taught their hands should be placed on their hearts, hats should be removed, and they should recite the pledge each day in school. Protocol and manners should be taught for what citizens need do and how they should act when our national anthem is played. Students should be taught the words and age appropriate meanings of the words to the Pledge of Allegiance and the Star Spangled Banner. This should be a part of required learning.

I question why the teaching of patriotism via our national pledge and anthem etc. is missing from our social studies school curriculum? I am a product of a generation where the teaching of patriotism was a part of school culture. I believe there has been erosion in the teaching of the principles of patriotism via a neglected use of our pledge and national anthem to set a foundation. Thus I would request the teaching of patriotism (beginning with our nations' Pledge of Allegiance and the Star Spangled Banner) be required events noted in the content statements we approve for our Ohio educators to instruct at multiple grade levels. This learning should not be left to chance or considered an event. Patriotism should be taught and a part of our educational culture.

Summary Statement by Lisa Johnson

December 2015

I appreciate the opportunity to participate on the Social Studies Standards Review Committee as the parent representative appointed by former House Speaker Batchelder.

I submitted my name for consideration for appointment to one of the SRCs because I have two school-aged children and care very deeply about the American education system. It should come as no surprise to anyone at the ODE or in the State Legislature that parents throughout the state are more concerned than ever about what and how their children are taught. They are equally as concerned about their ability to influence and/or approve the curriculum used in their local schools.

In an effort to add some value to our committee's work and because of the significant amount of time I spent reviewing the standards and model curriculum, and most importantly, because I care about making a difference for Ohio's children and teachers, I'm offering this written summary of my conclusions in addition to a rubric that does not allow me to do so accurately or appropriately.

The outcome, if any, of the Committee's collective efforts is yet to be determined.

That being said, it is with great disappointment that I have come to the conclusion that I cannot endorse the Ohio Learning Standards for Social Studies, the aligned Model Curriculum or the associated AIR assessments.

Review Process

The process by which these Committees were asked to review the standards and assessments was highly flawed. It falsely started with the assumption that a standards-based education is proven to increase student's academic achievement, when no such evidence exists. The process also assumes that the standards already meet the reviewer's expectations with regard to quality and completeness. The only measures for review included whether the standard was: clear and concise, grade level appropriate, promoted higher student performance*, supported subject matter comprehension, promoted essential knowledge in the subject, promoted lifelong learning, promoted the liberal arts tradition, promoted college and career readiness*, reduce the need for remediation*, and meet the definition of a standard*. I hope the ambiguous measures directing our review are readily apparent. The asterisks following some of the aforementioned measures represent those that should be evidence based, not opinion based. Therefore, in and of themselves, the rubrics and criteria used to review the standards and assessments are shallow, meaningless and offer little value to stakeholders, especially parents, who are interested in the results.

The result of this empty criteria is a final document that offers little with regard to substance for the ODE, the Legislature, teachers or parents throughout the State. On November 23, we reviewed a draft of the SRC final document which found that the "elements" for grades kindergarten through eight and the six high school courses reviewed "generally met the criteria".

I'm not quite sure what this means nor what the take away is for stakeholders. Just because one thing meets the criteria of another thing, this has no bearing on whether that one thing is good or bad. For example, an RV meets the criteria of a place where one can live, but that doesn't mean that most would choose to live in it. The standards do indeed meet some of the criteria noted above, but what they are missing in quality is not apparent from this review process.

General Conclusions

Standards are not proven to "promote higher student achievement" or "higher subject matter comprehension" or "lifelong learning" or "reduce remediation". Only teachers can accomplish these things. It is a shame that the role of teaching such historically and culturally significant topics as American and World History would be taken from teachers and turned over to unaccountable persons throughout the State. It seems to me that Ohio's children are being robbed of a proper, knowledge and fact-based, non-ideological account of America's incredible history, the story of the World and the role America has played in that story.

These standards and the aligned model curriculum, in many cases, hardly qualify as "academic content". In addition to significant "behavioral" and "social and emotional" content in the standards, the Social Studies

Standards have a clear political ideology seemingly meant to teach our children what to think and to ensure that that line of thinking is the same for all.

I discovered in this process that the Model Curriculum, which contains highly detailed and significant “content elaborations” and “expectations for learning”, is used to write the test questions. This amounts to a de facto state script for teachers. In other words, every child is taught what the ODE thinks they should know, leaving local teachers, administrators and parents out of the picture.

I also discovered that teachers are indeed following the Model Curricula as if was a script. ORC 3301.079 clearly states that Ohio school districts are not required to use any part of the model curriculum developed by the ODE. However, it also states that state adopted assessments must *align with the model curriculum*. Therefore, teachers are forced to follow it closely. How is it that Ohio law can codify the protection of a school district’s right not to have to use state written Model Curriculum, but also require that the same school administer high-stakes tests based on that same model curriculum? Our Legislature is telling our teachers “you are free to teach your way” but your performance review will be based on “teaching our way”. What role does this leave for teachers and parents? As available teaching materials become more digitally dependent, parents and teachers will continue to lose control over what is taught and how it is taught in their children’s classrooms.

The Standards and aligned Model Curriculum appear to impart a particular worldview on our children. Most parents agree that this is not the role of a public education system. These standards and model curriculum lead one to question the true purpose of education.

Since we were asked to limit our individual summaries to 2-3 pages, I will bullet additional concerns below. I am available to discuss in more detail or provide more specifics upon request. My academic content concerns rest on not just what is taught, but on what is *not* taught.

- Very concerned with the reliance and dependence that teachers, especially new teachers, will gain on model curriculum
- Lack of curriculum on America’s founding
- Age inappropriate economic lessons
- Little substance regarding the American Revolution, Civil War, WWI, WWII and the Cold War
- Themes: collectivism, racial bias, social justice, elementary career connections, behavior based standards, “human systems”
- Behavioral content vs. academic content especially in K-8
- Ideology, social politics throughout; especially in High School history
- Lack of curriculum on American Presidents and other key, influential figures

Social Studies Assessment Review

Summary of Common Themes

Overview

The committee reviewed the four social studies tests that were administered in spring 2015. The reviews took place during one week in June and one week in July. The committee used electronic and paper versions of the tests for grades 4-6 and for high school American history and American government. They looked at both parts of each test (i.e., the performance-based assessments and end-of-year tests).

The committee generally found that the items in each of the reporting categories aligned to the standards. There were a few items, some noted, that could have aligned more closely to other content statements. Some test items seem to call for specific content from the content elaborations in the Model Curricula. (Note: Test items are developed from the Model Curriculum, using the Content Statements (standards), the Content Elaborations and the Expectations for Learning.)

The committee generally found that the test items in each of the reporting categories were grade-level appropriate. A few on the committee felt that some test items were too complex for the early grades (e.g., grade four) and too easy in the high school tests. It was suggested that some of the items required certain math skills.

The committee found that the items in each of the reporting categories meet community expectations (fairness and sensitivity guidelines). The technical equity of delivering the test across the districts was raised. The committee suggested that students need training on using the electronic format prior to the testing year.

Other comments about the technology and functionality of the tests were over the state of the art of the electronic format. "Simulation" items with several questions based on the same set of documents might require complicated tasks where students have to continue to open and close a document to answer the questions. Some question prompts seemed too wordy or confusing. (Note: All test items go through an intense vetting process with reviews from the department and several committees of educators. Then, they are field tested and reviewed for possible use in an operational test).

Assessments Review

1. The items in each of the reporting categories align to the standards.

- Overall the test items align to the standards. There are a few that seem to be misaligned and align more closely to other content statements.
- Some test items call for specific content from the content elaborations in the model curricula.
- Some test items seem too complex in the grade 4 test.
- Some of the American government test items seem to rely on the memorization of facts instead of on big ideas (e.g. on the Amendments to the U.S. Constitution).

2. The items in each of the reporting categories are grade-level appropriate.

- Some test items are too complex for the early grades and too easy in the high school tests.
- Some items seem to require certain math skills.

3. The items in each of the reporting categories meet community expectation (fairness and sensitivity guidelines).

- There is an issue of technical equity across the districts. Teachers and students need to training on using the electronic format prior to the testing year.

4. Comments about the technology and functionality of the tests.

- Is the state-of-the-art for the electronic format for test items antiquated?

- Some formats seem particularly complicated. “Simulation” items with several questions based on the same set of documents might require complicated tasks where students have to continue to open and close documents to answer the questions.
- The prompt of a question might seem too wordy or confusing.

Section IV: Mathematics Review

Mathematics Standards and Assessments Review Committees

Discussion Summary

Introduction

The Academic Standards and Assessment Review Committees were created in 2014 by the Ohio legislature through the passage of HB 487. Beginning in January 2015, the committees have met to review the standards and assessments in four key academic areas. In accordance with Ohio revised Code, the Committee will continue to review Ohio's assessments annually.

The purpose of this document is to: (1) explain the legislative mandate to create the committees; (2) provide an overview of the review process that was followed and the role of the Ohio Department of Education in providing administrative support to the committees; (3) provide committee feedback summaries; and (4) suggest considerations for the future of the committees.

Legislative Requirement & Purpose

House Bill 487 created academic standards and assessment review committees for the subject areas of English language arts, mathematics, science and social studies.

The legislation states each subject area committee is comprised of the following members:

- Three experts who are residents of Ohio and who primarily conduct research, provide instruction, currently work in or possess an advanced degree in the committee's subject area;
- One expert shall be appointed by each of the following: the president of the Senate, the speaker of the House of Representatives and the governor;
- One parent or guardian appointed by the president of the Senate (or the speaker of the House, depending on the committee);
- One educator who is currently teaching in a classroom, appointed by the speaker of the House of Representatives (or the president of the Senate, depending on the committee);
- The chancellor of the Ohio Board of Regents (since renamed the Ohio Department of Higher Education), or the chancellor's designee;
- The state superintendent, or the superintendent's designee, who shall serve as the chairperson of the committee.

Each committee was legislatively charged to review the academic content standards for its respective subject area to ensure that such standards are clear, concise, and appropriate for each grade level and promote higher student performance, learning, subject matter comprehension, and improved student achievement. Each committee also shall review whether the standards for its respective subject area promote essential knowledge in the subject, lifelong learning, the liberal arts tradition, and college and career readiness and whether the standards reduce remediation. In addition each Committee was also charged to determine whether the assessments submitted to that committee are appropriate for the committee's respective subject area and meet the academic content standards adopted under this section and community expectations.

Finally, the legislation also requires the Ohio Department of Education to provide administrative support for each committee.

Process

In January 2015, prior to committees starting their standards and assessment reviews, the Ohio Department of Education provided a comprehensive orientation that covered topics such as ethics, Ohio Sunshine Laws, Open Meetings Act, the legislative charge for the committees, Standards-based education history, academic content standards overview, academic content standards development history, and an overview of resources and tools available for reviews. The Ohio Department of Education also used the orientation to establish a baseline of understanding regarding the history of the academic content standards, which were adopted by the State Board of Education in June 2010, and the multifaceted standards development process.

This session was conducted with committee members from all content subject areas meeting together. Following this portion of the day, each subject area committee met separately. ODE officials provided an overview of the format of the standards document and gave direction to committee members how to use the resources and tools.

From February 2015 to early June 2015, each respective committee convened for standards reviews. The first round of meetings occurred in February and March. During round one, committee members were introduced to the standards rubrics to use when conducting their reviews and were asked to provide comprehensive feedback on each standard using the rubric. Members reported their findings to the full committee. The committee agreed upon a plan to continue to review the next assigned sections of the standards on their own time in preparation for the next round of meetings.

Round two meetings, conducted in April and May, included oral reports on findings from individual reviews of the standards. The committees engaged in robust discussions based on their reviews and agreed upon assignments for the next section's "homework."

During mid-June 2015, the committees convened to recap the overall standards review process and to prepare for the assessment review process. In summary, much of the recap conversation centered on the difficulty of trying to determine whether standards promote "lifelong learning, the liberal arts tradition and college and career readiness" while looking at early grade standards (K-6). In preparation for the assessment reviews, the Ohio Department of Education oriented committee members to the assessment reviews and provided them with opportunities to practice the review process.

The tasks of the Academic Standards and Assessment Review Committee include an annual review of each assessment required by law for grades 3 through 8 and high school. In June, 2015, and July, 2015, the Ohio Department of Education provided times for each committee member to review their respective assessments and to provide feedback. These tests include the following for each content area:

English Language Arts: One test each at grade four through eight, English language arts I and II end-of-course tests for high school. (The Ohio Achievement Test for reading was administered for the last time to grade three students.)

Mathematics: One test each at grade three through eight, Algebra I or Integrated math I, Geometry or Integrated math II.

Science: Grade five, eight and the physical science end-of-course test for high school.

Social Studies: Grade four, six and American History and American Government for high school.

During the June standards and assessment committee meeting, Ohio Department of Education staff presented to committee members the process used by committees in the development of assessment items for all state tests. Staff members also presented the review process, the rubrics for collecting the feedback, the process for discussion of their review and the secure nature of reviewing the items.

Prior to being given access to the assessments, committee members were required to sign confidentiality agreements. Committee members were provided two weeks during the months of June and July to come to the Ohio Department of Education to complete the review. Time was available between 9am and 4pm Monday through Friday during the weeks of June 22-26 and/or July 20-24. Committee members scheduled times during these windows to review the assessments in a secure environment at the Ohio Department of Education and were reminded that if not kept confidential, the tests would lose their value and could not be used again.

During the review of the assessment items, each committee member who signed the confidentiality agreements had access to both the online version and a paper version of the online test. Other resources such as test specifications, answer keys, and item rubrics were also available as support materials. Ohio Department of Education staff members were made available to provide support to the committee members.

Each participating committee member completed a rubric. The test items were organized by the reporting categories for each content area and test. The committee members focused their review around two areas, alignment and community expectations.

Alignment:

Yes – The items in the Reporting Category are appropriate for the subject and address the corresponding content standards/evidence statements.

Partially – The items in the Reporting Category are appropriate for the subject and address the corresponding content standards/evidence statements with some exceptions (please provide evidence of items that do not meet the content standards).

No – The items in the Reporting Category are not appropriate for the subject and do not address the corresponding content standards/evidence statements.

Community Expectations:

Yes – The items in the Reporting Category meet the Fairness and Sensitivity Guidelines.

Partially – The items in the Reporting Category generally meet the Fairness and Sensitivity Guidelines with some exceptions (please provide evidence of items that do not meet the Fairness and Sensitivity Guidelines).

No – The items in the Reporting Category do not meet the Fairness and Sensitivity Guidelines.

During the committee meetings in late July and August, the committees met in executive sessions to discuss their reviews of the assessments. An overview of that discussion is provided within the appendices of this report.

In August 2015, the committee members who signed confidentiality agreements met in executive sessions to protect the content of the assessments. Members discussed their findings related to the assessment review.

Future Considerations

We recommend that the feedback be utilized as part of a larger body of feedback being used to guide the Ohio Department of Education as it continues its work with the state's existing content standards and assessments in English language arts, mathematics, science and social studies.

Mathematics Standards Review

Committee summary analysis of mathematics standards review committee feedback.

Overview

The Standards and Assessment Committee for Mathematics was comprised initially of seven people. These included two members selected by the speaker of the house, two members selected by the president of the senate, one member selected by the governor, a representative of the Ohio Board of Regents, and the state superintendent's designee. Committee members provided a summary of their reviews that are included in this section. Originally, the committee agreed to submit summaries not to exceed two pages. However, at a later meeting, they agreed to allow members who exceeded the page limit to include their summaries with the report. These are the summaries of the committee members and have not been edited.

The task of the committee was to review *Ohio's Learning Standards: K-12 Mathematics*. The committee used a rubric that included ten criteria identified in statute for review with focus on each of the domains in grades kindergarten through twelfth grade. Reviewers had the opportunity to rate the standard for each criteria as met, partially met or did not meet the criteria and to provide evidence to support their rating. This review was organized by grade bands K-2, 3-5, 6-8 and in high school the focus was around the conceptual categories.

Listed below are the domains for the K-8 grade bands review.

- K-2 – Counting and Cardinality; Number and Operations in Base Ten; Operations and Algebraic Thinking; Geometry; and Measurement and Data.
- 3-5 – Number and Operations in Base Ten; Number and Operations – Fractions; Operations and Algebraic Thinking; Geometry; and Measurement and Data.
- 6-8 – Ratios and Proportional Relationships; The Number System; Expressions and Equations; Functions; Geometry; and Statics and Probability.

Standards Review for Grades Kindergarten through Eight

The committee began working their way through each of the grade bands. Each domain was given a rubric template that listed the clusters at each grade for the domain and corresponding identification for each of the ten review criteria.

Listed below are the conceptual categories for the high school review.

- Number and Quantity
- Algebra
- Functions
- Geometry
- Statistics and Probability.

Standards Review for High School

The review of *Ohio's Learning Standards* for high school mathematics was organized around the six conceptual categories (Number and Quantity, Algebra, Functions, Geometry, and Statistics and Probability) and the related domains and clusters for each category. Standards were not organized by high school level mathematics courses, some standards at the high school level contain content that crosses multiple courses. The reviewers continued their use of the ten criteria as the basis for the review and in general found that most of the standards met or partially met the criteria.

Mathematics Committee Review Summaries

Summary Statement by Jane Ensign

The Mathematics Academic Standards Review Committee was created with the passage of HB 487 by the Ohio General Assembly on June 16, 2014. Each member serving on the Mathematics Academic Standards Review Committee individually reviewed every mathematics standard in grades Kindergarten through Grade 8 as well as high school math standards that include—algebra, functions, modeling, geometry, statistics and probability. Ten criteria established through law by the Ohio legislature were used as the rubric for this review. (See the Introduction for the ten criteria established in law).

From February through June 2015 the mathematics committee met to discuss our individual reviews of the Mathematics Common Core Standards. Meeting discussions focused on the mathematics standards as they relate to the ten rubric questions. Discussions also included topics such as the mathematics vocabulary used in the standards, appropriateness of a standard based on child development, level of difficulty and scope and sequence of the standards. Individual committee members frequently disagreed on one or more of these topics. However, it appears the majority of the committee members support the continued use of the Mathematics Common Core Standards in Ohio.

In June and July, 2015, mathematics committee members who signed a confidentiality agreement reviewed PARCC assessment items. However, later in the summer the Ohio General Assembly passed legislation that terminated the use of PARCC assessments in Ohio. Having reviewed the PARCC mathematics assessments, this reviewer agrees with that decision.

In this committee member's opinion, the Common Core Standards

- are a step up in difficulty from the original Ohio Mathematics Standards adopted by the Ohio legislature in 2001 and better prepare students for college and 21st Century careers.
- establish goals and expectations for all students at all grade levels.
- provide a "yardstick" from which to set expectations and measure the level of learning for each student.
- need to be implemented for at least five years to provide teachers with time to adjust to teaching the Common Core Standards by developing effective lessons and classroom assessments, both formative and summative, aligned with the standards.

Assessments aligned with the Common Core Standards

- show how students individually and collectively perform on the same learning expectations by student, by school and by district.
- should be developed by the same provider to show continuity across the grades.
- should provide data to schools and the public to determine the effectiveness of the standards as they are implemented in Ohio's districts, schools and classrooms.

This reviewer believes standards are effective for teachers, parents and primarily for students--Ohio's future workers and leaders. The data received from these assessments provide educators and parents with information that can be used to improve teaching and learning. However, there are multiple ways to measure student achievement in addition to yearly standardized assessments, which we all need to recognize when reviewing assessment data.

While standards are important, it is the opinion of this reviewer that the teacher in each classroom is the most important learning component. The teacher's knowledge of the content and standards, child development, instructional strategies, individualization and learning styles are vitally important to student success. Teachers who connect with their students and instill a desire to learn by setting high standards and then supporting students to achieve at high levels are the power behind the standards. This reviewer supports continued use of the standards and continued support for teachers through professional development in implementing the standards effectively in their classrooms to promote student achievement.

Summary Statement by Mindy Bettinger

Overall, the Common Core State Standards for Mathematics (CCSS-M) adopted by the State of Ohio have both good and bad components. [As a note to readers, this summary focuses on the components of the CCSS-M and not the writer's opinion about the overall need for and implementation of such standards.] Throughout, the CCSS-M use correct mathematical language and utilize concrete manipulatives to effectively help students construct their own correct mathematical thinking. The CCSS-M also eliminate excessive redundancy among grades. However, the CCSS-M are often developmentally inappropriate for all students; the standards expect students to use levels of thinking that their brains are not yet capable of. In addition, the CCSS-M are often overly wordy and, as they reach the high school level, are geared towards those students who plan to attend college and not those students who plan to enter directly into the workforce or learn a skilled trade.

In the K-2 grade band, the CCSS-M focus on counting and number sense and only use the operations of addition and subtraction. This is a positive as students can focus on truly understanding numbers. As a negative, students in second grade are expected to combine multiple strategies and even use symbols to solve two-step word problems (See 2.OA.1). At such a young age, most students do not have the ability to synthesize so many different ideas or utilize variables.

In the 3-5 grade band, the CCSS-M once again aid student understanding by using visual fraction models and tiling for areas. The CCSS-M also introduce graphing points in the fifth grade (5.G.1) at a time when students can comprehend the basics of a coordinate plane and gain familiarity with graphing. However, the CCSS-M once again require more from students than they are mentally capable of. As examples, all students are expected to solve two-step word problems involving the four operations using variables in third grade (3.OA.8) and understand the hierarchy of quadrilaterals in fifth grade (5.G.3, 5.G.4) when many high school students struggle to perform both tasks. One fellow committee member pointed out that repetitive explanations using the same reasoning are unnecessary, and another mentioned the lack of inclusion of English measurement units such as cups, quarts, and gallons.

In the 6-8 grade band, I question the developmental appropriateness of topics such as requiring compound probability in seventh grade (7.SP.8), solving systems of two linear equations in two variables algebraically in grade eight (8.EE.8), applying the Pythagorean Theorem in three dimensions in grade eight (8.G.7), and also analyzing bivariate categorical data in grade eight (8.SP.4). In addition, the CCSS-M are remiss in not mentioning pictorial representation when introducing functions in eighth grade (8.F.1). I agree with a fellow committee member who likes the inclusion of mean absolute deviation as a statistical measure in sixth grade (6.SP.5). I also like the use of dimensional analysis in sixth grade (6.RP.3) as preparation for high school chemistry but am unsure whether students will understand and remember the process. Finally, the CCSS-M again helps with student comprehension by requiring that they use the Pythagorean Theorem to find the distance between two points in the coordinate plane in eighth grade (8.G.8).

At the high school level, the CCSS-M once again have both positive and negative components. On the plus side, students are tasked with using units consistently (N.Q.1) and rearranging formulas to isolate certain quantities (A.CED.4). They are introduced to average rate of change (F.IF.6), piece-wise functions (F.IF.7), and end behavior of functions (F.IF.7), all precursors to the study of calculus. On a negative note, the CCSS-M fail to include the Zero Product Property when introducing the Remainder Theorem (A.APR.2). In general, as mentioned previously, the CCSS-M often expect too much of all students at the high school level and focus more on the college-bound student. For instance, students are expected to derive the quadratic formula (A.REI.4). Given my experience teaching high school students of all ability levels, not all high school students develop the abstract thought necessary to complete such a proof. On a similar level, not all students should be expected to derive the equation of a parabola (G.GPE.2).

Summary Statement by Kate Whitesel

The CCSS Standards for Mathematical Practice, renamed Ohio's New Learning Standards, include subject matter topics that are an important part of primary and secondary education. Issues arise out of the non-traditional definition of education standards given in the document and the flawed philosophy in accordance with that to attempt to change education from students acquiring knowledge to teachers forcing understanding and processes.

While a review can lead to identifying those topics included and not included in the standards, that would lose sight of the overarching issues of concern. Our charge as a committee was not to provide editing comments for use by the Ohio Department of Education, but to review the standards based on criteria specified by the Ohio Legislature. To that end, I submit the following summary.

Clear and Concise: The arrangement of the standards document and the order and arrangement of the individual standards often compromises the clarity and leads to confusion. Some topics are not listed in an order that makes it easy to ascertain what has been covered in the immediate or prior grade levels.

Some topics are not presented in an order for a logical learning progression. Important information is given in footnotes, tables and prose in various parts of the document making it difficult to keep track of all that is relevant. Some standards are unnecessarily and detrimentally wordy. Multiple standards are often written as one standard. Like topics and concepts are not always presented by a similar explanation or in the correspondingly named domain from one grade to the next. Standards contain typographical errors. Often the strategies included in the standards cause confusion of what is expected.

Use of "understand" and "explain" makes expectations vague and opens the opportunity for the developers of assessments and teaching materials to define the interpretation of the standards.

Grade level appropriate: Standards by grade level create a definition of each grade level. As a result, all standards, by identity, regardless of content, would be grade level appropriate. Evaluating this criteria rooted in circular logic would lack any value or meaning. In our schools a grade level is comprised of unique students at various points of development, on a continuum increasing in knowledge and abilities.

Accordingly, appropriateness cannot be defined for the masses.

Promote higher student performance, learning and improved student achievement: What promotes these gains by students can vary greatly from one student to the next; each student is a unique individual. To make a broad determine of what promotes these outcomes would be naive, and relying on such a determination to influence an educational system for all students in Ohio would be ill-advised.

Therefore, an evaluation of the standards on this criteria could not be made in good faith.

Promote lifelong learning: While the ability of standards to promote lifelong learning cannot be established, the focus on theory before students gain abstract thought and the confidence developed by automaticity of facts and operations raises concern about frustration and discouragement that could result. Standards written requiring a student to "understand" and "explain" ironically could lead to students learning an explanation or process they do not truly understand. They may miss learning facts and concepts and acquiring skills. Some students with thorough understanding may not have the ability to express it in the way required. Also, at the lower grade levels expectations that require reading skills which some students may not yet adequately possess is of concern. All these resulting situations could prevent able-students from a desire to pursue a future interest in mathematics and related fields, and discourage learning.

Promote the liberal arts tradition: A definition of the specific subject matter content of "the liberal arts tradition" has not been provided. No determination of this criteria can be made.

Promote college and career readiness: The specific type and level of college and career are not identified and entry requirements are not defined. It cannot be determined that the standards promote college and career readiness.

Support subject matter comprehension: The intent for students to gain subject matter comprehension is evident by the content of the standards, however, the end goal could be compromised. The standards are constructed with the use of multiple strategies, implied and explicit pedagogy, and the expectations of students to discover theory over gaining knowledge. Delaying the memorization of basic mathematics facts and not requiring automaticity could inhibit the student's ability to grasp deeper comprehension of subject matter because without automatic use of mental mathematical tools conscious focus is still needed on basics, inhibiting the mind from deeper thought.

Some standards assume prior knowledge that was not addressed in prior standards and some require abstract thought by students at an age when they may not yet have developed those abilities. In some instances the standards require multiple strategies at once, which may be too much for some students, causing confusion rather than comprehension. The standards' inability to address students as unique individuals who may not respond to the same methods and means of education, compromises support of subject matter comprehension.

Promote essential knowledge in the subject: The standards include essential subject matter in mathematics but it is frequently enveloped in forced pedagogy and seems to be driven by a flawed premise that understanding can be taught, resulting in the promotion of essential knowledge to become secondary to the pedagogy in and philosophy behind the standards. This, in combination with mandated standardized tests, could lead to the teaching of ways to demonstrate the pedagogy rather than focusing on students gaining essential knowledge and skills.

It is noted here that the standards do not address knowledge of mathematical terminology. Being able to comprehend the language and to converse in it is essential to advancing knowledge.

The standards also seem to ignore the student's present need for practical mathematical ability.

Enabling students to daily use and apply mathematical tools with ease to their current life situations as they also prepare for their future will incline them to be more likely to embrace mathematics rather than be intimidated or discouraged by it. And thereby the ultimate goal of education can be achieved: to equip citizens to lead fulfilling and successful lives.

Summary Statement by Carl Jones

Grade Band K-2

I am generally pleased with the mathematical standards for K-2. There is a reduction in the number of topics and the number of standards from past versions at this grade band. There is a strong emphasis on number sense and I believe there is a good balance between the procedural, conceptual, and the application of mathematics. I think the standards are clear in their expectations for teachers and students and lay a great foundation for the future learning of mathematics.

Some specific comments about this grade band include counting backwards and the introduction of money. Counting backwards could be implied from the standards but is not specifically mentioned. Many primary teachers may overlook this important, fundamental skill.

I agree with the position of not teaching money in kindergarten. My experience is that most students are just not ready for a real understanding of our monetary system. However, I believe an introduction to money (recognizing coins and their values) would be appropriate for grade one. Geometry is introduced and is used to lay groundwork for future learning of fractions, area, and multiplication.

Grade Band 3-5

I like the direction of the mathematical standards for 3-5. There is a continued reduction in the number of topics and the number of standards from past versions of standards. There continues to be a strong balance between the procedural, conceptual, and the application of mathematics. It is clear the main objectives of this grade band are to reach proficiency in the procedure, understanding, and application of the arithmetic operations and also to develop a sound understanding and use of fractions.

I specifically like the way fractions are introduced with the unit fraction and relating it to the same steps of learning as whole numbers were learned in primary. I agree with the approach of teaching decimals as a subset of fractions and relating them to fractions instead of a separate set of numbers. Geometry and measurement topics are introduced and a conscience effort of relating these to arithmetic operations and fractions should not be missed. The geometry topics also do a much better job of aligning to the learning levels of geometric understanding established by the research of van Hiele.

There is some concern that some statistics and probability topics are missing from this grade band. I would not be opposed to adding some of these topics but not if it detracts from the focus on fractions and the mastering of the arithmetic operations. Any new version to these standards will have to be mindful how easy it becomes to add standards to please various constituents at the cost of losing focus on the critical topics.

Grade Band 6-8

The standards at grades 6-8 focus on ratio/proportion, developing the real number system, building algebra concepts, and introducing statistics. If students haven't reached a mastery of their mathematics taught in K-5, this grade band will be problematic.

I believe there are two important points that some educators and the public in general do not understand about this grade level. The first is the introduction of statistics and probability. Until this grade band we have been focused on arithmetic and algebra concepts and it may be easy to overlook this critical content. I personally believe that everyone needs a sound understanding of statistics to function well in our current society.

The second point is the amount of algebra in this grade band – especially grade 8. Most of what we traditionally called Algebra I is now included in the grade 8 standards. In our rush to accelerate students the standards at this grade band are often slighted or skipped entirely.

In the next version of Ohio's Learning Standards, I believe the authors need to pay closer attention to the GAISE (Guidelines for Assessment and Instruction in Statistics Education) model when developing statistics and probability standards. I think the current standards do a very good job of providing a coherent path for the learning of algebra. However, I think improvements could be made in a coherent path for statistics.

I believe functions and function notation covered at this grade band is a big improvement over past versions of the standards. It is covered earlier and has a better balance between the algebraic, numeric, graphic and verbal interpretations of functions.

Absolute value concepts are given a conceptual context and are an improvement over the typical “procedure only” treatment they were given in the past.

Grade Band 9-12

The standards at this grade band are arranged by content strand and not by courses. This was done because of all the variations of high school mathematics courses that are currently being used in high schools across Ohio. This includes the use of integrated programs and those that are content specific.

At this level I believe we begin to lose the focus and coherence in the standards we were achieving in grades K-8. We lose focus because there is not really a reduction in standards. Everything that was there in the past is still there, maybe even more. We lose coherence because it is pretty much up to each individual school to define the topics they choose to cover in each course and how they arrange the sequence of their courses.

The state assessments will actually provide the guidance for the first couple of years. Whatever is assessed on the Algebra 1 and Geometry (or Integrated 1 & 2) mathematics assessments will need to be taught in the first two high school courses. After that there is little or no guidance.

The other concern I have is the intent of the high school mathematics standards. Some criticize that the standards do not cover topics beyond Algebra 2. However, it has always been my understanding that the goal of high school mathematics standards were to outline the levels of mathematics that *all* students needed to attain to be successful and not to dictate the entire high school curriculum. This needs to be communicated more effectively to educators and the general public.

This in turn leads into the second problem. At this level, students are beginning to make plans and decisions for their future career intentions. Depending on whether their future includes a STEM related career or not will greatly impact the level of mathematics they should know to be successful. Currently our standards make *some* distinctions between students seeking a STEM career and those who are not. However, I think more should be done in this area to differentiate the standards for each career path.

Summary Statement by Deborah K. Guebert

December 4, 2015

Grade Band K-2 Short Summary

It is difficult to write any sort of review of the 2010 Common Core State Standards (now renamed as Ohio's New Learning Standards) without lapsing into outright mockery. Despite their claim to improved focus, clarity, and rigor, even a cursory glance at the most basic elementary level standards, will demonstrate otherwise. Added to the confused and convoluted wording of these "standards", is their glaring age-inappropriateness, a flaw which continues throughout the elementary level.

Starting with the **Mathematics/Kindergarten** section (p9 of the Common Core State Standards for Mathematics, available on the internet), there is this instruction: Students choose, combine, and apply effective strategies for answering quantitative questions.... This "standard" continues for another three lines. As one well-known comedian might say, "You can't make this stuff up." Most students, even as late as grade 5 or 6, would struggle to meet this expectation, and nearly all non-math oriented adults would as well.

Should one think that the above statement is an anomaly, consider how many reasonably intelligent adults would be able to interpret this Kindergarten Counting and Cardinality (K.CC) standard: Compare two numbers between 1 and 10 presented as written numerals. Numbers? Numerals? Written numerals? How many kindergarten teachers care about the finer points of distinction between these terms? And if they did, would they be very effective with 4 and 5 year old learners?

Just one more example from the Kindergarten arsenal, under Number and Operations in Base Ten (K.NBT) should suffice: Compose and decompose numbers from 11 to 19 into ten ones and some further ones, e.g. by using objects or drawings, and record each composition or decomposition by a drawing or equation....

When one notes in the Ohio Revised Code Section 3301.079 (A) that the statewide academic standards are to emphasize coherence, as well as to be "clearly written, transparent, and understandable by parents, educators, and the general public," it is difficult to imagine how this kind of absurdly over-complex wording, confused thinking, and age-inappropriate expectation could have been accepted. Read them and weep.

Grade Band 3-5 Short Summary

Following on from the K-2 Band Short Summary, which commented on the overly complex and confused wording, as well as the age-inappropriate requirements of that band, one can only re-emphasize those aspects in the Common Core State Standards (renamed as Ohio's New Learning Standards) for Grades 3-5.

As with the earlier years' standards, this band also promotes the pedagogy of "discovery learning". Time-honored, effective methods for the basic operations of addition, subtraction, multiplication, and division are deliberately withheld for **years**, forcing the child to reinvent the wheel of basic arithmetic operations for himself/herself. Standard mathematical vocabulary is also avoided, the student being urged to "use *informal* language" (4.OA) instead. The regular repetition of phrases such as "students develop their understanding" make it clear that the focus is on the *child to develop his/her own understanding*. Under 3.OA, the child is exhorted to: *Understand* properties of multiplication and the *relationship* between multiplication and division. Students are expected to "*choose strategies*", including paleo methods like using tally marks, counting pebbles, and drawing pictograms.¹ Third graders are expected to: Fluently add and subtract within 1000 *using strategies and algorithms* based on place value, properties of operations, and/or the relationship between addition and subtraction (3.NBT). Nowhere is fluency with the simplest, most efficient way to add and subtract

¹ These "strategies" are not without their merit, if used as introductions or illustrations. However, used as *methods*, they are extremely frustrating and time consuming, especially when asked to use them with numbers as high as 1000. This is expected as early as Grade 2, according to p17 of the online **Common Core State Standards for Mathematics**: They solve problems *within 1000* by applying their *understanding of models* for addition and subtraction....

mentioned, nor will it be until Grade 5, two **years** away. By this time, most children’s logical brain and natural curiosity will have withered away, starved of clear facts and solid information.

Devaluing strict logic and precisely defined mathematical language in favor of fuzzy language and “friendly” numbers, results in generally incoherent, and even incorrect statements throughout the Common Core standards. This approach encourages vague, sloppy thinking, utterly failing to respect the distinctive quality of mathematics as a precise discipline, degrading it to the point where its inherent beauty, based on clarity of order and structure, disappears. How many children will choose to study higher math, when their only experience labeled “math” has been with incoherence and frustration?

Grade Band 6-8 Short Summary

E. D. Hirsch, in the Grade 6 Mathematics section of his highly regarded Core Knowledge Sequence, states, “Mathematics has its own vocabulary and patterns of thinking. It is a discipline with its own language and conventions. ...it is critically important to attend to math as math.”

This sounds obvious, yet is a principle stood on its head by the ideologically driven Common Core Math Standards (now relabeled as Ohio’s New Learning Standards). One of the signal failures of the deliberately casual, develop-it-yourself approach that is embedded in these standards, is a lack of respect for the precision of standard math terminology and methodology. It is not until Grade 6, after years of directives to “use strategies,” that despairing students are finally introduced to the standard algorithms for basic arithmetic operations (p38,6.NS #3). However, even in Grades 7 and 8, students are still urged to use “*informal* geometric constructions...”, to “begin *informal* work with random sampling...”(both on p41), as well as to “use *informal* language or arguments (Intro to Grade, 8.G #5, 8.NS #1).²

The ambiguity resulting from the deliberate avoidance of clearly defined mathematical methods and vocabulary (and/or the sloppy misuse of standard math terms), makes it nearly impossible for a child to gain an appreciation for the beauty of precision, order, and logic, which characterizes authentic mathematics. Most children have a natural craving for clarity, logic, and regular structure. Refusing to satisfy that desire will result in their deep-seated aversion to that which has been presented to them as “math.”

Throwing the would-be learner into the deep end of a pool of undifferentiated, primitive “strategies,” surely qualifies as a form of child abuse. Yet the C.C. standards insist on this approach, apparently in an attempt to realize the utopian goal of equalizing the achievement potential of every child. Unfortunately, the real life result is the diametric opposite, as the evidence demonstrates.³ Those children from homes with the least resources will suffer the most, as these less advantaged children are the most dependent on what the school system has to offer. This is the sad reality of a utopian scheme concocted in a hothouse academic environment by zealous theorists, theorists who apparently had only tenuous contact with normal human beings.⁴

High School Band Short Summary

As in the earlier grade bands, the high school band is made up mostly of pseudo-mathspeak. Professor emerita of mathematics at U. C. Berkeley, M. Ratner, makes this relevant comment regarding the standards: “It became clear to me that the Common Core’s “deeper” and “more rigorous” standards meant replacing math with some kind of illustrative counting saturated with picture, diagrams and elaborate word problems. Simple

² For more specific examples, please see Appendix A.

³ “Common Core Math will Reduce Enrollment in High-Level High School Courses” by R. P. Phelps and R. J. Milgram, The Pioneer Institute

⁴ For more detail see “The Revenge of K-12: How Common Core and the New SAT Lower College Standards in the U.S.” by Richard P. Phelps and R. James Milgram

concepts are made artificially intricate and complex with the pretense of being deeper—while the actual content taught was primitive.”⁵

Not surprisingly, therefore, the main emphasis of the high school math standards seems to be applied or vocational, rather than liberal arts or college prep. There is the usual refrain of “represent,” “model,” “interpret,” and “real world problems” familiar from earlier years, along with references to “data”, “create,” and “construct.” There is an entire “conceptual category” (p51) devoted to modeling, which is seen to be of primary importance: “Modeling is best interpreted not as a collection of isolated topics but in relation to other standards. Making mathematical models is a Standard for Mathematical Practice....”

Another “conceptual category” listed is Statistics and Probability, despite that being historically regarded as an *applied* branch of mathematics, and unworthy of inclusion in a liberal arts curriculum.

Geometry is approached through the visualization of physical “transformations,” rather than from the classical Euclidian approach of using axioms and postulates to prove theorems, the latter approach noted for its development of logical thinking.

Calculators, spreadsheets, and computer algebra systems are promoted (p51) as “ways for students to become better acquainted with these new number systems and their notations,” in apparent ignorance of the well-known “Garbage in, garbage out,” result with programmable technology.

Despite the “real world” application that is encouraged at every turn, the language of much of these standards is vapid and vague, or just incoherent. One can put a finger down almost at random and find statements such as: “Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context.” It is difficult to avoid a sense of wonder and astonishment that this kind of writing could have been accepted by any person with basic common sense, much less used as the basis for the education of an entire nation’s children.

⁵ “Making Math Education Even Worse” by Marina Ratner, WSJ, Aug. 5, 2014

Summary Statement by Bradford R. Findell, PhD

January 22, 2016

Ohio's new mathematics standards are based on the *Common Core State Standards for Mathematics*, (CCSSM or "the Standards") first adopted by Ohio in 2010 and largely common across more than 40 states in the U.S. Although some states (e.g., California) amended the CCSSM upon initial adoption, and other states (e.g., Florida) amended the standards somewhat later, Ohio has not yet made any state-specific changes. Thus, the work of the mathematics standards review committee is an opportunity to consider, with the benefit of several years of experience, what amendments and adaptations might make sense for Ohio's students and teachers. To support the committee's work, I am pleased to step back from the detailed analysis (as captured in the committee's review rubrics), to provide this summary of my findings.

Overall, the current Standards represent a substantial and significant improvement over Ohio's previous *Academic Content Standards in Mathematics*, adopted in 2001. Nonetheless, and unsurprisingly, there is room for improvement. Before providing a grade-by-grade review and describing areas for improvement, it is worthwhile to highlight several essential overarching features of the current Standards that must be preserved in any revision: focus, progression, balance, and the standards for mathematical practice.

Essential Overarching Features

Focus. Since the late 1990s, mathematics standards and curricula in the U.S. have been characterized as "a mile wide and an inch deep," covering too many topics in each grade or course, and treating each shallowly. Ohio's 2001 mathematics standards fit this description. Ohio's new standards, in contrast, draw on the standards of high achieving countries by focusing on a few "critical areas" in each grade or course and by describing expectations for deep learning.

Progression. Mathematics instruction in the U.S. has long been beleaguered by repetition of content from grade to grade. This repetition is both a consequence and a symptom of the mile-wide-in-deep characterization above. To overcome this challenge, the Standards describe clear progressions of knowledge and skills across grades.

Balance. Consistent with research on mathematics learning, the Standards call for both procedural fluency and conceptual understanding. The Standards explicitly include important and necessary fluency expectations, such as the following:

- Basic addition combinations (2.OA.2)
- Basic multiplication combinations (3.OA.7)
- Standard algorithms for addition and subtraction of whole numbers (4.NBT.4)
- Standard algorithm for multiplication of whole numbers (5.NBT.5)
- Standard algorithm for division of whole numbers (6.NS.2)
- Standard algorithms for arithmetic of decimals (6.NS.3)

These benchmarks are developmentally-appropriate culminations of progressions of standards that call for strategies based on place value and properties of operations. Such strategies are useful for using the algorithms correctly, and they are essential for understanding the algorithms. The Standards provide frequent descriptions of what understanding looks like, with the following rationale:

One hallmark of mathematical understanding is the ability to justify, in a way appropriate to the student's mathematical maturity, *why* a particular mathematical statement is true or where a mathematical rule comes from. (p. 4)

To support such understanding, the Standards are infused with research-based thinking strategies that provide meaning and simultaneously support reasoning and problem solving alongside fluency. In grade 1, for example, the "make a ten" strategy supports place-value understanding. Beginning in grade 3, area models for multiplication help explain the commutative and distributive properties of multiplication as well as algorithms for multiplication of both whole number and fractions. Furthermore, algorithms for multiplication of whole numbers are generalized in high school when students multiply polynomials.

Standards for mathematical practice. The Standards build on previous descriptions of mathematical processes and proficiencies by describing how mathematically proficient students engage in the work of mathematics. Where Ohio’s 2001 mathematics standards included processes such as “problem solving” and “communication,” the Standards now provide more direction, calling for students to “make sense of problems and persevere in solving them” and to “construct viable arguments and critique the reasoning of others.” Furthermore, these standards for mathematical practice are highlighted in the overview of every grade and also threaded throughout the content standards.

The paragraphs that follow describe grade-specific critical features of the Standards that should be maintained and also mention a few places for improvement.

Kindergarten – Grade 3

Kindergarten. Students develop essential connections between counting (the sequences of words, the sequence of numerals) and cardinality (number as an idea, represented as a numeral), emphasizing one-to-one correspondence and the role of the “last number name said”. They begin habits of composing and decomposing numbers. They begin making sense of place value with numbers from 11 to 19 by composing and decomposing them as a ten and some number of ones. Students also develop habits of making sense of numbers and operations by direct modeling, by drawing pictures, and by writing equations with numerals.

Grade 1. Critical here are the meanings of addition and subtraction (e.g., adding to, taking from, putting together, taking apart, and comparing) and the relationships between them. These meanings support the properties of operations (e.g., commutativity and associativity, though students need not use the formal terms), and unknowns in equations promote algebraic thinking. Also critical here is the emphasis on place value: bundles of tens and some number of ones. Students begin measurement concepts, emphasizing comparison and equal-sized units, and they compose and decompose shapes.

Grade 2. Essential here is the increased emphasis on base-ten numeration, counting by fives, tens, and hundreds. Students are expected to have fluency with addition and subtraction within 100. For addition and subtraction within 1000, students use concrete models and drawings, develop strategies based on place value understanding and the properties of operations, and relate the strategy to the written method

SUGGESTIONS

- The concepts and skills for counting backward are missing from the standards and might be added in Kindergarten.
- Standards about length (1.MD.1-2, 2.MD.1-6) might be better classified as geometry.

Grades 3 – 5

Grade 3. Critical here are meanings of multiplication (equal groups, arrays, and area models), meanings of division (number of objects in each group and number of groups), and meanings of fractions (as copies of unit fractions and as numbers on the number line). Basing fraction meaning on unit fractions, students compare fractions and reason about equivalent fractions.

Fractions. The concept of “unit fractions” (e.g., $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, ...) was central in the mathematics of Ancient Egypt, and it has a long history in mathematics research. In the CCSSM, the idea that $\frac{3}{5}$ is “three pieces of size $\frac{1}{5}$ ” serves as a fundamental meaning that allows students to use their knowledge of whole numbers to make sense of fractions and their arithmetic in a careful progression from grades 3 through 6. For example, $\frac{3}{5} + \frac{4}{5}$ is clearly “seven pieces of size $\frac{1}{5}$, which would be $\frac{7}{5}$.” Note that the improper fraction is unproblematic. To make sense of fraction arithmetic, the standards encourage the use of visual fraction models (based on length or area, unit fractions, and meanings of operations), thereby strengthening connections among number, geometry, measurement, and even algebra. Visual models are not required for computation.

Grade 4. Students use unit fractions and whole number arithmetic to make sense of equivalent fractions, addition of fractions with like denominators, and the product of a whole number and a fraction. Students use their knowledge of fractions to make sense of decimals to tenths and hundredths. They begin using angles (both as turning and as formed by rays), and they learn that angle measure is additive.

Grade 5. Students use area models to make sense of fraction multiplication and also to show that the area formula for rectangles makes sense even with fractional side lengths. Students learn a critical consistent feature of the base-ten place value system:

5.NBT.1. Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and $\frac{1}{10}$ of what it represents in the place to its left.

They use this feature to explain patterns of zeros and the movement of the decimal point when multiplying or dividing by powers of ten.

Patterns. “Guess what comes next” patterns, which have been common in school mathematics, are mathematically dubious because most any answer could be correct. The standards, in contrast, emphasize patterns with a given rule and patterns in arithmetic. With underlying structure, such as in the multiplication table or as provided in a problem context, students can reason (not just guess) what should come next—and why.

SUGGESTIONS

- Standards about area and perimeter (3.MD.5-8, 4.MD.3), angles (4.MD.5-7), and volume (5.MD.3-5) might be better classified as geometry.
- The data standards in these grades (3.MD.3-4, 4.MD.4, 5.MD.2) focus mostly on line plots and do not progress much across the grades. Maybe some of the grade 6 data displays could move earlier into grades 4 or 5.
- For connections to fraction multiplication, and to relieve some of the pressure in the middle grades, some probability concepts could begin in grade 4 or 5.
- It is appropriate in grade 5 to begin to discuss properties of quadrilaterals logically and with careful definitions. Subcategories and hierarchical classification of quadrilaterals (5.G.3-4), however, is too much to expect. These ideas should be softened in grade 5 and postponed until later grades.

Grades 6-8 review

Ratios and Proportional Relationships

This is the centerpiece of middle grades mathematics, building upon fractions from grades 3-5 and undergirding functions, which begins formally in grade 8. This content is also critical for college and careers. Proportional relationships are particular kinds of relationships between quantities: functions of the form $y = kx$. Critical here is the unit rate, which is later interpreted as the slope of the linear equation.

In some problem contexts, proportional relationships can be interpreted as reasoning about equivalent fractions. In these situations, students can also write an equation and then solve it, which strengthens essential habits for algebra. (Note: This habit is much more broadly applicable than “set up a proportion and cross multiply,” a misunderstood skill that students often misapply.)

Statistics and Probability

An important goal of the CCSSM by the end of high school is statistical literacy, which is useful for not just science and social sciences but also for everyday life, such as reading the newspaper. Thus, it is wise that students begin learning statistics in the middle grades, if not earlier.

Mean absolute deviation (MAD), although unfamiliar to many, is an intuitive measure of spread that supports understanding of standard deviation, introduced in high school. Furthermore, MAD is an immediate application of the idea of absolute value, also introduced in grade 6.

SUGGESTIONS

- The sampling ideas in grade 7 are quite sophisticated, and the distinction between a sample and a data set is subtle.
- There is a lot of probability content in grade 7. Introducing the simple ideas earlier and postponing probabilities of compound events might make sense.
- There is a lot of statistics in grades 6 and 7, and spreading it out a bit might be worthwhile. Sequencing of topics perhaps could be improved.

Geometry

In grade 7, the scaling ideas (7.G.1) are about similarity. Drawing figures from given conditions (7.G.8) undergirds congruence. These ideas are developed more fully in grades 8 and in high school.

Standards about the Pythagorean Theorem (8.G.6-8) are a dramatic improvement over previous approaches involving only the equation. The phrase “explain a proof” can help bridge the gap between informal justification and formal proof. And distance in the coordinate plane is an application of the Pythagorean Theorem rather than a formula to be memorized. The Pythagorean Theorem was in grade 7 in the previous standards; grade 8 is a more appropriate place for it to be learned conceptually, as a connection between length and area, with respect to right triangles.

SUGGESTIONS

- In 6.G.1, it would help to be clearer that the standard implies that students be able to explain area formulas for triangles and various quadrilaterals.
- There appear to be no clear standards that introduce similarity as a proportional relationship between quantities (building from 7.G.1).
- Need to be explicit that transformations don’t require a coordinate system.

The Number System

These standards are the culmination of decimal and fraction arithmetic (particularly division) from grades 4 and 5 and also the beginning of the rational numbers and the idea of a number system.

In the previous standards, arithmetic of negative numbers was introduced in grade 5. Separating the idea of negative numbers (grade 6) from their arithmetic (grade 7) is an opportunity to promote better understanding than has been typical.

This progression is supported by long division (grade 6), fractions as repeating decimals (grade 7), and then the introduction of irrational numbers as non-repeating, non-terminating decimals (grade 8).

Expressions and Equations

Radicals (8.EE.2) and irrational numbers (8.NS.1-2) are introduced in grade 8 (and not earlier) because the Pythagorean Theorem makes the ideas necessary.

A critical connection is using similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane (8.EE.6).

In some standards and textbooks, the rules of exponents (8.EE.1) are introduced long before zero and negative exponents, but this approach requires three separate rules for the division rule for exponents. Thus, the CCSSM has made the right choice introducing them at the same time.

SUGGESTIONS

- Rules of exponents (8.EE.1) would be improved by making clear that the meaning of 0 and negative exponents follows from extending the properties of counting-number exponents to zero and negative integer exponents (as in high school for rational exponents).

Functions

A critical habit is approaching functions with algebraic, numerical, graphical, and verbal representations. The key idea for grade 8 is distinguishing direct proportions (as in grades 6 and 7) from linear functions that are not direct proportions. It is wise not to require function notation at this point. It is wise also to talk about input and output values rather than the formal language of domain and range, which is introduced in high school.

It should be noted that linear functions, along with linear equations, is the bulk of what has typically been learned in Algebra 1. Thus, with the CCSSM, all students begin the content of Algebra 1 in eighth grade.

High School review

Overall the high school standards raise the bar significantly, which is an important step toward improving college and career readiness of all students. Critical features may be summarized as follows:

- Algebra 2 for all students
- Different forms of an expression or equation serve a purpose (seeing structure in expressions)
- Sequences are functions
- Congruence based on transformations
- Statistics for all, based on simulation
- Modeling as a habit, threaded throughout the standards

Politically, it was wise not to organize the high school standards into courses, because some of Ohio’s high-quality mathematics programs have made significant improvements through integrated courses. At the same time, other high-quality programs have made progress within traditionally-named courses. The standards should allow both approaches to grow and flourish.

Overall suggestions

The standards need to be studied rather than skimmed, and perhaps the introductory high school pages could make this necessary habit clear: Without careful reading, high school teachers (and assessment developers) sometimes overlook subtle distinctions between what is expected of all students and what may be expected of some students, as indicated by standards that are marked with (+), roughly the divide between Algebra 2 and Precalculus. Here are a few places of misinterpretation, some of which are detailed below:

- Complex numbers (division not required)
- Inverse functions (very modest expectations)
- Logarithms (very modest expectations)
- Trigonometry (just enough to model periodic phenomena)
- Sequences and series (need not be taught together, and needs no formulas)

The high school standards pose some additional logistical and curricular challenges:

- There appears to be too much content; the focus is not clear.
- Subtle distinctions between grade 8 and high school (or too much apparent overlap).
- Some standards cut across courses.
- The needs of career-intending students are hard to envision in the Standards, as written. More attention to modeling might help.

Number and Quantity

The standards emphasize number systems and the distinction between rational and irrational numbers. These standards provide good opportunities for reasoning and proof about number ideas (rather than merely in geometry).

Another critical idea is that the meanings of rational exponents follow from the rules of integer exponents and connect to radicals.

Science teachers particularly appreciate the attention to units (dimensional analysis) in modeling situations.

For complex numbers, all students are expected to add subtract and multiply them, as this is what is necessary to verify that a particular complex number is the solution to a polynomial equation. Division of complex numbers can be reserved for a Precalculus course for interested students.

Vectors and matrices are excluded from the expectations for all students. This was a wise decision because it is difficult to describe a coherent set of expectations about vectors and matrices that would not take significant time away from other content that is more critical for college and career readiness.

Algebra

Seeing structure in expressions is a critical idea for college readiness, as is the realization that different forms of an expression reveal different features, thus there is no “simplest” form. More generally, many of these standards are about reasoning, explaining, and solving problems.

An important connection is between the arithmetic of polynomials and the arithmetic of integers (A-APR.1).

A-REI.11 is a critical connection between functions and algebra that can potentially unite the many different equation-solving techniques.

SUGGESTIONS

- The algebra standards would benefit from explicit attention to the zero-product property, as it relates to the Remainder Theorem (A-APR.2) and finding zeros of polynomials (A-APR.3).
- It would help to have more clarity about the fluency expected with rational expressions, which is a very difficult topic for students because of weak fraction understandings. For college and career readiness, the expectations should be just hard enough to generalize fraction understandings.

Functions

A critical connection is that sequences (patterns) are functions. Series need not be taught at the same time.

Average rate of change is a useful and important idea for understanding, discussing, and explaining the distinction between linear and nonlinear functions. And this undergirds calculus.

Geometry

The narrative overview provides especially useful information for teachers.

It is useful conceptually to undergird congruence and similarity with transformations. Because much of familiar high school geometry follows from the congruence and similarity criteria (e.g., SSS, SAS, AA), theorems do not need to be proven from transformations when they can be proven from triangle congruence or similarity.

SUGGESTIONS

- There appear to be too many standards in the congruence domain (G-CO) because of too much overlap with grade 8.
- Need to be explicit that transformations don't require a coordinate system.
- Need to be explicit that proofs do not need to be in two-column format. In fact, the two-column format may be more formal than is necessary.
- In high school (or grade 8) there should be an explicit standard about the effects of scaling on area and volume. These are important connections to quadratic and cubic functions.

Statistics and Probability

One can reasonably argue that, for citizenship and everyday life and for many careers, statistics sense is more important than algebraic fluency. Thus, the standards for statistics and probability represent a potential educational improvement for Ohio's students. Teachers should be encouraged to thread them throughout high school rather than sequencing them as the last unit each year.

Mathematics Assessment Review

Summary of Common Themes

Overview

The assessments for mathematics include a test at each grade three through eighth and the high school end-of-course test, (Algebra I, integrated Math I, Geometry and integrated Math II). The committee reviewed eight of the ten mathematics tests that were administered in spring 2015. The committee members were given the option to review the integrated math I and II however because of the large number of items in common with the algebra I and geometry tests, they determined a review was not needed this year. The reviews took place during one week in June and one week in July. The committee used electronic and paper versions of the electronic test. They looked at both parts of test (i.e., the performance-based assessments and end-of-year tests).

The committee found that each test had many high-quality items. The committee generally found that the test items in each of the reporting categories were aligned to grade-level standards, though a few items aligned more closely to standards other than the ones they reportedly assessed. Committee members also felt that some items were overly complex or too difficult, especially in the early grades and high school.

The items in each of the reporting categories met community expectations (fairness and sensitivity guidelines). The technical equity of delivering the test across the districts was raised. The committee suggested that students need training on using the electronic format prior to the testing year.

Additional comments were made about the technology and functionality of the tests focused on the items types, ease of use and continuity of items with multiple parts. Reviewers were pleased to see that students could receive partial credit for an incorrect answer in one part carried through correctly in subsequent parts. There was some general concern that some of the multi-part items seemed disconnected and did not flow from part to part.

Assessments Review

1. The items in each of the reporting categories align to the standards.

- Reviewers appreciated the content limits in the evidence statements and that the items reviewed followed that guidance in most cases.
- Reviewers noted there were too many items addressing some of the standards at a grade level while other standards had too few.
- Reviewers noted there were several items that seemed to be mismatched or aligned to another standard
- Reviewer questioned appropriateness or correctness of items that include context from another content area.
- Reviewers questioned the inclusion of standards marked with (+), indicating that they were not to be expected of all students.

2. The items in each of the reporting categories are grade-level appropriate.

- Reviewers noted that some items had issues related to the wording of the problem, topics beyond the scope of the grade
- Reviewers mentioned that some of the questions are artificially difficult made so by, for example, the numbers chosen or the explanation required
- On the extended response items, the rubric didn't always seem to match.
- Reviewers mentioned that the use of notation needs to be appropriate for the grade
- Reviewers mentioned that some items required a lot of work and contained many opportunities to make mistakes

- Reviewers had the following comments about some of the items at different grade levels
 - Very complex.
 - Convoluted.
 - Required students to synthesize too much information when responding to a question.
 - Some items asked two or three questions but provided only one response area.
 - Use of similar symbols within an item.
 - Questions were overloaded with too many parts.
 - Too many items required students to select multiple correct answers.
 - Poor context.
 - Poor rubrics.

3. The items in each of the reporting categories meet community expectation (fairness and sensitivity guidelines).

- At most grades there were no issues raised regarding community expectations.
- Reviewer noted that graphics on a few items could have caused issues with student responses.
- Reviewers questioned the use of some symbols, language and wording of a few items across the grades.

4. Comments about the technology and functionality of the tests.

- Reviewers mentioned that the performance-based assessment part of the test seemed to have more technology issues than the end-of-year part.
- Reviewers noted that some of the tools are easy to use.
- Reviewers noted that the interface worked well with some types of items and had glitches with other types of items.
- The equation editor sometimes caused problems entering a correct answer.

Guide to Appendices

Appendix A – English Language Arts

- A.1 [English Language Arts Standards Review Rubric:](#) Copy of standards review rubric used by English language arts standards review committee members.
- A.2 [English Language Arts Standards Review Committee Member Rubrics:](#) All English language arts standards review committee member rubrics.

Appendix B – Science

- B.1 [Science Standards Review Rubric:](#) Copy of standards review rubric used by science standards review committee members.
- B.2 [Science Standards Review Committee Member Rubrics:](#) All science standards review committee member rubrics.

Appendix C - Social Studies

- C.1 [Social Studies Standards Review Rubric:](#) Copy of standards review rubric used by social studies standards review committee members.
- C.2 [Social Studies Standards Review Committee Member Rubrics:](#) All social studies standards review committee member rubrics.

Appendix D – Mathematics

- D.1 [Mathematics Standards Review Rubric:](#) Copy of standards review rubric used by mathematics standards review committee members.
- D.2 [Mathematics Standards Review Committee Member Rubrics:](#) All mathematics standards review committee member rubrics.

Appendix E – [Committee Membership](#)

A list of each committees' membership.

Appendix F – [Fairness and Sensitivity Guidelines](#)

These guidelines are used by Ohio educators, parents and community members during the review and evaluation of Ohio's State Test questions to ensure that each question is fair, unbiased and does not promote individual moral values. The Academic Standards and Assessment Review Committee used these guidelines as part of the assessment review in determining if the test questions met community expectations.

Appendix G – [Confidentiality Agreements](#)

Examples of the confidentiality agreements that committee members who wished to review confidential assessment items signed in order to gain access to the items