

Item B: First 60-Day Public Review Science Framework Survey Responses

Science SMC Meeting- February 19, 2016

2016 Science Framework

California Department of Education

Curriculum Frameworks and Instructional Resources Division

**Please note that survey responses have been populated directly from submissions and have not been edited.*

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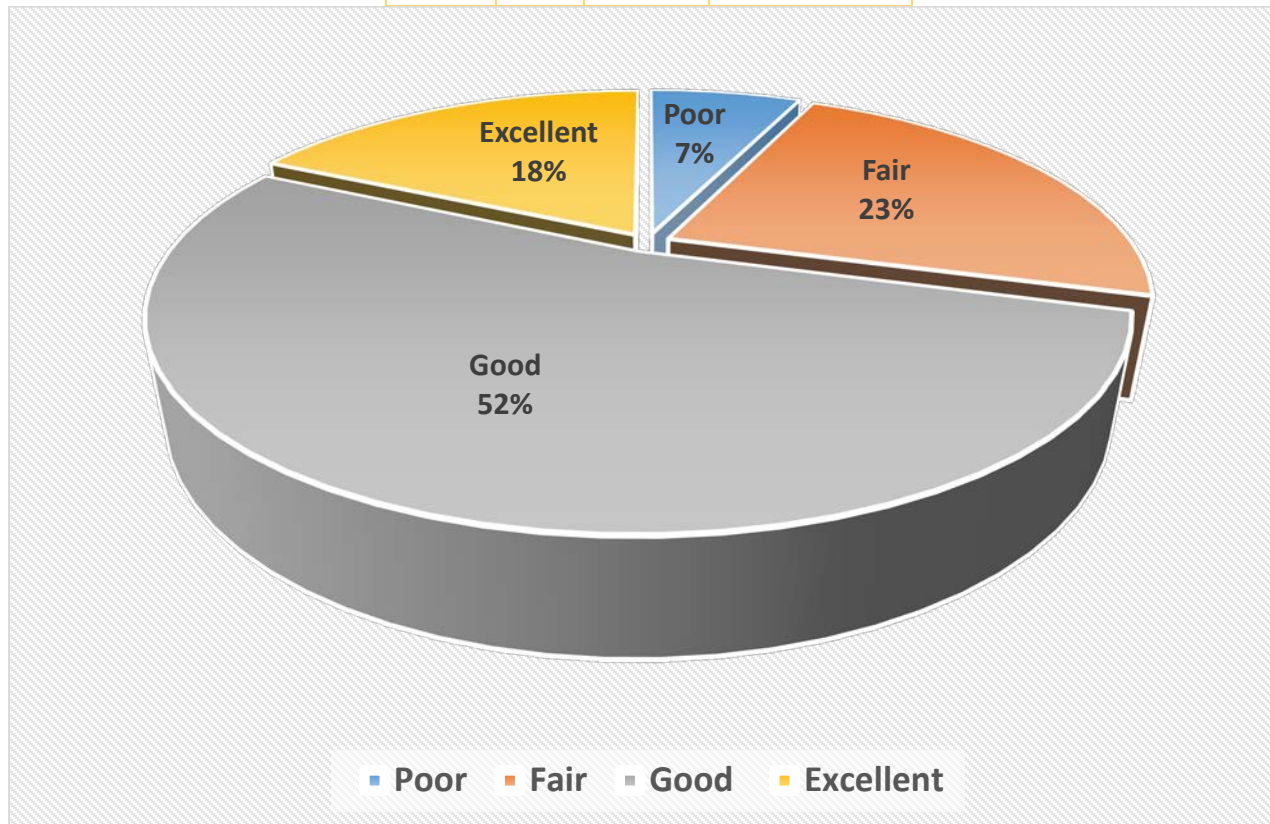
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Tables and Graphs

Framework Overall

Framework Overall (Based on 207 Responses)			
Poor	Fair	Good	Excellent
14	47	109	37



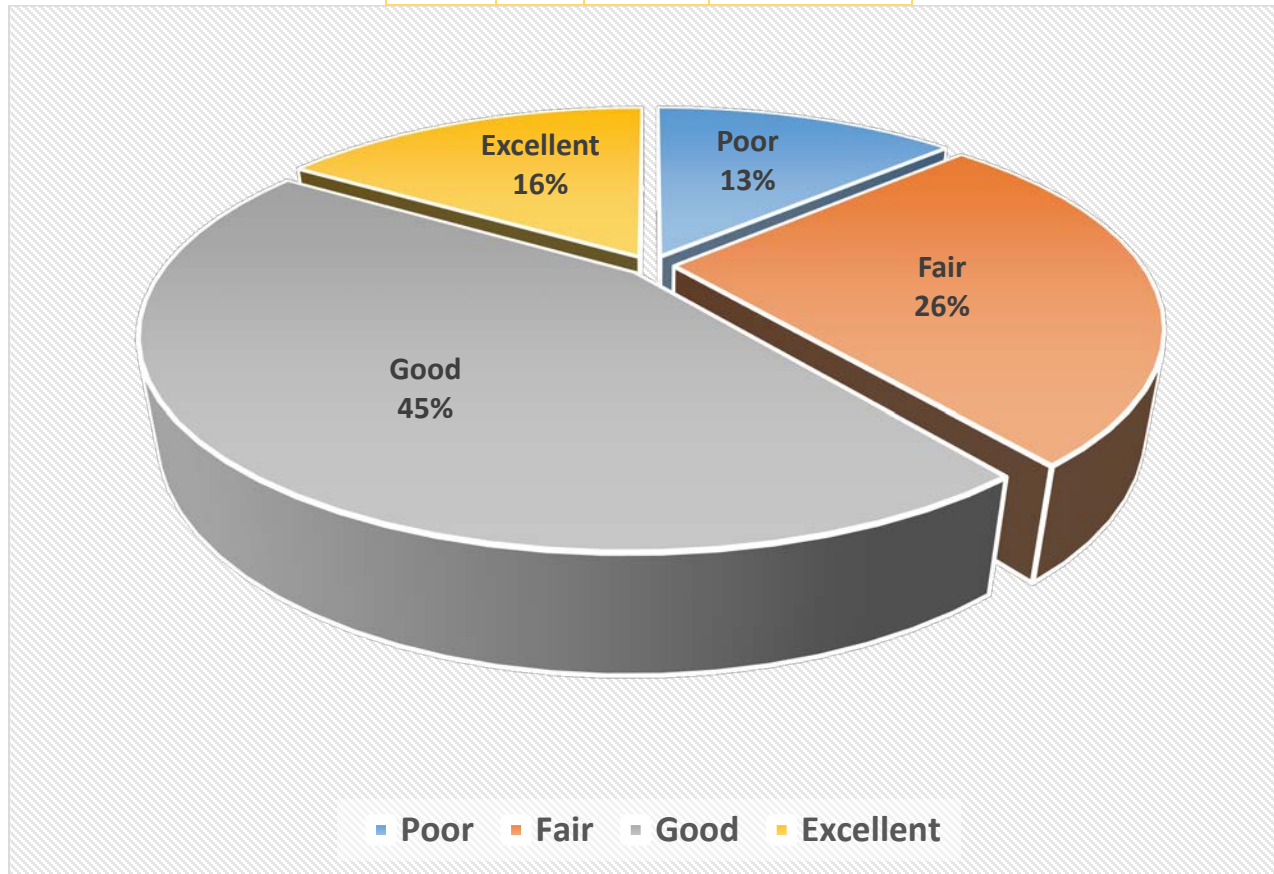
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Format and Clarity

Format and Clarity (Based on 205 Responses)			
Poor	Fair	Good	Excellent
27	54	91	33



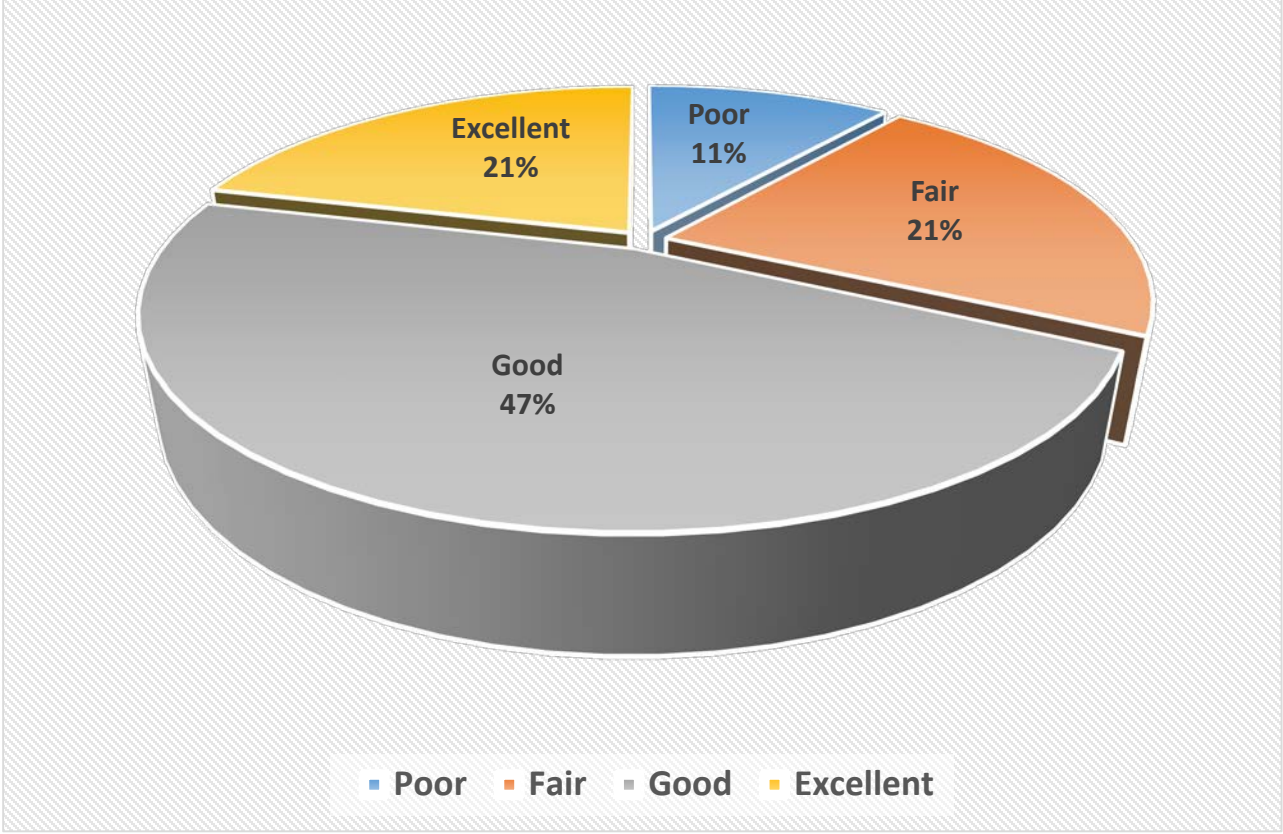
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Design and Principles of the CA NGSS

Design and Principles of the CA NGSS			
(Based on 204 Responses)			
Poor	Fair	Good	Excellent
22	44	95	43



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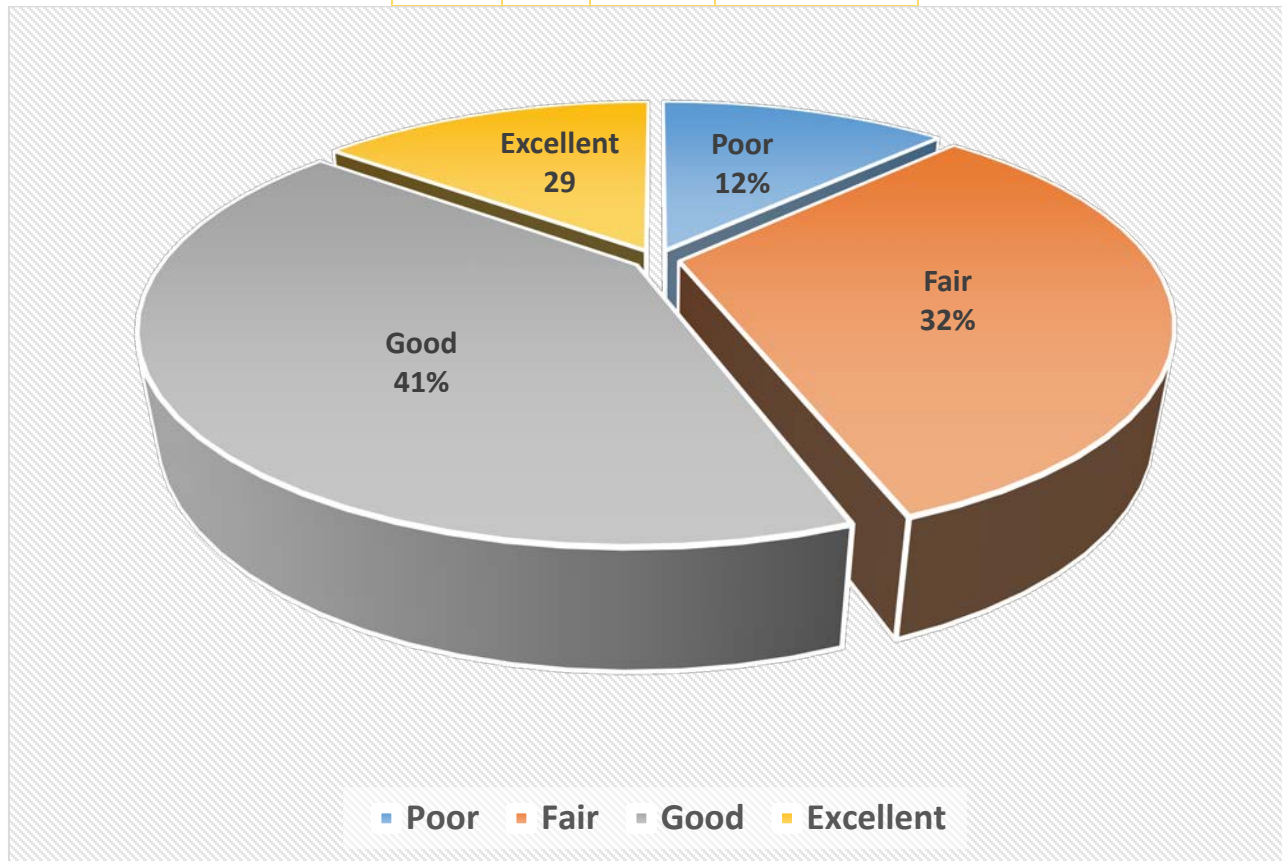
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Guidance of Instructions of All Students at All Grade/Course Level

Guidance of Instructions of All Students at All Grade/Course Level
(Based on 200 Responses)

Poor	Fair	Good	Excellent
25	64	82	29



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Chapter 1: Introduction and Guiding Principles for the Implementation of the NGSS for California Public Schools, K-12.

Comments (1-59)

#	Ch.	Title	Reviewer	Comments
1	1	Teacher	Galvan Bernedette	The introduction lists the focus on the teaching year of 5 concepts is a approximate guideline for teachers to collaborate and build assessments. Also the world connection to subject matter concepts is Key.
2	1	Other	Durant Jayne	Why do the powers that be continue to place patches on a seriously broken education system. It all sounds nice on paper but it will not work in classrooms, especially in those of schools within poor areas. These students have too many issues that take priority over school work and are on the bottom of Maslow's pyramid. They are in survival mode wondering if they will make it to school without being "jumped" or beaten up at school, possibly even worse. For many the only food they get is the appalling, under-nutritious excuse for food that is provided by the school. Their brains and bodies are undernourished and have been since early childhood. For student success there really needs to be parental involvement, which is sorely lacking for many poor students. Many students are bi-lingual verbally but are not fluent in either their home or the English language and I have found that the majority of my students have a 3rd grade reading level. Lastly, class size in most public high schools is 40+ which does is not conducive for learning. It is merely a "holding tank," unless, of course it is a special ed classroom, and then there seems to be a surplus of funds. I feel that unless many of these situations are addressed you can dress up the standards any way you would like but it will make very little difference. As teachers we are still unsure as to what we are supposed to be teaching and although we had someone come and speak to us about CA NGSS when we asked her questions she admitted that she didn't know what it was all about and so how we were supposed to teach our students. Perhaps the people who write this flowery "stuff" should come and teach in a classroom for a year before making decisions about high school education.
3	1	Teacher	Trammell Rozalia	Fairly clear. Do not have any suggestions for changes.
4	1	Teacher	Grudin Tara	Please just use the Next Generation Science Standards
5	1	Teacher	Munsell Marry	NGSS standards are so convoluted that they require clarification standards. I have been to many conferences and have yet to find a district that has even the slightest idea on how to implement them.
6	1	Teacher	Morrison Dawn	The introduction was very helpful with giving an outline or summary for the information that would be given. It is very easy to read and follow.

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7	1	Teacher	Shelton Betzabel	The introduction for the middle grades, 6-8 was a great resource to understand the framework for the integrated model compared to the discipline specific model. The side by side comparison table is a clear display of what is taught at each grade for each model.
8	1	Teacher	Graves William	I seriously hope that this doesn't adversely affect my career but as a 32 year veteran science teacher credentialed in Chemistry, Physics, Life Science, and Psychology, to be completely honest and forthcoming, the draft of the framework for High School Physics and High School Chemistry is completely incomprehensible. I have never in my entire life seen such a collection of meaningless phrases. Please! Please! For the sake of education in our wonderful Golden State, you need to scrap the entire thing and start over or just go back to the original California State Content Standards for Chemistry and Physics and work on ways to improve those standards. I've spoken with my other colleagues in my department and many feel exactly the way I do. Are you guys going to come up with a Rosetta Stone for all of this?
9	1	Curriculum Specialist	Dutta Debolina	I am very happy to see that Attention to equity was included in the introduction and as a key part of education.
10	1	Teacher	Chapman Donna	Guiding principals are a good direction. It will be difficult to achieve all of the goals.
11	1	Teacher	Da Costa Cora	Very well written and concise.
12	1	Teacher	Miller Nancy	Framework is very hard to follow and comprehend for example "Patterns - Macroscopic patterns are related to the nature of microscopic and atomic-level structure" pg. 99 this statement could be interpreted many different ways. The framework is also misleading in the content knowledge a student must have regarding vocabulary; one section has the example reading material discuss ions yet the vocabulary word ion is never mentioned in the framework.pg. 97 Covalent bonds also used in an example of a model yet they are not suppose to be taught pg. 96. The guiding questions are very vague and not do not flow well in terms of relationships.pg. 100.
13	1	Teacher	Claxton Jeff	Thanks for creating the Instrcutional Segment 1-4 integrated story line. I created my own months ago. The table provides a great guide.
14	1	Teacher	Jimenez Lourdes	precise, teacher friendly
15	1	Teacher	Merrihue Ronette	The draft is wordy. We might need to say these concepts with less words, and more visuals.

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16	1	Teacher	Stack-Kitley Susan	I am very pleased with the kindergarten chapter and the new standards. Ideas are clear and well designed. The intro was very easy to read and follow. Activities are very child friendly and lend themselves to STEM or STEAM classrooms. I currently have a STEM classroom and I see many similar concepts, such as engineering
17	1	Teacher	Collar Theresa	I'm very pleased with the teacher-friendly language in the framework. It really clears up a lot of the mystery in the NGSS about how the new standards can be presented in the classroom. The teacher background information is also very valuable. As a kindergarten teacher, it is easy to see how the instruction I present will create a valuable base for instruction that will come in the following years. They layout was very clear and easy to follow. The sample lessons were extremely valuable for understanding what instruction might look in the classroom.
18	1	Teacher	Berger Linda	Very nice perspective- easily read and absorbed
19	1	Teacher	Kossak Scott	Clearly written and provides nice overview.
20	1	Teacher	Jung Jinny	1. page #5, line # 106: The colors for the column titled Preferred Integrated and Discipline specific, in fact the word "preferred" is highly suggestive and takes away from the readers ability to make independent decision. The colors red and green should be deleted and the word 'preferred' should be also deleted or replaced with 'recommended.'" 2. page #4, lines 77~ 84: Line 80 - There is single evidence from Darling-Hammond referring to adequacy of general science certification. This is not enough to convince middle school teachers; more specific evidence is required. Teachers are hesitant to teach in areas where they do not have specialty, especially when there is no resources available. Specific evidence and references to specific plans to provide resources and support will help convince the teachers
21	1	Teacher	Vohra Ashima	1) like the 3D model of DCI, CCC , SEP 2) like the emphasis on project based learning and active questioning /discussions 3) mathematical thinking of big pictures through relationships , patterns but stems away from confusing math calculations
22	1	Teacher	Andrews Valerie	The Introduction/Guiding Principles are a helpful background for teachers and administrators to see where and how the framework was created. It is also helpful to see the intent. The intent for Teachers and Administrators can be helpful with regards to lessons and assessments. The intent can help publishers and District Administrators to see what sort of curriculum and materials Teachers will need or will be requesting.
23	1	Curriculum Specialist	Zacuto Wendy	I am very supporting of the NGSS and feel the introduction represents the same perspective.
24	1	Teacher	Flammer Lawrence	See my list of suggested revisions in table I'll send in separately.

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25	1	Teacher	Berrner Jill	Guiding principles omit the historical context of science and engineering. (This would be in the center of your Venn Diagram). From what I understand, NGSS is seeking to launch a "second renaissance" so to speak. What launched the (original) Renaissance was a re-discovery (and hunger) for historic scientific knowledge. For example, children could (and should) be exposed to Archimedes as he experimentally discovered the physical (and mathematical) principle behind buoyancy. In my opinion, this type of knowledge should be foundational to further instruction.
26	1	Teacher	Brandon Linda	The "Introduction/Guiding Principles to the Draft Science Framework" are simply adding to the confusion of the GREAT "Common Core" standards. Why is it that we make these grand pledges such as "Our overreaching goal for all students" when the truth in so far as it exists amounts to "Teaching to a Test." ALL students will no more receive equity under the NEW plan than ALL students have received equity through the OLD plan. All things are determined first by National Standards --> State Standards--> County--> District--> Board Adoption and finally priority implementation by campuses. At any point along the pathway they can be deviated further by selection options. New books, equipment and lab essentials will have to be purchased as the same subjects the schools have been struggling to support will now be shuffled, i.e.; 8th grade astronomy will be taught in the 6th grade. Subjects prioritized for high school and beyond (Earth Science, Biology, Chemistry, and Physics) will now be placed in jeopardy via lack of teaching materials/knowledge and time. Many self-contained classrooms only teach science twice a week for 45 minutes. They are generally manned by multiple subject teachers who do not in any way shape or form meet the NCLB standards the single subject science teachers have been held to. It is the common belief of the classroom teacher that the standards, curriculum and the many mandates are so lost in translation that they will long be replaced before they are ever understood.
27	1	Other	Deswal Servesh	Provide more applied mathematics. We need less calculus and more geometry/applied physics (cmon when have you honestly used a derivative)
28	1	Teacher	Cheung James	What will these conceptual shifts look like on exams and state testing? How will this impact high school teachers without technology in their classroom? Should teachers stop giving end of chapter/unit tests and only give performance expectations (if not, where will this extra time come from)? Are teachers going to receive training on how to incorporate environmental literacy into their existing curriculum topics?
29	1	Other	Glimme Aida	Densely written, not reader friendly. It seems to be written for everyone and no-one. We would like to see the document be user friendly to teachers as they will be implementing the vision of the framework. Administrators without science background will have a difficult time understanding how to implement. Pg 5,

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				is an example of a writing that is clear and easily understood - this would be an example of what we as educators would find useful.
30	1	Teacher	Ultican Thomas	The three dimensions of learning is adds more confusion than light. Leave philosophy of teaching to education schools.
31	1	Teacher	Loeb Deborah	Good ideas that need improved organization and implementation.
32	1	Curriculum Specialist	Rooney Shannon	The options to teach a two, three or four course model are appreciated. I prefer a two course model that would then allow students the option to take some subject specific advanced courses beyond the required courses. However, a lack of in depth topics in Chemistry in a two course model are concerning. The three year model provided in Appendix D seems to offer the most logical two year sequence that will allow students to then take an AP course or a subject specific class such as Marine Biology, Physics or Anatomy. However, the lack of basic knowledge of Chemistry will, I fear, cause students to struggle in the subject specific courses. Chemistry is a challenging course for many of our students both at the high school and college levels.
33	1	Curriculum Specialist	Murphy-Shaw Marian	Page 7 line 11 replace "leading question" with guiding question as it fits current educational language better. Page 8 line 208 "for this reason teachers need access to well designed curricular materials... engineering practices" This should be highlighted for this chapter. Alternately or in addition this paragraph might be considered as part of the introduction to Chapter 12. It highlights the critical need for exemplary curricular materials. Page 11 consider using terminology more familiar to classroom teachers - such a CCR Anchor Standards or other Common Core wording than "student capacities" regarding the ELA portion of the Venn.
34	1	Curriculum Specialist	Proctor Kathy	I found the Chart on 5th Grade Learning Overview on Page 112 very helpful for myself and my team of educators.
35	1	Teacher	Lee Kathy	Pg. 64 "Sounds Wild" lacked "Crosscutting" dimension. Lesson did integrate music but I thought teacher could have easily integrated Writing task. This task would provide a venue for students to analyze and synthesize what they've learned and teacher can use the writing for assessment component.

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36	1	Curriculum Specialist	Stillittano Marissa	3/71 like that the table highlights the concepts spiraling K12 2/39-51 appreciate that they talk about the beauty and wonder of science 2/46-55 some appreciation, sufficient knowledge, not master of knowledge, positive comment, likes wording 4/86 add citation for where the research came from beyond the framework 9/219-221 great statement! 10/253-261 simple example to provide clarity 11/274-285 science is in every subject, this is great!!! Cross-curricular 13/337-342 great because it emphasizes the need “must” for district support of PLC. 14/345-353 good to know that all stakeholders are involved in the process 14/361 Use of technology is an essential tool.. very strong wording... this is appreciated that the technology is emphasized 14-15/399-414 relationship between technology and hands on science... technology is an adjunct it does not replace real tangible science 15/393-395 specific resources provided 15/388-398 Add phet resource does this mean that coding is required? Do we need to teach coding? What grades or what subject groupings does coding begin to be taught? 15/393 What is considered age appropriate? 17/430 insert word long term before links to ensure that teachers have access to links long term. 18/464-472 This is great! Emphasizes the inclusion and differentiated instruction needed for diverse learners! EQUITY! 19/493 Will the framework address equity for higher, gifted, students (differentiation)? Will the framework address accelerated course pathways? 22/606 Surprised by the existence of these resources and not sure what to do with them 23-24/635 Thank you for the emphasis of spiraling earth science throughout. 23-27/605-723 Title section Human Impact? Section seems out of place... should their be a specific appendix? 24/640 Thank you for giving us the link to the EEI curriculum 25/654 Great for CA specific real world phenomena 26/680 Why is the emphasis on environmental literacy?Why does the framework not mention scientific literacy in general?
37	1	District Administrator	Warren Glen	Excellent!
38	1	Curriculum Specialist	Henderson Kenelee	All comments made are representative of Kern High School Science Review committee We believe the chapter outlines a very close association with the heart of the NGSS and is a good background for understanding the framework's intent as a reference for districts to revise science curriculum in alignment with the 3D learning involved in scientific inquiry. Lines 213-221: We really think this passage is important regarding the need for all grade levels to expect mastery of the science content at that grade level, so as not to impeded or negatively impact student success at subsequent grades. Line 773: Appreciated that the the examples of instruction are intended to be viewed as clarifications, but not as a prescription for cookie cutter curriculum design.
39	1	Other	Ellis Kelly	Not sure if this figure can be changed, Chapter 1 Fig. 1 Where is says EPA under the ELA section could be moved up to the center of the diagram because the idea of building upon a person's own ideas with others ideas can help to solve complex math problems and create stronger hypotheses and conclusions in science

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40	1	Teacher	Paymer Silja	<p>The Venn Diagram on 312 is atrocious. Are you telling me that MP1: Make sense of problems and persevere in solving them, MP2: Reason abstractly and quantitatively, and MP6: Attend to precision, shouldn't be addressed in Science? And isn't EP7 the same as the expectation 4 on line 360 of this same document? Basically, every standard is covered by science- show pride in that in the framework! I know we don't all want the responsibility of teaching every standard, but when some schools are short changing their science classes because NGSS test has a lower multiplier than ELA and Math test results in the school scores it is important to emphasize that science classes support higher achievement in all standards covered by all the tests.</p>
41	1	Teacher	Hegdahl Lisa	<p>P 26 L 606 Info about Environment curriculum - why is it here in this location. Seems political. If this is not NGSS aligned, it must be clear that that is the case. Perhaps appendix. 2P 24 Ln 654 - Info moved up. First mention of EEI should have explanation. EEI addresses the earth and human activity portion in a better way than has ever been done before. P23 Ln 618-627 Description of how law was passed is unnecessary. Summary- it should be in the document somewhere but needs to be some place different. P. 24/Ln 654 Add that it predates development of NGSS and may not be aligned Pg3 Ln 70 Old- "These conceptual shifts as identified and articulated in appendix A of NGSS". New - "These conceptual shifts as identified and articulated in appendix A of NGSS are..." Otherwise it makes it unclear where these came from. p5 Ln108 "all content and practices.." Need to add cross cutting concepts p 8-9 Ln 187 Language describing Coherent instruction is not clearly defined. Insert language from Math framework about coherence between lines 187-189 " Comment: Seems like a bunch of stuff is thrown in but it does not seem coherent by nature Comment: review the language in math framework. p 6 Ln143 @ Ln 180 Need simplified example In 180 Old text - "The type of learning and understanding described in the example above, which is referred to as three-dimensional learning, ..." Insert something that specifically refers to the 3 parts of 3-d learning. Or insert a reference to another place in the document where it is described. Sense making is another way of describing what students are actually doing. The term is being diluted and needs to be clarified how it applies to science instruction using the 3 parts of NGSS. Now when content is described does it mean DCI or all three? Addition of a simple sentence on line about 180 to illustrated what 3D learning means. p18/Ln491 ELL or EL Consistency in acronyms</p>

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42	1	Teacher	Elizabeth Mary	Line 39-40 Through the implementation of the CA NGSS, all students kindergarten through grade 12 will have the opportunity to thrive in a 21st century world which demands an increasingly sophisticated ability to make personal decisions, use technology proficiently, solve humanity’s current and future challenges, and participate wisely in a democratic society. There are no changes requested to this statement only the ability to access students through grade 12. I understand that there is the option to test 10-12. At the end of 12th grade is the time that all standards have been implemented. I have heard that the 11th grade is the preferred testing time because the 11th graders are already accessed for the Common Core ELA and Math standards. I hope that 11th grade testing is not a foregone conclusion for science and my recommendation is that NGSS be assessed at the high school level in the 12th grade.
43	1	Teacher	Elizabeth Mary	Line 99-101 Coherent instruction: Learning opportunities in science are based on a carefully designed and coherent instructional sequence with clear and focused learning goals, and appropriate connections to grade-level expectations in other disciplines. Change to: Clear and focused learning goals should read “clear and focused learning goals developed during implementation and disseminated statewide by County Office of Education for reference allowing appropriate connections to grade-level expectations in other disciplines.” Rationale: Since the framework has stated many times in the documents that the framework is not curriculum I worry that levels of minimum instructional sequence rigor will vary in quality throughout our state. The focused learning goals necessary to implement don’t have to be content specific but teachers need to know what level of performances the students are expected to master so that teachers have something concrete with which to collaborate with cross curricular disciplines. Having this guidance may not be such a big deal for high performance schools and districts. Leaving so much to the individual teacher in classrooms that have diverse ability levels and a low performance culture is sending the message that you can do it without providing the directions and scaffolding that is needed for many teachers, schools, and districts in our state. LEA’s will be the ultimate consumers of approved curriculum and if everyone had access to the best developed curriculum and ancillary equipment, perhaps more students would be at grade level.
44	1	Teacher	Elizabeth Mary	Line 111 Student motivation and engagement: The vision of the CA NGSS and the NRC Framework highlights the importance of student motivation and engagement as critical factors in providing a rich science education linked to students’ interests, experiences, and engagement. The last engagement should be changed to “the development of student grit or student’s persistence in solving problems.” Rationale: motivation was described as linked to students’ interests, experiences. Engagement was described as engagement. The challenge with engagement is keeping students working when the topics are deemed hard by a student. Engagement cannot happen if the student has a mindset of defeat and inability. It is easy for

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				teachers to develop lessons that are fun focused on students immediate interests but may lack the rigor necessary to develop mastery of performance expectations. Not so easy to keep students engaged in more difficult activities. Helping students develop a mindset of persistence or grit will lead to better engagement when the student is faced with a difficult task.
45	1	Teacher	Elizabeth Mary	Line 134 -136 When students are engaged throughout each instructional sequence with multiple practices and crosscutting concepts to explain phenomena and design solutions, they build a more robust and connected understanding that leads to authentic three-dimensional learning. Change to “When students are engaged throughout each instructional sequence practicing engineering and crosscutting concepts to explain phenomena and design solutions, they build a more robust and connected understanding that leads to authentic three-dimensional learning. Rationale: Practice means many things but I think the purpose of engagement is to actual practice skills of application. Line 153-155 They should create graphs from data, produced with appropriate controlled, varied and dependent variables, to recognize patterns that can be described by a linear relationship or equation. No change requested but this is the kind of information that should be in the framework showing a progression of the science practices from K-12. I know that the practices are outlined in Appendix F in the standards and would like to more descriptions and specific examples in the Framework.
46	1	Teacher	Elizabeth Mary	Line 171 teachers need to provide the equipment necessary to make relevant and accurate measurements Change to: teachers need to have available to them equipment necessary so that students can make relevant and accurate measurements Rationale. I am now in my 12th year of teaching and have purchased too much equipment using my own money. This is a second career for me and I continue to be amazed that so many schools and districts expect teachers to purchase classroom supplies. Schools and districts need to provide the tools and supplies necessary for teachers to carry out the job of instruction. For a new teacher, depending on the school and district, the lack of supplies is onerous. The supply issue directly impacts the educational opportunities that students have. I believe strongly that the Framework or some supplemental document prepared in the near future outline mandatory labs that are grade/course specific. This does not have to be an exhaustive list but a minimum list that ALL students in California experience. This requirement has been adopted in at least one other state, NY, and I believe it creates more opportunities than many California schools provide.
47	1	Teacher	Elizabeth Mary	Line 174-176 Students will not “discover” Newton’s laws or even draw graphs of speed versus time without well-planned guidance from the teacher. Change to: Students will not “discover” Newton’s laws, be able to

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				describe the relationship between speed and time, be able to develop and use the linear expression to make predictions without well-planned guidance from the teacher in the form of experimental inquiry and computational practice and supports. Rationale: When I read the example and the statements comparing 3-d learning with the traditional approach it seemed that the authors were stating that it was better to just be able to draw a graph rather than solving an algebraic problem. What I think the authors were getting at is that it would be better to be able to understand the relationship and to derive the algebraic expression, and then to make predictions. Developing design solutions requires an understanding of factors involved and at some point a mathematic relationship to make predictions of changing variables and scale.
48	1	Teacher	Elizabeth Mary	Line 205-207 Coherence is achieved through careful planning and communication among teachers in different subject areas at the same grade level, as well as across science disciplines and grade levels. Change to: Coherence is only achieved through careful planning and communication among teachers in different subject areas at the same grade level, as well as across science disciplines and grade levels. Rationale: Please excuse the wordsmithing, but this coherence is vitally important and an area of education that has been sorely lacking. I want to see this statement strengthened so I suggested only to make the needed collaboration seem mandated by the state. Line 218-221 Therefore, it is of great importance that science educators support students to master the content expected at each grade level. Any omissions in content at lower grades can severely impact the success of students' later achievement and compromise the instructional work of science educators in subsequent grade levels. Change science teachers to all teachers or just teachers Rationale: Multiple subject teachers have been directed by some administrators to not focus on science but instead to focus on Math and English. So, 1) multiple subject teachers may not consider themselves science teachers, and 2) some of the skills learned in science are needed to critically analyze social studies or math problems or engage in an English discourse.
49	1	Teacher	Elizabeth Mary	Line 277-281 . The California ELA/ELD, Mathematics, and History- Social Science frameworks provide some guidance to elementary-level teachers, as well as secondary science teachers and ELD teachers, for incorporating instructional strategies that develop students' language proficiency, literacy, and mathematics skills to support learning in science and engineering. Change to The California ELA/ELD, Mathematics, History- Social Science, and Health Content Standards and associated frameworks provide some guidance to elementary-level teachers, as well as secondary science teachers and ELD teachers, for incorporating instructional strategies that develop students' language proficiency, literacy, and mathematics skills to support learning in science and engineering. Rationale: Later in this section Line 288 health is mentioned. I know that there is not a current framework document to support the new health education standards but there will be one day. Line 295 I don't know what is meant by "capacities" Line 302-305 For example,

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				<p>educators can stress the similarity in the structure of an argument (claim, evidence, reasoning, rebuttal or counter-claim) across disciplines, while at the same time discussing the particularity of what counts as evidence, and types of reasoning used within each discipline. Change by adding the following sentence: “ Another example, educators know all too well is the similarity of MP1. Make sense of problems and persevere in solving them for application in English, science and math. Teaching students how to read problem statements (directions) and to feel able to dig deep into problem topics rather than be satisfied with superficiality.” Line 332 “multiple years”. Is there an expectation as to how many years implementation is expected to take – how many beyond when assessments begin?</p>
50	1	Teacher	Elizabeth Mary	<p>Line 344-346 This will allow both teachers within and across schools and districts to share expertise, reflect on challenges, and plan for future units of instruction. Responsibility for the preparation and support of teachers as they progress towards implementation of the CA NGSS is shared among principals, district administrators, and designated lead or mentor teachers. Change to: Responsibility for the preparation and support of teachers as they progress towards full implementation of the CA NGSS is shared among principals, district administrators, designated lead or mentor teachers and regional county offices of education. Rationale: If there is going to be collaboration across districts that will require the active involvement of County Offices of Education. I personally this this is great opportunity because in some regions there is great disparity between districts. For example, all of the districts in and around Stockton Unified have much higher proficiency levels for 3rd grade reading. What are the other districts doing that Stockton Unified is not. Line 391 Because computer models are written in code, Change to Because some computer models are written in code. Rationale: Computer models can be written in Excel or some other spreadsheet program. For example, the Physics Solar Project Assessment requires that student not develop a graphics based model but instead a spreadsheet model. Please include some mention of the utility of creating spreadsheet models or utilizing pHet.</p>

**Please note that survey responses have been populated directly from submissions and have not been edited.*

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51	1	Teacher	Elizabeth Mary	Line 553 Large-scale external tests aligned to the CA NGSS may be developed for statewide assessment purposes. When the format and technology platforms of these tests are available, students will need experience with them in order to prepare for the tests. Add: As these tests are being developed, practice assessments will be made available so that each student has an opportunity to experience the format and level of questions before the tests are administered statewide. Rationale: I want to see a commitment from the state to provide learning assessments for practice and for teacher reality checks. There is no mention of the Science Safety Handbook for California Public Schools, 2014 Edition in this Chapter. Please add a comment that the state is committed to ensuring the safety of all students, teachers and the environment and promote the safe use of chemicals and equipment necessary for the implementation of NGSS in California.
52	1	Curriculum Specialist	Velez Diana	Page 2, line 43: Add more here about the Nature of Science Page 6, line 133: Change "understanding of" to "ability to achieve" the PE. Page 10, line 248: Change "infer" to "develop an understanding of" concepts page 11, line 288: "health" doesn't seem like a discipline, but if so, add "arts" as well. page 15, line 401: delete "completely" In general, the guiding principles and attention to 3-D learning is great. Following are some suggested changes: page 18, line 459: Change "do science and engage in scientific discourse" to "engage in the science and engineering practices." page 22, line 607: Use language from the Environmental Literacy Blue print page 23, line 609: This statement makes it sound like diverse students aren't currently contributing members.... page 24, line 649: CA standards are no longer in effect. Should not be promoting the curriculum as science - not 3-D as per NGSS Page 26 - A Blueprint for Environmental Literacy - Yes! This is great. Should be the focus "moving forward..."
53	1	Teacher	Van Dordrecht Anna	Excellent overview. Thank you.
54	1	Teacher	Tupper David	1. Should be moved to Chapter 2 (after Overview chapter) --makes more sense in light of the overview 2. EPCs/Environmental Task Force is overrepresented. From line 606 (pg. 22) to Line 722 (pg. 27) is all about EPCs and Environmental Task Force. (5 pages out of a 32 page document) A new/naive reader may easily assume that the EPCs ARE the ngss. (I understand that the EPCs are included by law, but too much emphasis is placed on them in this early chapter) Move the Environmental Task force stuff to the appendix.

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55	1	District Administrator	Sargent Cynthia	Good intro. Cite more clearly that the NGSS shifts (line 71) are appendix A of NGSS and that the standards and the appendices are part of CA NGSS. People may try to do a 1:1 correlation between the 7 shifts in the table (line 71) and the 7 guiding principles (line 97) when that correlation doesn't exist. In the coherence section it would be good to mention explicitly that progressions are in the NGSS appendices (for DCIs and the other dimensions too) and that coherence with ELA and Math is facilitated through the architecture of NGSS (the connections box). Technology section: I get frustrated when something is mentioned, like the bifocal modeling project at Stanford, and I go to their website and it's not clear whether it has any actual use to me as a teacher. Sure it's interesting and it would be great to implement in NGSS lessons but if it's still in research phase and not widely available it's only frustrating to have it mentioned. It becomes extraneous information that doesn't inform the reader. Shorten the EEI and Environmental Literacy sections - focus more on their tie-in to NGSS and not so much on those topics themselves.
56	1	Curriculum Specialist	Galisky John	Lines 558-591 This section was not a Guiding Principle in developing the Framework because this is the first draft in which it has appeared. This section is more about literacy than science. The two are not exclusive, but the focus in the science framework should be on science. Lines 576-591 At the very least, this section summarizing a panel report on literacy is out of place. Maybe it belongs in "Access and Equity." Line 692 Use a phrase other than "guiding principles" for the Environmental Literacy report. This phrase will confuse people since the title of this chapter includes "Guiding Principles for the California Science Framework." Lines 696-720 We do not need this much detail from the Environmental Literacy Blueprint. Cut this section.
57	1	Teacher	Minassian Zovig	Page 13, section 3, paragraph 1: learning opportunities mentioned seem to be vague; is there a way to clarify what those entail? Are those state-mandated? State-funded? Page 20, 1st paragraph: "There are examples of integrated ELD" I didn't see or read any examples in the 9th-12th chapter.
58	1	Curriculum Specialist	Kolevzon Grey	(637-723); One's personal connection to the living world is based in direct experience with living systems, especially in a relevant, place-based context. Students in low-income urban neighborhoods do not generally have this experience, and unless financial resources are specifically set aside to enable the vast % of California's students that live in these neighborhoods to have these experiences as part of their schooling (professional development, program coordination, field study trips, project-based learning, supplies/materials, etc.), the enormous effort that went into creating the framework can only be viewed as incomplete and inadequate.
59	1	Other	Kendrick Desiree	I love the Introduction Guiding Principles in the Science Framework Draft cohesiveness, clarity in which all grade level teachers can implement the Framework with confidence.

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Chapter 2: Overview of the California Next Generation Science Standards

Comments (60-104)

#	Ch.	Title	Reviewer	Comments
60	2	Teacher	Galvan Bernedette	The Ca NGSS is designed to build sciences appropriately as S.T.E.M. being the basis to have a graduating student well rounded enough to choose to pursue a career in STEM and or work in related fields. This gives the student a foundation to problem solve and collaborate with co-workers in any field. All students need a three year science framework of physical sciences and biology.
61	2	Other	Durant Jayne	I think they are a joke. They are expecting a level of thinking that high school students will not be ready for until they reach college. Their brain is not fully developed and abstract thought is not usually possible until about the age of 18-25. High school students have an immature pre-frontal cortex and this level of thinking is too much.
62	2	Teacher	Trammell Rozalia	Clearly outlined. However, there are very specific assumptions made about previous knowledge base of students at each grade level.
63	2	Teacher	Grudin Tara	Please just use the Next Generation Science Standards
64	2	Teacher	Morrison Dawn	The overview allows teachers tons and see a snap shot to the whole unit and it is very helpful with mind mapping and planning the units. These connections will make the curriculum easier for the students to make those connection s and for the teachers to be able to teach the connections.
65	2	Teacher	Chapman Donna	Breadth of content is good- focus on systems in organisms and their relationship with the environment is of basic importance. Although the NGSS states that the goal is student "performance" not content/curriculum knowledge students need to understand content BEFORE they will be able to apply it in relevant, higher order thinking activities. We cannot give expect our students to move from level "a" to "f" without giving them the building blocks "b-e."
66	2	Teacher	DuBois Joy	I like the NGSS approaches to Science throughout the grade levels and using all of the fields of Science.
67	2	Teacher	Jones Chris	Appreciate the work and think it's a good, well thought out step in the right direction - How assessments are going be structured and when they will be administered is still a real "Gorilla in the room"
68	2	Teacher	Miller Nancy	The framework is very confusing to read and comprehend.The vignettes are going to be difficult to teach as they are written and over whelming for a typical 7th grader to grasp the concepts especially the cross cutting concepts.
69	2	Teacher	Nikkel Loren	The overview was sufficient. It gave a great overview of the focus and aim of the year.

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70	2	Teacher	Jimenez Lourdes	The integration of the storyline can be improved
71	2	Teacher	Navarro Rafael	<p>Page 34, Computer model or simulation. Please add the following in order to clarify and connect between different models. Computer simulations are an extension of a mathematical model that cannot be solved through analytic methods or is too large and complex that a computer is needed to automate the enormous amount of computations. For example, Typhoon Mawar is simulated by solving the Navier-Stokes equations numerically under appropriate boundary and initial conditions. The Navier-Stokes equations are a mathematical model of conservations of mass, momentum and energy for fluids. Numerical solutions to the Navier-Stokes equations involve breaking up the domain of interest into tiny boxes and defining the temperature, pressure, velocity and density of the air in each of them. As air flows from one box the its neighboring boxes, these parameters are updated in time. Page 36, Three Dimensional Scale Model, This section is not quantitatively different from scale model, so it should be omitted or replaced by another model. This section should be renamed, "Dimensional-Reduced Model" and should describe a model that has been project to lower dimensions. For example, when only one or two dimensions may be of interest in a 3D model in the floor plans of a building. Line, 839-841 "Computer modeling and simulation present a concrete way to make explicit the links between scientific and engineering practices. Computer models are engineered designs manifested in computer code." These two sentences are incoherent and maundering and should be omitted. Consider replacing them by: Computational science is one of three modalities, of science along with experimentation and theory that is emerging due to increased computational power. This new modality encompasses all the scientific practices of the other two forms and all three modalities of science work in synergy to validate each other. Computational science has also revolutionized and enhanced scientific practices such as data collection, analysis, and visualization. The same computational model may used to answer a scientific question or engineering a solution to a problem. Line 1904: More elaboration is needed to clarify the difference between static and stable. A static system is stable if perturbations will always lead to the same static condition and unstable if these perturbations take it away from this stable condition. A ladder leaning against a wall is stable if it leans close to the wall but may become unstable if it leans farther from a wall. In the ladder example, if the frictional force between the ladder and the wall and ladder and ground is strong enough to balance the weight of the ladder, then the ladder is at equilibrium and is static. On the other hand, if the static frictional force is at it's maximum possible value in the regime that the static frictional coefficient is larger than the kinetic frictional coefficient, perturbing the ladder will make it slide down to the floor, which represents another stationary configuration. In fact, there is a range of angles you can place the ladder that will lead to a static and stable configuration, so there exist a region of</p>

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				neutral stability. Now if the ladder is placed flat against the wall, this state is unstable because it could fall forward. The stability of a system depends on the number of degrees of freedom. A ladder constrained to move in two dimensions has three degrees of freedom, so equilibrium is achieved by balancing the forces in the x and y directions and balancing the torques acting on the ladder.
72	2	Teacher	Merrihue Ronette	In theory, these concepts are good, but can we make sure curriculum matches them
73	2	Teacher	Stack-Kitley Susan	Activities are very child friendly and lend themselves to STEM or STEAM classrooms. I currently have a STEM classroom and I see many similar concepts, such as engineering and inquiry based research/design.
74	2	Teacher	Collar Theresa	The overview creates a better understanding for how the standards build on each other as the students move from grade level to grade level. I regularly utilize STEM lessons in my classroom and can see the engineering activities and the inquiry-based lessons found in STEM instruction align themselves beautifully with the NGSS.
75	2	Teacher	Berger Linda	I'm a fan. They have an easily traced connection to both the real world and current environmental challenges that can be addressed via Science. I particularly appreciated the narratives that will help explain the context and pacing of the units and lessons.
76	2	Other	Bethune Robert	Nicely organized and setup, the interactivity of the NGss website makes planning easier and more concise. The connections to the CCSS make the integration of cross-disciplinary content much more accessible.
77	2	Teacher	LAUSD South/West (no name provided)	The outline of segments for the whole of Biology/Life Science is not in sequence. Ecosystems, which is the second segment should be the last segment in the curriculum. Perhaps, even in the beginning? The ideal sequence should be 1.Molecules to organisms, 2. Heredity, 3. Biological Evolution and finally 4. Ecosystems. In reference to adding historical events, persons, timelines; these items could be condensed to a one day lesson or an aside to a given topic. It is unnecessary to spend more time than that discussing history.
78	2	Teacher	Lim Michael	A strength of NGSS is that there are less standards than the CST's. There is more time to focus on the few concepts and go deeper with real-life applications.

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79	2	Teacher	Vohra Ashima	very comprehensive and overwhelming . Requires teachers to teach few areas with great depth and prepare for high school and further education in core and allied science fields . The integrated model is great as student does not stop thinking of earth science as he transitions across grade levels in middle school . His world of science is all inclusive and for this reason having earth science, life science and physical science concepts taught at each grade level is great as long as new textbooks are provided to back up . Adoption and implementation can be a challenge for this reason. Also SEP concepts require teacher training or at least guidelines on what may be relevant experiments or models to trigger discussions
80	2	Teacher	Andrews Valerie	The Overview chapter that was provided for each grade span was helpful because it showed lesson examples, and teacher background information. This is helpful especially for teachers who do not necessarily have a science credential (elementary or multiple subject credentialed teachers). It does take some time to study and read through the standards to understand the layout, and what is expected. The framework overview with examples and background is very helpful.
81	2	Teacher	Flammer Lawrence	Excellent job (mostly some technical errors: lists being sent in separately).
82	2	Teacher	Berrner Jill	This will probably seem like an extension of my previous argument, but let me begin by saying that my background is in Engineering. In Engineering, after a problem is clearly identified, the next step is to review what is known (both scientifically and historically). It is not to develop, w/o prior knowledge, arbitrary solutions. In order to create 21st century learners, students need to have an understanding of 20th century successes and failures. Building upon prior knowledge is a key to success in any area. The second bullet in Dimension 1 (in my opinion) should be to survey prior solutions to the problem defined. THAT, my friends, is why Russia, China, and many other countries have been successful - they learned from, and built upon America's successes. We can't ignore that and must teach our children to be as shrewd.
83	2	Teacher	Gettman David	On Line 450, misspelled Poincare In the section starting at Line 737, Developing and Using Models, there needs to be clarification in the first paragraph about what a model is since many teachers conceive as a model as being only representational such as a labeled model for the cell. There is a statement in Lines 810 to 812 that too many teachers think models are representational only This entire statement on Lines 810 to 812 also needs to be brought to the first paragraph to clarify at the beginning of the reading what a model looks like in NGSS.

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84	2	Teacher	Pringle Kenneth	I didn't know where to put this so... Please recognize that the chemistry guidelines in the "High School Three Course Model – Chemistry in the Earth System: Integrating Chemistry and Earth Science" are minimal. But you have said that you are opening the teaching of the course to all teachers with a single subject credential. You must create a solid chemistry curricula to guide nonchemists, new teachers, departments, on the direction and implementation of chemistry in the integrated model. I think that this is destined to cause problems and make the implementation subject to ridicule if teachers do not provide a chemistry background during the course.
85	2	Teacher	Brandon Linda	The "Overview of the California Next Generation Science Standards (NGSS)" is a 101 page essay on how to read the standards. What does it tell you when a teacher needs to read 101 pages on how to read their teaching requirements?
86	2	Teacher	Cheung James	Lines 50-57 I like the analogy with the housebuilding. It makes it clear what place the CCC have.
87	2	Other	Glimme Aida	Tremendous amount of acronyms are used which makes it difficult to read the document. These acronyms are not what is currently used in our common science vocabulary - makes it difficult to read it.
88	2	Teacher	Ultican Thomas	There is not need for engineering standards. Science is the foundation for engineering. This just adds confusion. Students need basic science education from teachers that are excited about teaching science.
89	2	Teacher	Loeb Deborah	OK. 7th, 8th grade is not defined. HS Chemistry motivation says ESS, but this is actually defined as HS Physics. All 3 HS subjects are integrated into Earth science. All address energy and climate change. Perhaps these should be electives, like Physiology, which is not introduced in biology or the other disciplines.
90	2	Teacher	Pitts Patricia	I like the fact that these standards are focused on allowing students more freedom to use critical thinking. I also like the fact that students are given exposure to all the sciences. In the old standards based model, students that were on a university tract were not exposed to the earth sciences in my district. They would take biology, chemistry, and then either physics, or AP bio, AP chem.
91	2	Other	Hoyt Brian	Sequencing of material to be taught is widely varied among the different potential course offerings. While content taught should be in depth, the standards are extremely vague and broad as to what can be potentially taught. Having more specific areas of study would be helpful in guiding curriculum and laboratory development. Overriding concerns are if the UC, state and private colleges nationwide accept integrated models of science. Especially if they do not have access to subject specific courses and the students access to AP course offerings becomes limited during their High School education. -Have more examples of lessons and labs. Having examples of full unit and lab sequences and the development of curriculum would be helpful.

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92	2	Other	Murphy-Shaw Marian	<p>Page 5, Line 124 Students’ mastery of each of these dimensions as well as their integration is expected by the end of high school, and here a brief outline is provided for how each of these dimensions should be developed across the grade levels. Further details regarding these progressions are described in the CA NGSS Appendices E, F, and G. Students’ integration and mastery of all three dimensions is expected by the end of high school. The progressions (found in the appendices) illustrate how each of these dimensions should be developed across the grade levels. Further details regarding these progressions are described in the CA NGSS Appendices E, F, and G. and in Appendix C – Progressions of this framework. First sentence need simplification and showing how mastery and integration go together. Last sentence needs explanation of what the progressions are. Page 6, Line 147 With the adoption of the Next Generation Science Standards, California has transitioned from the state content standards that were adopted in 1998, where the focus was on what students should know and be able to do, to standards where the focus is on students’ expected performance at the end of instruction. With the adoption of the Next Generation Science Standards, California has transitioned from the state content standards that were adopted in 1998, where the focus was on what students should know and be able to do, to standards where the focus is on what students should know and be able to do with knowledge at the end of instruction. This shift is represented by PE that describe... The old standards did not focus on what students were able to do. Page 7, below Line 182 Page 8, Line 218 Looking at the schematic in Figure 8, the title at the top contains a code associated with the grade level or the grade band and the core ideas included in the standards. Should be Figure 3 Include a decoding key to explain the codes – example 5-PS2 (what does that mean) Move line 218-225 to Page 7, and incorporate into Line 187 Clearer understanding of how to read grade span and discipline Page 7, Line 202 The performance expectations (PE) are the assessable statements of what students should be able to demonstrate in order to show understanding of the core content in that subject area. The performance expectations (PE) are the assessable statements of what students should be able to demonstrate (through science and engineering practices) in order to show understanding of the core content and the cross cutting concepts. Teachers may believe demonstrate refers to just MC tests, whereas it is referring to the practices and using them to demonstrate knowledge of content. Maintains focus on the three dimensions throughout. Page 8, Line 206 and Space Science, Life Science, and Physical Science and Engineering. and Space Science, Life Science, and Physical Science and Engineering, Technology, and Applications of Science Engineering also represents these other areas. Page 11, Line 288 Both the SEP column and the CCC column may also contain supplemental learning goals identified as the “Engineering, Technology, and Application of Science” (found only in the green CCC column) and the “Nature of Science” connections (found both in the SEP and the CCC columns). Not sure if these are learning goals or if they are DCI – can you check this wording. Unclear –</p>
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				seems to minimize significance of ETS as a DCI Page 31, Table 1 Table 1: Types of models Include more examples for each model type Examples are very vague and some are not related to science or engineering. They should exemplify the power of modeling.
93	2	Teacher	Lee Kathy	NGSS seems to be better Science Framework in regards to preparing students for their professional lives. Especiall, adding Engineer aspect to science for K-5 was a brilliant thing to do. To get students ready for 21st Century-and the global world, these standards seem more align to real world.
94	2	District Administrator	Warren Glen	The shift in these standards are moving us in the right direction, from teacher centered to student centered.
95	2	Teacher	Hegdahl Lisa	pg 22 fig 5 Diagram regarding modeling - Change the figure. That figure is outdated and the group that developed it has actually moved on in their thinking of modeling.
96	2	Teacher	Deich Molly	Lines 1220-1223: "Thus the young child's idea that 'heavy things sink and light things float' does explain why a stone sinks or a piece of wood floats, but fails to explain why an iron boat floats and a grain of sand sinks." The characteristics "heavy" and "light" in this context do not explain why something floats or sinks. The mass of an object is an extensive property: the mass of a material changes as the size changes. Whether an object floats or sinks, on the other hand, calls for a comparison of two intensive quantities (the ratio of mass to volume of the object, compared to the ratio of mass to volume of the fluid). I recommend not using the words "heavy" and "light" when talking about floating and sinking. In the case cited above, the writer has conflated mass and density, which is a common language and conceptual pitfall in density instruction at all grade levels. My doctoral dissertation at UCSC (Deich, 2015) focused on how 6th-grade students understand density, and I found that the imprecise use of language can have a profound effect on how students make sense of mass, volume, and density. Even though this example appears to be specifically about displacement, I recommend changing the wording so as not to create confusion around mass and density.

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97	2	Other	Markus Doron	<p>36, lower RH cell of table it's its 38 lines 823-826 Sentence is too long Shorten sentence incomprehensible sentence 48 line 1065 with the explosion of technology-based tools with the sharp increase in the use of technology-based tools Clearer meaning 48 line 1079 measure measurement correct word choice 49 lines 1083-4 51 line 1142 computater computer Correct spelling 51 line 1165 youth youths correct usage 53 line 1214 the force that pulls apple the force that pulls an apple correct grammar 54 line 1255 it was recognized that the continents scientists discovered that the continents Avoid use of passive voice; active voice is more direct 55 line 1282 argumentation argumentation correct spelling p. 56 line 1293 This encapsulation of explanations as mechanism is then testable - [not sure what the writer means here] Statement is unclear p. 57 line 1325 well aslearning well as learning space needed p. 57 lines 1332-5 From an educational perspective, the value of providing opportunities to students to engage in argumentation is that it demands the higher order thinking skills of evaluation, synthesis, comparison, and contrast Providing opportunities to students to engage in argumentation is valuable because it entails the higher order thinking skills of evaluation, synthesis, comparison, and contrast remove excess verbiage p. 57 lines 1342-3 are not congruent to everyday common sense. do not arise from everyday common sense. clearer wording p. 59 line 1380 require justification drawing on a require justification, drawing on a correct punctuation p. 63 line 1513 Doing so, Doing so correct punctuation p. 72 line 1768 as I change the length scale of the model as I change the scale dimensions of the model clearer wording p. 77 lines 1938 and 1940 Figure 5 Figure 6 "Figure 5" refers to SEPs, not CCCs p. 83 line 2057 Figure 6 Figure 7 correct reference to figure p. 85 line 2066 so to ensure full to ensure full clearer wording</p>
98	2	Curriculum Specialist	Velez Diana	<p>Page 13, line 334: Why present an alternative if integrated is clearly better for students? The state should be telling districts and schools to teach integrated - no alternatives. Page 14, line 377-379: Wow! If these haven't been tested, why are they here in the state framework?! We need a framework based on research-based designs and practices. If something is experimental or non-conclusive it should be in an appendix or another resource document. Page 15, line 390: "American" sounds redundant here. Does this mean all the Americas?</p>
99	2	Teacher	Tupper David	<p>Useful document. This should be moved to Chapter 1 More of This/Less of This tables on line 424 are useful here and in the other chapters</p>
100	2	District Administrator	Sargent Cynthia	<p>Lines 69-71 emphasize only two dimensions (the CCC are not mentioned); please add. As much as possible, the grade level chapters need to have the PE's, 3 dimensions, and connections organized in the original architecture of the NGSS. By changing the way standards and info is provided in the charts/tables of the grade level chapters it becomes unclear as to why a significant section of chapter 2 was dedicated to explaining an architecture that doesn't get used in following chapters. Unless teachers need to access a</p>

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				format of the standards other than what is presented in the framework - in which case, make this clear that they need to have the standards docs as reference as they read/refer to the framework. Lines 323-329: Use a call out box, bold text, or something to make this stand out and be noticed! General comment - OMG! this chapter is crazy long. It's hard to pinpoint what to remove/shorten but perhaps consider what might be achieved by leaving some things to the NRC Framework and not re-inventing the wheel in a sense in this chapter. Consider placing the grade band progressions for each science practice in the section that summarizes the practice. I know it's in an NGSS appendix but the progressions are so valuable! Bold/make obvious the section titles for the 3 dimensions, such as Dimension 2 on line 1497. Line 2369 and beyond: I think I'd rather see this info about appendices in Chapter 1 where the structure of the framework is described.
101	2	Other	Galisky John	Line 788 Table 1: Types of models Some of the descriptions of models need to be significantly reduced in length and complexity--system model, mathematical model, computer model or simulation. There is already a column for examples so examples don't need to be provided in the description. Lines 961-964 Cut these lines or re-phrase. "Data produced by a stochastic model will have variation due to randomness inherent in the model" has no value for ordinary teachers.
102	2	Curriculum Specialist	Aust Andrea	In the section about the Science and Engineering Practice "Obtaining, Evaluating and Communicating Information" (pages 60-62), the importance of scientists' abilities to communicate with the public--something scientists are engaging in more frequently--is missing. Here is some suggested language: "Scientists today not only need to be able to communicate with their peers in academia, but also with the general public, which requires a non-academic writing style. The ability for scientists to share their work is essential in contributing to the scientific literacy of the public, assisting citizens in making informed science- and health-related policy decisions. This is especially crucial with contentious topics like climate change and vaccines. Scientists communicate to the general public through various means, including writing for websites and news outlets, appearing as experts on television or in Web videos, giving public talks and lectures, and sharing their research on social media. Students should be given the opportunity to develop skills in translating complex scientific information and ideas into understandable, accessible language for the general public, while still maintaining accuracy."
103	2	Curriculum Specialist	Inouye Nathan	pages 69-76. I would categorize the crosscutting concept questions into grade bands so they are aligned to the learning progressions indicated in appendix G from nexgenscience.org. Even though there will be significant overlap in the grade-bands, the different questions will demonstrate the increase in depth of questioning that teachers can use as students learn at a deeper level.

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104	2	Other	Kendrick Desiree	the Overview was great, as an early educator and visual learner. I needed to see a quick snapshot of the foundation and connection boxes. In understanding how to model coordinate and implement EDP (engineering design process) into my curriculum resource, and instruction.
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Chapter 3: Transitional Kindergarten

Comments (105-114)

#	Ch.	Title	Reviewer	Comments
105	3	Teacher	Galvan Bernedette	Transitional kindergarten is the BEST time for students to have the guided freedom to explore their surrounding world through hands on learning.
106	3	Curriculum Specialist	Stack-Kitley Susan	The NGSS standards seem to flow nicely from one grade to the next for k and T-K.
107	3	Teacher	Zacuto Wendy	My greatest concern is for kindergarten. I applaud the language used to describe the TK program and early childhood practices. I also applaud the scope of a two year program from TK through the end of kindergarten to establish mastery. I wish the introduction to the TK program was replicated at the beginning of the Kindergarten-2 standards, and that the k-2 standards place a greater emphasis on the integration of disciplines, play/experimentation, environmental inquiry, and the development of oral language and vocabulary as was provided so well in the TK document.
108	3	Teacher	Brandon Linda	This document appears reasonable on its face. It is 6 pages on the intent of teaching science in transitional kindergarten. However, if you continue to read on you realize the complexity that is expected of the teacher. What are the projected roll-out costs? Where are the moneys for materials, books, and lab supplies coming from? Where are the realistic classroom minute time allocation expectations?
109	3	Teacher	Gann Kristi	Lengthy background knowledge for Transitional Kindergarten. Use the examples from the TK on Kindergarten in the Kindergarten section. Tables versus paragraphs? Consistency throughout the chapters.
110	3	Curriculum Specialist	Eby Daphne	Lengthy background knowledge for Transitional Kindergarten. Use the examples from the TK on Kindergarten in the Kindergarten section. Tables versus paragraphs? Consistency throughout the chapters.
111	3	Teacher	Ultican Thomas	Please stop pressuring babies to achieve accountable standards.
112	3	Other	Murphy-Shaw Marian	Page one bridging of Foundations to NGSS and the tables for page 11 on are excellent to see and useful for LEA's and teachers.

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113	3	District Administrator	Warren Glen	I am glad this was included
114	3	Other	Kendrick Desiree	I'm so excited to see the addition of the California NGSS for Transitional Kindergarten. I appreciate the examples of short curriculum examples model.

Chapter 4: Kindergarten Through Grade Two

Comments (115-148)

#	Ch.	Title	Reviewer	Comments
115	4	Teacher	Galvan Bernedette	K-2 is a wonderful time to build word vocabulary through exploration and start to explain how the world works at a fundamental level. The elementary level is "key" for teachers to have Classes and PD to build their confidence in teaching science and or provide a "pull out" model where a science credentialed specialist is at each site or district.
116	4	Teacher	Stanger-Montano Sarah	I appreciate getting a better description of the standards and the clustering is very helpful. Would it be possible to give one more example for each cluster to show a different way of teaching? I am afraid that giving one way in this framework will limit creative ideas and publishers will be too rigid in what they expect teachers to teach. There were several typos in this section. I'm sorry I am not more specific. I will try to write them down and respond again later.
117	4	Teacher	Mulhern Kristin	I got halfway through kindergarten and lost focus. I love the amount of resources and examples, but there should be a synopsis, bullet points, to summarize, with references to more information.
118	4	Teacher	Farahmand Heideh	I don't like the narrative format of this document. It's too much to read. Bullet points might be more effective. I only read through 2.5 instructional segments for 2nd grade only. From what I read, there are many good ideas for a teacher with a science background to use, or if the teacher teaches only science. However I believe that most K-2 teachers don't have a background in science and are very focused on teaching their students to read. Most K-2 teachers will not implement these ideas with fidelity unless they're tied to the new CCSS for math and language arts. There are little notes in this document that point out where it's related to math and language arts, but it's not easily done for the teachers.

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119	4	Teacher	Wasaznik Isabella	Developing language is highlighted as an important concept for science in Kinder. Perhaps including some specific terms would be helpful. The segments are clearly explained with great example, some materials are provided. I would like to see specific examples of resources to be used: names of specific children books to read and/or videos to watch as well as links to where the materials are found. For example: alphabet cards from The World Around Me.
120	4	Teacher	Hohn Laura	I liked that chapter 4 is very teacher friendly, including background knowledge for teachers, as well as examples (vignettes). The layout is easy to read --easy to find information (ELD Components, Math, Engineering), which I appreciate. I appreciate that the NGSS are meaning-based, and the early grades (K-2) are building blocks utilizing a design model. I liked that STEM could be easily implemented as well.
121	4	Teacher	Stack-Kitley Susan	Kindergarten NGSS standards were well done and developmentally appropriate.
122	4	Teacher	Collar Theresa	This was a very concise, teacher-friendly explanation of what science will look like with the new standards. For me, it created a better understanding of the way that the standards are actually constructed across grade levels. This will an excellent explanation for new, as well as veteran teachers.
123	4	Teacher	Boecking Rachel	The format for the standards is not reader friendly. It would require a couple of hours for a teacher to read and process the information in its current format. -The standards contain lesson suggestions. These should either be placed in a separate section from the standards and/or provided to the publishers who will create the textbook. -The standards need to be more concise so that they can be referenced quickly, not read like a novel. The current format requires the teacher to read an entire section to find one piece of information. Teachers do not have the time required to read this current format. Some of the abbreviations explanations need to be listed in an area adjacent to the tables: (i.e.: SEP, CCC, DC1)
124	4	Teacher	Berger Linda	Nice way of integrating all the standards, particularly Engineering.
125	4	Teacher	Whitby Dommenique	In reviewing page 7 of 119 Table 1 "Instructional Segment 3: Animals and Plants can change in their environments", a suggestion is to add to the Highlighted SEPs to include Obtaining, Evaluating and Communicating information. Rationale: Students in K will obtain information through Big Books and informational texts. The integration of obtaining information about plants an animals is natural to how they are taught in class. For example, when I did an animal units this year, we read books, made Venn diagrams comparing animals by size, attribute and habitat. My students made a powerpoint presentation about their favorite animal as well as made an oral report in class. In reviewing page 8 of 119, line 143-147, "Because of this, and also because weather in California during the beginning months of the school year is generally rather uniform, this instructional segment is better placed later in the year. The collection of weather data can also be made relevant to questions in the context of instructional segments 2 and 3—in which students

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				learn all living things need water and how living things may change their environment as they access or use the water in it." a suggestion is to consider students who live in the arid areas of California as well as those who live along the coast. During the beginning of this school year we experienced rainy days, cool days as well as hot summer school days. So the statement should be revised because the beginning school days are not rather uniform across all schools within the state. Also, some schools begin the new school year as early as July and as late as September. Perhaps, "weather in California can fluctuate depending on location". Also, as a special education teacher, we begin discussing weather on day one as a common talking point, especially for students who are English Language Learners.
126	4	Curriculum Specialist	Singh SC	Just started reviewing overview & K. I will continue to work on it - thanks!
127	4	Teacher	Cho Won	<p>Comment 1: Page #: 6 Line #: 4-5 Comments: "Teachers pose additional questions to motivate and engage students as they learn about forces and interactions; what animals and plants need to survive, how animals and plants change and adapt to their environments, patterns in weather over time, and how sunlight affects the Earth." Question: If kindergarteners are learning about animals and plants surviving in their environment, should the underline part be written to target the same learning concept? On page 8, it addresses as live and grow. So can page 6 be written in the same way although educators understand that survive does mean live and grow? Comment 2: Page #: 9 Line #: Brief summary for table 1 Comments: Can we add the Depth and Complexity icons and/or indicate in some ways to address the gifted and talented program as well? Ex: patterns over time Comment 3: Page #: 9 Line #: 4 Comments: "Because of this, and also because weather in California during the beginning months of the school year is generally rather uniform, this instructional segment is better placed later in the year." Can this part be revised? Recommended Action (Rewrite with changes): This instructional segment may be recommended later in the school year due to the inconsistent weather pattern in California during the beginning months of the school year.</p>
128	4	Teacher	Reyes Rose	<p>Page:48 Line #697 1-LS3-1 The fact that assessment boundary doesn't include "inheritance or undergoing metamorphosis." It should be included in the actual standard so teachers won't misinterpret standard. Page: 50 Line #726 It will be a difficult task to have students find similarities between young plants to mature plants because the mature plant looks so much different than the young plant. Students in our communities often times aren't surrounded by plants.</p>

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129	4	Teacher	Andrews Valerie	I currently teach 1st grade. I like the standards that have been written because they are age appropriate. The information includes tangible concepts that students can see or experience. I have used many resources including the EEI curriculum and PLTW (Project lead the Way) to teach the NGSS for the last 3 years. I think that the students have a much better understanding of basic scientific inquiry. I would like to continue to teach the standards.
130	4	Curriculum Specialist	Zacuto Wendy	My greatest concern is for kindergarten. I applaud the language used to describe the TK program and early childhood practices. I also applaud the scope of a two year program from TK through the end of kindergarten to establish mastery. I wish the introduction to the TK program was replicated at the beginning of the Kindergarten-2 standards, and that the k-2 standards place a greater emphasis on the integration of disciplines, play/experimentation, environmental inquiry, and the development of oral language and vocabulary as was provided so well in the TK document.
131	4	Other	O'Connor Dawn	Like ELA,ELD, Math, Engineering, VAPA connections. Explicitly point out the integration between the disciplines and within Science. Would like the vignettes to reflect more 3D teaching. More specific examples linked to the elements in the progression of SEP's and CCC. Like the recommended instructional sequence of the instructional segments with valid reasons for having segment 4 last Appreciated getting resources such as books, curriculum, science talk ideas and debrief of the vignette Liked the phenomenon provided but need more examples and need to make it clear that phenomena does not have to be phenomenal.
132	4	Teacher	Brandon Linda	These expectations require a 120 page "How To" manual. What are the projected roll-out costs? Where are the moneys for materials, books, and lab supplies coming from? Where are the realistic classroom minute time allocation expectations?
133	4	Teacher	Lehnhard Joey Noelle	424 Vignette:Day 1: Instead of starting with content, students should go outside, and make observations on what they see animals and plants needs and where they live. Instead of a virtual field trip around California, there are different habitats in their own community. Focus on those for stronger contextualization.Day 3: Water in different locations is a better match for 2-ESS2-3 best instead to use the time to observe a local habitat.A wall map of habitats of California is really broad for Kindergarten. Instead, connect to the social studies standards and have a wall map of habitats in their neighborhood.Generally, the analyzing and interpreting data connection here seems pretty weak in this vignette. I had to go back and read a few times to even figure out what true data the students were collecting. 528 Vignette: Two poems in one unit ... that is not literacy for science. Instead, students could come outside and find water in their schoolyard (drinking fountain, puddle, dew, etc.) A leaky faucet is not in ks locus of control. Instead the conservation message could be to turn off the faucet. In fact, the majority of Day 4 is developmentally inappropriate for 5 y.o. Please see texts in the fields of conservation psychology and works by David Sobel. Instead, focus

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				conservation actions on what students actually have control over – picking up litter, using less paper, walking on the trail, being kind to animals, using less paper. This unit could be focused on picking up litter and changing their schoolyard (now a known habitat for plants and animals) for the better. They could collect data on this using Litterati or Ocean Swell apps and make posters informing their peers. Then they could see if their posters made a difference in the amount of litter found. 746 Vignette Using penguins in first grade is not contextual. There are a lot of animals that would showcase family behavior in a fascinating way that live right here in California like Sea Otters. P. 111 parent volunteers for a schoolyard exploration is not a strong family connection. Please re-read Appendix D Case Study 4 for examples of family and cultural connections.
134	4	Teacher	Gann Kristi	This feedback is more than 2,000 characters and will be emailed from gann0055@gmail.com
135	4	Curriculum Specialist	Eby Daphne	This feedback is more than 2000 characters and will be emailed from daphneeby@vistausd.org.
136	4	Teacher	Ultican Thomas	Please stop pressuring babies to achieve accountable standards.
137	4	Other	Murphy-Shaw Marian	Grade level examples are good ones.
138	4	Teacher	Vigil Melisa	The Description sections and Background information for teachers in the first instructional segment of section 1 is a good length. However, the Instructional segment 3 Background and Description is very lengthy. It would be more useful if they were boxed with key information bulleted. While the vignettes and snapshots are a concise way to give teachers direction and guidance about how to plan for the Instructional segments, they often include examples that are unrealistic for most classroom teachers to achieve. For example, the web chat with the scientists is unrealistic for many teachers to actually apply in the classroom. The example about measuring shadows is much more realistic for teachers to accomplish.
139	4	Teacher	Hori Jolene	Kindergarten Snapshot-Pushes and Pulls, Page 14, Line 310 Though I like the narrative format of the snapshots, the text is way too wordy. I do like the Math, ELD, and Engineering connections that are placed in the text throughout. Very helpful in planning. Kindergarten Vignette- Needs of Plants and Animals-line 424 Again the information is helpful, but their is way too much in the explanation.
140	4	Teacher	Lee Kathy	CA NGSS seems more structually organized, more teacher-friendly, and thereby students will have better experience in science.
141	4	Curriculum Specialist	Anastasopoul os Stephanie	Kindergarten Comments: Segment 3 Last DCI should be ETS1.B: Developing Possible Solutions instead of ETS1.A. Second Grade Comments: Segment 1 The title should be geosphere and hydrosphere (not biosphere). I don't think Designing Solutions should be an SEP here. They aren't designing and solutions. It should be Obtaining, Evaluating, and Communicating Information. The second sentence in the Brief Summary

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				seems like it fits better with Segment 2. Segment 1 is only about shapes of land and water features and that water can be liquid or solid. 2nd grade is limited in vignettes and samples. This does not provide many examples to aid teachers for in implementation. Segment 3 The Brief Summary only summarizes one of the standards (1-4)
142	4	Other	Janzen Jennifer	IMPORTANT COMMENT: Too wordy - For each instructional segment: Like the background information for teachers, Can this be highlighted so it is easier to find? - We like the ELA, Math, and ELD connections and the engineering connection - IMPORTANT COMMENT
143	4	Teacher	Cameron Kristina	The background and description of instructional segment is very very helpful for elementary teachers! With a multiple subject credential, I am not even close to being an expert in science. Having this background and detail makes teaching science easy to imagine and more tangible. It would be helpful if, included in the table of contents, were specific page numbers referenced on where the grade level pages start. Having the three grade levels lumped together in a 120 page document makes it difficult to navigate where each grade level starts. Teachers are going to look at the table of contents and try to easily access their grade level information. When starting a new grade level, acronyms should be reintroduced in full term. If I flip right to my grade level and see PE, I have to backtrack to find out what PE means. It would be helpful if segments referenced had page numbers referenced along with. For example, on line 674, segment 4 is referenced but it does not tell me where segment 4 is located. Math and ELA/ELD connections need to be more detailed and specific, some are very vague and hard to understand. It would be helpful if a link to an example is included, or a picture example.
144	4	Other	Duong Annie	Grade K vignette lacks explicit instructional strategies and connections to literacy instruction to scaffold for ELs and special needs students. Grade 1 vignette includes explicit instructional strategies and connections to literacy instruction to scaffold for ELs and special needs students.
145	4	Other	Barnett Teresa	Too much use of EEI curriculum, and need to "show" more of what STUDENTS are doing, rather than just what teachers are doing. Vignettes are not focused, not helpful. Some examples not grade appropriate. Line 194 – the idea of 'pushing ball up' not k appropriate – better examples: show object changing direction due to direct force Line 240 diagram. Seems non ngss to have teacher create diagram, too abstract for K. How can kids draw, develop a model of the relationship between the force and the direction of movement? Line 260 – example of a very non ngss approach: "Teacher introduces idea..." followed by a phenomenon to demonstrate. Start with the phenomenon! Vignette: mention of the talk moves should include a link to more info about talk moves. Provide sample questions, follow up q's to facilitate deeper student thinking. Less detail (such as words and tune to the sitting down song) and more specifics about suggested teacher moves/prompts Line 377 – should have more about importance of observing animals. Vignette in this

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				<p>section: too much books, video. Go outdoors!! Patterns is not the best ccc for this. line 481 – highlight these as examples of phenomenon k vignette 3 – day 1 example too abstract for k, day 4 "we cut down trees" is too abstract. This vignette shows 5 days of instruction with NO hands on! That does not fit with ngss K-weather Line 621 Why instruct about weather in us regions when the K standard has to do with local weather? 627 – Too doomsday for K! More about why weather forecasting helpful. Engineering connection – good, hands on. 1st grade Vignette – should be focused on the practice/student discussion to use evidence. Not "Her students have already made observations, conducted investigations, and developed evidence-based accounts to explain that young plants and animals are alike but not exactly like their parents." Show how students "developed evidence-based accounts to explain" -- what does that look like?</p>
146	4	Teacher	Barber Lisa	<p>I like how research and writing projects are included. I like the engineering connection section where it connects the topic (wind) to a real world problem or situation.</p>
147	4	Other	Markus Doron	<p>5/99-100 they are able to see, observe, and describe. they are able to sense and describe see and observe can be construed as the same. Also, students can use all five senses -- not just their sense of sight. 5/118 .)). Punctuation 10/193 and THROUGHOUT THE DOCUMENT phenomena phenomenon grammar 12/241 Add a hand to the left side of the force arrow, as described in the passage 13/259 students understand that objects push or pull on other objects when they collide students understand that objects push on other objects when they collide Objects do not pull on each other when they collide. Snapshots do not have line numbers. Why not? K snapshot: pushes and pulls occasion in which a Classroom Talk is occurs occasion in which a Classroom Talk occurs grammar</p>
148	4	Curriculum Specialist	Velez Diana	<p>Recommendations: Take out vignettes or make them short snap shots of 3-D teaching and learning. Do not use EEI as basis for science lesson; instead more of students outdoors. Focus on how to engage students in observing a phenomenon and making sense of it. Model relevancy and authenticity for students ELA/ELD connections should be highlighted in the box, but not the focus of the snap shot. Science ELA/ELD integrated lesson has good ELD discussion and strategies, however, the activities are not appropriate for K. Either change content or make it for 2nd grade. Rationale: My interpretation of NGSS is that students' science experience should start with phenomena, we don't see this reflected in the document. There seems to be a heavy emphasis on pictures and videos and not on first hand experiences with phenomena. Vignettes do not have enough meaning-making coming from students - too teacher directed, not student-centered as required by NGSS. The structure and purpose of the vinettes are not clear. Some snap shots, some seem like a multi-day instructional sequence. Would be more helpful to see short snap shots of 3-D teaching and learning. (I'm sending a line by line critique via email with suggested vignette.)</p>

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Chapter 5: Grades Three Through Five

Comments (149-187)

#	Ch.	Title	Reviewer	Comments
149	5	Teacher	Galvan Bernedette	3-5 is very important for growing children to know what is true science and what is not through hands on exploration and research. They also need to learn the basis of team work and each member of a team contributing to their distinct roles. This age group needs the most practice writing out their procedures and summarizing their reasoning. evidence and conclusion.
150	5	Other	Lounsbury Kim	Read only the 4th grade part; love the background for teachers, but not sure the NOVEL form will be well received by elementary teachers who are currently overwhelmed with Common Core and new math programs; there is NO time to read and organize all this information, and if someone was willing to read it, I don't see anyone doing anything other than what you have explicitly spell out in this draft. I will continue to read, and of course, try and make it work. I think it is good science, but how we roll it out and TEACH it is still the question.
151	5	Teacher	Baker Cara	Reviewed 5th grade only: 5th grade Instructional Segment title for #3 is missing from table on page 111/112. It would be helpful to know before beginning the Instructional Segment, what prior knowledge students should have from previous grades. The placement in the document of the Vignettes are confusing. Perhaps place as in another area, so the descriptions of each part is not interrupted. Are there Engineering Connections for each instructional unit? Sequence of units and parts makes sense logically and helps create big picture connections to content.
152	5	Teacher	Merrihue Ronette	I like the examples of what lessons would look like in the classroom for a 7-day period. However, if the curriculum does not match these concepts, it would be really difficult to implement since our days are stretched really thin. Planning for science takes a great deal of time, and many instructors would not be able to take the time to do what is necessary to ensure students are exposed to these standards.
153	5	Other	Frutchey Lynne	Since this is developmentally really challenging, I am a little concerned that there would be no time to review and build upon the learning. It seems that the assumption is that every child will actually get a good chunk of time devoted to these science concepts, which is fabulous! However, the reality is that each teacher is not going to devote the time it takes to do this well when there are other demands in time. So I really think that the big concepts have to be presented in easy to read, easy to implement bites. I also think there should be reviews of major ideas the following year. Since these are really stretching students, some will need review time again and again to really have it sink in. Processing time is so valuable. NGSS would be more likely to be implemented well if there was a science teacher at every elementary school that would facilitate the

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				planning and teaching. (The classroom teacher should be there for each lesson so they are actually learning and helping as well. As a third grade teacher, I have seen some teachers teach science, and some never do more than read a section or two in a science text. I am a really enthusiastic teacher and I do a lot in science, but the reality is not all teachers do, and they tend to put ELA and math first. I do not want to see science lost because this will seem really overwhelming to plan, set up, teach, and grade on top of everything else and I can see that happening. How are we going to chunk this in to manageable bites for both teachers and students? Putting this plan on paper is a great attempt, but without a great deal of support, there will be inequity from teacher to teacher, class to class, school to school, and district to district in what students are exposed to and what they learn. I actually really like the direction of NGSS and think it is exciting, but they could be taught in a very dry, way where what the students are learning to dislike science.
154	5	Teacher	Berger Linda	I appreciated the lessons, scope, and sequence, although I didn't see as much authentic engineering connection in the 4th grade lessons as I would have liked.
155	5	Teacher	Menck Dana	Page #: Line #: These instructional segments are designed to be taught in this suggested sequence over the span of a school year, not taught individually. Comments: I think it is always best to consider the likelihood that many classrooms may not be able to maintain or complete the full pacing plan. Students can do this as well, investigating and modeling the system of any vehicle with a block sliding across a variety of surfaces including some with very high friction, and others with much lower friction. At first, the teacher may tell the students to initiate the motion by giving the block a quick push. The teacher can challenge the students to devise a way to control the force that initiates the motion and to develop a way to include the unseen forces on the block in their model. ... This type of questioning is designed to elicit from students the idea that there is a force on the block due to friction between the block and the surface. It should also elicit that the size (or strength) of this force depends on the nature of the surface. Students revise their models to include the friction force at various instant ... This section represents the challenge of the high level of the language content. Though I do desire this level of academic language; and I think we could design physical demonstrations of this, I am not sure I can easily get third graders to accurately use all these terms in written descriptions and analysis.
156	5	Teacher	Kossak Scott	The draft provides a strong rational for studying the four sessions and their connections to past learning. The draft is visually overwhelming. It would helpful to have chapters and more headings to easily find the information needed.
157	5	Teacher	Akinsanya Ashley	Please delineate the state standards from the national framework standards more clearly. It becomes confusing when reading through with multiple standards being listed and not identified.

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158	5	Teacher	Galli Pam	We would like a clearer link between the national disciplinary core ideas in engineering, technology, and the application of science with the California disciplinary core ideas in engineering, technology, and the application of science.
159	5	Teacher	Nagy Olguin Melanie	We would like a clearer link between the national disciplinary core ideas in engineering, technology, and the application of science standards and California disciplinary core ideas in engineering, technology, and the application of science standards.
160	5	Teacher	Clark Vettania	We would like a clearer link between the national disciplinary core ideas in engineering, technology, and the application of science and California disciplinary core ideas in engineering, technology, and the application of science standards.
161	5	Teacher	Jones Andrea	On p. 60, Line 4-PS 3-3 there is a clarification needed to determine whether energy is transferred AS sound, heat, light, etc. or BY sound, light. Pages 63-64; Line 1339-1340: When discussing the idea that energy is never "used up", perhaps it would be prudent to mention that the energy is either transferred or distributed within the local environment. The rationale for this is the importance of including the concept of transfer in the discussion. Page 61-64 Line: 1278-1365: When considering the stakeholders who will utilize the "Background for Teachers", the suggestion is to include this information divided into sections immediately before or after the clarification statement and assessment boundary information for each standard. Recommended action: Standard, Clarification, Assessment Boundary, Background. The rationale is that when the information is presented in large sections, it may not be user friendly for all teachers.
162	5	Other	O'Connor Dawn	various pages Variable definitions/des- criptions of phenomenon Clear, concise definition and specific examples. Phenomena are the initiators of 3-D learning. It should be elevated and treated as such. two boxed examples i.e, lines 246 & 566 ELD and ELA strategies are combined. Separate if and when appropriate. Starting with the scientific vocabulary is NOT the most effective ELD - or ELA - strategy for teaching science. various lines Many topics and strategies provided. More focus and detail on fewer topics. Lots of information in this draft version; needs a more focused approach, especially for the regular classroom teacher. various lines Several examples and certain information is inconsistent within the grade level. More consistency needed; also more similar formats.. Ideally, there should be a seamless science learning progressions across each of these 3 grade levels so that teachers could see their students' cognitive development for that grade level. line 346 - on Introducing science vocabulary first. Introducing the activity or demonstration (phenomenon) first. According the NGSS, the phenomenon should be introduced BEFORE the related vocabulary is provided.

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163	5	Teacher	Mackey Lenn	My only concern is that with the push for hands-on, real science, I find it difficult to do astronomy during the day art school. I don't understand how 5th graders are going to reason the solar system and make arguments for their theories when they are in school during the day. I think we can find a lot of more practical, everyday physics knowledge they need to discover.
164	5	Teacher	Berner Jill	If you haven't decided to round file my comments by now, this should do it... I disagree with this approach for 7 - 11 year olds. In this technological age, they will be curious (and driven) to understand it more. Electricity, electronics, and computer technology should be the focus for this age group. You may argue that thousands of hours of "expert educators" time has gone into the development of your NGSS model. May I ask how many 7 -11 year olds were on your committees? In my opinion, which you may enjoy reading before it finds it's way to round file infamy, is that every elementary student should spend at least a month of their year with a screwdriver in their hand - exploring through reverse engineering. Educators are afraid of this kind of learning, because they don't have all the answers. THAT will inspire most 11 - 13 year old to explore even more! ;-)
165	5	Teacher	Brandon Linda	These expectations require a 170 page "How To" manual. Where are the moneys for materials, books, and lab supplies coming from? Where are the realistic classroom minute time allocation expectations?
166	5	Teacher	Lehnhard Joey Noelle	Most language scholars are in agreement that vocabulary should be taught in context, after students have had experience with the concept and after they have used their own words to make meaning of it. In this vignette, the teacher front loads vocabulary. Talk to Dr. Okhee Lee about this if you have questions. There are very few examples of starting with a phenomenon. This is integral to NGSS. More vignettes should start this way instead of with vocabulary development. The Monterey Bay Aquarium has some examples of pieces of curriculum that do this well.
167	5	Teacher	Deem Diana	Chapter 5 Introduction Line # 18-22. "While the performance expectations shown in kindergarten through fifth grade couple particular practices with specific disciplinary core ideas,...". This should include something about Cross Cutting Concepts being included with the SEPs and DCI's. Starting with the word "couple particular practices with cross-cutting concepts and specific disciplinary core ideas." Line #58-65: These lines are helpful to educators in understanding that more practices are developed other than those explicitly stated in the PE. Also it demonstrates that it is 3-dimensional as well as emphasizing that investigations are student-centered because they have developed questions from phenomena. Grade 4 Chapter 5 Line #1246-1247: use of the word "deeply". "Intensely" could be a better synonym to use to describe the kind of investigating the students will be doing. Or reword the phrase to say: "...and participate in an in-depth investigation of the structures and functions of plants and animals." Line #1269-1273 - Questions - These questions are repeated in the table. This seems redundant. Line #1325: remove period after "structure".

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				Table in Line # 1332: Helpful visual for educators, and for students, if needed. Line #1433-1434: Why can't students observations be qualitative AND quantitative? In order to support a qualitative observation of a student, it should be backed up with the measurement of the height of the marble, or the car in collisions. Also, how the object affects the cup could be measured. These quantitative observations can show the cause and effect relationships observed. Line #1543-1544: doesn't make sense. Instead: "Intensity is one more technical-term that students will need to talk about with respect to light and sound." Line #1747: "amazing" is an opinion, should be replaced. Line #1746-1747: This line is redundant and wordy. Line #1762: "though" should be "through".
168	5	Teacher	Ultican Thomas	Somewhat over optimistic.
169	5	Teacher	Loeb Deborah	Food webs are everywhere.
170	5	Other	Rege Dawn	Pg 63: POE? Not sure if this is meant to be PE. Pg 66, line 67: explain what this means... what is an expanded learning program? an after school program or during the school day? Lines 111 - 118 (comments also apply to each instructional segment): why are these questions different from the ones in the table? what are these questions called? essential questions? guiding questions? maybe provide some identification for the questions in the table so it is clear how they are meant to be used. -maybe the questions in the paragraph are probing questions? these seem more specific than the questions in the table but it is unclear why 120 (background for the teacher): could there potentially be links to videos that provide background information for the teachers so they can watch and/or read? with physical science it can be helpful to have visuals -could use existing videos like Kahn Academy -quick, multimedia videos not meant to replace the text but to supplement -more images 246 (ELD connection): seems to emphasize vocabulary which is important, but we think it should emphasize the fact that current research supports first providing hands-on experience to provide context within which students can develop academic language, rather than front loading vocabulary at the beginning of a unit of study -maybe include links to previous chapters that refer to ELD strategies such as chapter 10 557 (using models): needs some examples of instructional strategies around developing models (teachers can have hard time understanding what models are within the context of the NGSS) - maybe some resources on models could be linked here, or links to previous chapters that define or refer to developing models 492 (table): "Why do organisms grow and develop?" Change "why" to "how" 513: "Most of the calories consumed by people around the world are from seeds and fruits."-seems out of context 489: Question repeated: In what way can variation help or hurt the chance of an organism surviving?

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171	5	Other	Murphy-Shaw Marian	Grade level examples are good ones. Though a long chapter the teacher background information is well done and useful.
172	5	Teacher	Katzman Kelsey	As a 5th grade teacher, I looked at the Grade 5 NGSS implementation framework. I thought the framework was well written, concise, include the NGSS standards well and thoroughly enjoyed the questions that were included on the framework. This will help teachers with an understanding of the new standards and where to go.
173	5	Teacher	Proctor Kathy	Helpful questions and support for teachers 3-5 as they begin to transition to what are we to teach in 3-5.
174	5	Teacher	Del Razo Crystal	Chapter 5 needs to be more user-friendly. The "Background for Teachers" and " Descriptions" are too lengthy (wordy) - there's too much information. If this is necessary, then, perhaps, include Cliff Notes for it. Another suggestion is to shorten the section and box it in another color. Or, use bullet points or colored graphic organizers for the key ideas. The vignettes and snapshots are somewhat helpful. Some are not realistic, though. For example, the Eco-system vignette for 3rd grade appears to over achieve. A lot is done in a short amount of time, and assumes that the students have strong skills in reading and writing. I looked at other vignettes for other grades and found a similar problem. A 1st grade vignette on penguins included a web chat with a scientist. Please use vignettes that are practical, and use resources easily accessed by most teachers. And remember, elementary teachers often only have 20-30 minutes a day to teach Science - if that.
175	5	Other	Olsen Elena	In Section: Grade 3 Instructional segment 2 Life Cycles and Inheritance of Traits, pg. 43, lines 971-973. Teacher was explaining the purpose of the field trip. Please include, " In your science notebook sketch plants, list the type and quantity of animals sited there and what they were doing," Please consider gathering evidence in a science notebook and having students use notes as evidence for claims and arguments.
176	5	Other	Sanchez Elizabeth	The following disciplinary core ideas in Life Science LS1. B: Growth and Development of Organisms, LS3.A: inheritance of Traits and LS1. A: Structure and Function; should be taught with in the same grade as the connection is greater therefore the concept can go into more debt on how specific traits inherited from an organisms parents will affect the organisms function thus far it's chance for survival. The following disciplinary core ideas should be taught congruently in the same grade level as LS2.B cycles of matter and energy transfer in Ecosystems and LS2.B: and LS 2. A: interdependence relationship in ecosystem connects much better with the instructional segments Exploring Eney and Ecosystems and Interdependence as energy is transferred through food webs in ecosystems, as energy travels through food webs in various ecosystems this allows for teaching in more debt.

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177	5	Teacher	Morrison Susan W	My major problems were with science inaccuracies. 3rd grade - Climate refers to average weather changes over several decades, not years. 5th grade - Question use of term "particles" for atoms and molecules when in science particles is often used to refer to sub-atomic phenomena AND question having students learn that the light seen in the sky are Moon, Sun, and stars, leading to the misconception that the brightest lights in the night sky after the Moon are stars when actually they are planets. Also, the Sun, Earth, and Moon form a system, but at this level, the stars are not part of any system the students are learning about.
178	5	Curriculum Specialist	Anastasopoul os Stephanie	Fourth Grade Comments: Segment 2 Electromagnetic Radiation is listed as a DCI. I think it should be with segment 4 instead (like it is in NGSS). Segment 2 is about waves and the assessment boundary specifically states "does not include electromagnetic waves".
179	5	Other	Janzen Jennifer	IMPORTANT COMMENT: Too wordy - IMPORTANT COMMENT: We sense a lack of pattern in the way that the information is presented. We suggest adding a "How to Read" section that reviews how the information is organized (and way) and where to find different fea
180	5	Other	Stillittano Marissa	Color needs to be consistent with NGSS standards and visible across all grade levels and unit;, formatting and tone needs to be consistent across all levels and unit. Hyperlinks to the various models, referenced standards, resources would be incredibly helpful. Crosswalk,Is there a crosswalk between CA 98 and NGSS? Will it be a part of the Framework/an appendix? First appears/last appears. In the text, state the first time a subject is introduced as well as the final time the subject is discussed from K-12. Cross- Curricular connections (inset boxes) Make sure the connection is academically rigorous and supported by the standards. The grade specific comments will be e-mailed since they will not fit in this box.
181	5	Other	Duong Annie	Instructional strategies and connections to literacy instruction to scaffold for ELs and special needs students are well addressed in the vignettes.
182	5	Other	Barnett Teresa	Much the same as K-2. Too much EEI, too much reliance on books, videos, not on hands-on. Show more of what teachers are doing to facilitate student meaning making. Get students outdoors, investigating, and communicating. Show teachers HOW to make this shift from telling students information about content topics, more on how teachers can guide through well crafted questions and investigations and meaning making. 5th grade – missing home to school connection, too much emphasis on individual research, writing. While it is great to connect science more closely with language arts, it is important that the little "hands on" investigation time students currently have is not further eroded with more reading and writing assignments, taking them even further from the actual practices of science and thinking scientifically. Vignettes talk about stuff without doing stuff!!
183	5	Teacher	Cope Sasha	Plants and animals have unique and diverse life styles The wording of "life styles" is ambivalent. Instructional Segment 2: Life Cycles and Inheritance of Traits (table 1)

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184	5	Teacher	Hegdahl Lisa	All - K-5 general comment - Using BOLD type to highlight the CCs and SEPs shows importance All K-5 General Comment - the description of instructional segment and the following vignette is linear; the fear is that we limit creativity appears to be linear and may be scripted as only one pathway, may stifle creativity. All teachers and publishers should be encouraged to create lessons that do not only follow the instructional segments in the Framework; we do want to not see that the format in the vignettes is prescriptive.
185	5	Teacher	Flanagan John	There is a major overemphasis on genetic topics in grades 3-5, which is complicated by the way it is organized. Individual adaptations are emphasized in 4th grade but group behavioral adaptations are emphasized in 3rd grade. That is conceptually backwards. 3rd graders are expected to make an intellectually abstract jump that many are not ready for. There is actually a lot of crossover, in general. Rather than creating a natural atmosphere for building deeper understanding, this will probably lead to a lot of repetition. Many elementary teachers look for the easiest way to integrate science into their already busy day of language arts & math. They have a lot to set up each day without much prep time. Given their time limitations and the average depth of scientific knowledge that many elementary teachers have, the similarity of several of the 3-5 science topics will make it difficult for teachers in many schools and districts to "divvy up" the concepts and key activities. For example, third grade gets an intro to the idea of magnetic & electrical fields, but then 4th grade does electricity & magnetism. Plate tectonics are covered in 2nd grade, then in 4th, while 5th covers the geosphere in Earth science. 3rd grade has weather, but 4th grade has natural disasters. Given the time limits mentioned above (and the unfortunate territorialism and one upmanship which can create infighting between grade levels when deciding which grades get to do certain popular activities), this is a recipe for disaster. Face it, some activities are easier to set up, more affordable & more engaging than others. And even when annual iterations of a great activity would actually deepen student learning, it is a difficult sell to teachers who fear the complaints of the few resistant but highly vocal students who say, "we did this last year!" Anything that reduces cross grade level cooperation or teacher buy in is not helpful to the overall educational environment.
186	5	Other	Tupper David	vignettes should focus on something other than environmental (EEI) driven content. EEI was created before NGSS and the connections/relationships drawn are more tenuous than other examples.
187	5	Other	Inouye Nathan	Page 11 of 169 from Chapter 5. Re-word labels in diagram from "Left Force/Right Force" to "Force caused (created) by the people on the right" and "Forced caused (created) by the people on the left". "Right Force" might be misinterpreted and to be more specific.

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Chapter 6: Grades Six Through Eight

Comments (188-292)

#	Ch.	Title	Reviewer	Comments
188	6	Teacher	Galvan Bernedette	Junior high level students need to be shown more thorough thinking of science concepts on the basis of what they learned in elementary level.
189	6	Teacher	Trammell Rozalia	Within all the context, there is an assumption built into the statements that the students will have already learned specific content matter at each grade level and that they should already know the basic information. In the real classroom setting that is not true. Not all the students will have seen this information at a foundational level because: 1. They come from another state that is not using the NGSS. 2. They are students identified as special education. 3. They are students that have immigrated.
190	6	Teacher	Galvan Bernedette	Junior high level students need to be shown more thorough thinking of science concepts on the basis of what they learned in elementary level. This is where a model of the lab report book needs to be in place for students to learn to write their thoughts and evidence on paper for reproduction for accuracy and precise to start forming.
191	6	Teacher	Trammell Rozalia	I do prefer this model, yet currently I do integrate many concepts into my current teaching and have been doing so for the last 8 years.
192	6	Teacher	Banner Wendy	Among those of us who have followed this process since its inception, first at the national level and ad infinitum at the state level here in California, there are many who have lost all confidence in the competence of our CDE. I could go with either model, but in a high transience urban school district like mine,(LAUSD) vertical articulation will be a nightmare. Experienced educators know this, politicians don't. There will never be enough staff development/planning time to coordinate the content mastery required for instructional expertise in the toss-up of new diciplines presented in the Integrated Model. A modern biology e Major may have 2 years of chemistry and a year of general physics as undergrad requirements, but this is not the case for most single subject science credential holders. My guess is, many science faculty will lurch back to textbook based lessons. While others among our most experienced educators will elect to retire.
193	6	Teacher	Mebane Myesha	The preferred model is well-written and conducive to learning but there are little to no resources on the market currently which makes it difficult for teachers to effectively relay the content to students. The state needs to consider these issues and afford school districts with funds appropriated specifically for NGSS implementation.
194	6	Teacher	Banner Wendy	NGSS 6-8 discipline specific 👍 (thumbs up) CA NGSS 6-8 discipline specific 👎 (thumbs down)

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195	6	Teacher	O'Malley Kim	This model is incredibly complicated for our students. I don't see how this will allow for students to go in depth into the concepts and truly make connections
196	6	Teacher Librarian	East Jennifer	I really like the storyline, which gives a visual of the course layout and structures the units. There are great explanations and examples of how/what to include in the units, which is the first definitive information regarding actual curriculum building I've seen. This is a huge relief. However, some of the integration seems forced. It seems likely that a good deal of the material is only loosely connectable to other units. You would need to teach the basics and then try to find ways to connect those concepts at later stages.
197	6	Other	DuBois Joy	I have only 1 issue with this Model and that is the Life Science of Sexual Vs, Asexual Reproduction. 6th grades, ages 10 - 12 are not developmental ready for discussion in regards to reproductions. Even in 7th grade, many students are embarrassed by the subject matter. I feel this should be kept in 7th grade or placed in the 8th grade model.
198	6	Other	Schleder Bradley	Line 1374, Figure 2. Thinking that students will look at the figure and realize that air is made up of diatomic molecules is unrealistic. The integration of Grade 7 instructional segment could be improved. It would be difficult to discuss molecular bonding without a firm grasp what atoms and molecules actually are and how the different elements are fundamentally different. Line 1517, I feel that students will not be able to make connections on what they have learned about water to infer Helium's or other elements properties. Line 1556, Extended atomic and Molecular Structure. Again, there is not enough teaching of molecular structure for them to deeply understand that graphite is in layers. Although this activity is something that middle school students can understand with more background knowledge. Line 1664, it would be better to give a more detailed description of the model and the model's purpose. Line 1775, Again, if students do not have a firm grasp of atoms and molecules the chemical equation of photosynthesis will be far over students heads. There needs to be more context for this abstract concept. Ditto for glucose. Line, 1880 I am not convinced that students, without additional support would make these connection. Line 1996, This activity is very unclear. More details please. Segment 4 Vignette, line 2286, please use another vignette. This sounds like an after school program. The restoration project is not realistic for the typical middle school science teacher who teaches 6 periods. There is too much EEI curriculum in the framework.
199	6	Teacher	Ellis Peggy	The document is very difficult to understand and very poorly organized. Maybe the Instructional segments for each topic could be grouped together in order to understand the flow of the topic. Currently the storyline seems quite contrived and unrealistic. It appears that there is an unrealistic expectation of what middle school students already know and what they are expected to learn. The integrated approach has too many large gaps of information that must be taught before the actual NGSS. If you don't know where the gaps are, the flow for the students will be very disjointed. Another issue is the type of examples(pg 96)

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				given expect a different level of knowledge than what the NGSS specifies. Covalent bonds are used and yet the NGSS does not address covalent bonding.
200	6	Teacher	Jimenez Lourdes	more graphic representation as the ones already provided.
201	6	Teacher	Courdy Tyler	Integrated Model Grade Seven: Between line 1268 and 1269: Figure 1 In this model under unit 2. This unit focuses on cycles and how things flow within a system. How are they to design a solution for these systems? Are the students supposed to try and find ways to optimize these systems and analyze where they are weak and try and improve them? Line 1345: Table 1 Summary of DCI Clarity in explaining how PS1.A and PS3.A to connect atomic structures learned and students observations in reality. An example would be greatly appreciated. Line 1347: Still no clear concepts of how to effectively implement engineering practices. More suggestions, examples, etc., needed. Line 1349 No engineering practices seen in this table. Line 1406 through 1407: Describe not using the terms protons or electrons. This is key in helping to describe what makes oxygen different from nitrogen, etc. This should be a part of the standards regardless of the fact that teachers may still teach it if desired. It makes no sense for it to be optional it should be part of the standards. Line 1414 and 1415: Periodic table is not included in NGSS. While I understand depth is not needed, clear basic parameters should be taught. This primary exposure will help high school students when they learn about the periodic table in depth. It will also help provide a context of the derivation and patterns within element structures. Line 1424-1425: Attraction of particles. Discussion of electrons and charge (which right now is not part of the standards) helps with this discussion. 1489-1501: Discussion of cause and effect. Is exciting and clear. Helps demonstrate how to use a CCC well. Line 1547: Mentions several models. Discussion of the differences between diagrams and models needs to be addressed somewhere. . Line 1754: Typo: "As student (sic) presented their ideas". Instructional segment 2: No clear use of engineering practices. Clear use of practices needed.
202	6	Teacher	Laird John	Line 1150 "Global Temperature and Carbon Dioxide Over the Past 1,000 Years" What is the source of this graph? This is basically the same graph used by Al Gore in the movie, Inconvenient Truth. This graph is based on come very biased "science". Craig Loehle and Steve McIntyre have done extensive work showing the "hockey stick" graph was not vetted by the journal, Nature, or the IPCC before widespread dissemination. Michael Mann failed to include all the data which he reported he'd used. A correction of this graph was refused publication in Nature, however was published elsewhere, and is supported by the Wegman Report, et. al. The original data for this graph came from a tree ring study in Yamal, Russia. 34 trees were used in the

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				<p>approx. 2000 year study of temps. Researcher Briffa carefully selected 12 of the 34 tree rings samples (one of which was a radical outlier that transformed the graph) and applied a filter after 1990 to create a false uptick in temperature shift. The framework must be true to science at all costs. Please replace the graph with an accurate one. Here are a couple of resource to consider: http://icecap.us/images/uploads/LoehleHOCKEY.jpg, http://icecap.us/images/uploads/JoanneNovaStick.jpg, http://icecap.us/images/uploads/Joannenovastick2.jpg Line 1073, Earth's Energy Flow Model. Illustration label states, "Greenhouse gases in the atmosphere absorb IR and make the Earth much warmer than it would otherwise be" It would be prudent to add "making life possible" One of the characteristics astronomers are always looking for in exoplanets is the possibility of liquid water. Our greenhouse effect must be celebrated as one of the major catalysts of life here on Earth. It should also be noted that Earth radiates at least an equal if not great amount of energy than it receives from the sun. (if one accounts for the thermal energy generated by radioactive decay.) Line 3068 - FIGURE 7 - The train cars with the little squiggly lines is very unclear. I had to stare at it for a long time and still was not able to fully appreciate the model represented. I think there are plenty of models out there that would be a better representation of this concept. Several colleagues viewed this illustration attempting to show a model of net forces and all of us thought this was horribly confusing and ineffective. Please consider changing this to something more effective.</p>
203	6	Teacher	Song Nitta	<p>I have a thought about the integrated model for the 8th grade. I am not so clear about the degree of integration. For example, covering the fossils unit with Newtons 2nd law is a stretch. The emphasis of the fossils unit is not on the motion of asteroids but rather in the history of Earth. Then to teach Newton's second law won't fit well.</p>
204	6	Other	Watts Tyler	<p>1930: What would the iterative testing look like in Mr. G's activity? 1951: Table 7 should read Contrasting Minerals and Rocks 2033: Under Guiding Questions: What processes have shaped the distribution of Earth's resources and their availability in ecosystems? 2112-2113: The San Andreas fault does slide, but a bend in the transform boundary does create the San Gabriel Mountains. This could lead to inaccuracies in mountain formation not being found as a result of transform boundaries. 7th Grade Integrated flows well and makes sense. Make 6th and 8th Integrated cohesive like the 7th grade integrated course.</p>
205	6	Other	Schmitz Jeff	<p>Intro to Grades 6-8 p. 4 Line 80: Period should follow citation p.4 4 Line 84: Insert (PCK) after knowledge p. 5 Line 93: Change simple to simpler p. 5 Line 104: Uncapitalize Framework The grade level concepts and subsequent unit level concepts are a welcome method of organizing and sequencing the standards and practices within the integrated model. However, in Grade 6, it may be worth considering a unit sequence that pushes the DCIs related to the brain & nervous system forward to unit 1. Here's why: The growth mindset research by Carolyn Dweck and Jo Boaler is being heavily promoted throughout the state. Promoting</p>

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				student belief in a growth mindset at the beginning of the school year is becoming a popular means of gearing students up for success through the school year. This gives 6th grade teachers a perfect vehicle for for the nervous system science DCIs in their grade level. Also in 6th grade, I believe it will be irresistible to teachers to investigate heat transfer principles (currently in Unit 2) before, or in concert with, the water cycle (which begins in Unit 1), being that heat is the driving force behind the water cycle. p. 15 Line 140- This definition of a system should be called out more explicitly (bold, italics, ...something) Yea for snapshots and vignettes!
206	6	Other	Desai Shital	I like the visuals and vignettes. I like how some words are written in bold such as "model" and "argument based on evidence." The new standards are very dense (that's a good thing). Line 1905 (Engineering design challenge to quantify energy released) To me, this seems like it would take too many class periods and would be too difficult for my students to do on their own. Perhaps, I do not have enough knowledge in this area to understand how to implement this lesson in my classroom. I definitely need background knowledge for some of these units.
207	6	Teacher	Wison Cindy	I am very impressed with the attention to detail and how the grade level plans are organized. I love the integration of all science strands connected to the theme or story line for the year. The examples of lessons and how all elements tie into each other is a great resource for teachers. The length of the document is not a concern for me, however, it may be overwhelming for some. Breaking down each section or chapter by grade level would be helpful.
208	6	Teacher	Wheaton Kyra	I am 100% in support of this model.. The current system that has 6th graders learning earth science, leaves me with students in high school that have no memory for the subject. Last year, I took my Engineering students to LAM Research. The engineers all stressed that they no longer just worked in one discipline. Their current job overlapped in different fields of Engineering. Students need to know that disciplines are no longer isolated.
209	6	Teacher	O'Malley Kim	This model makes so much more sense for our kids. It allows them to dive deeper into the concepts and truly grasp them.
210	6	Other	DuBois Joy	This is what I've been use to teaching. I would like to use the Preferred Model with 1 change mentioned above.
211	6	Teacher	Nickel Loren	I liked the flow of the lesson and the guiding questions included. The examples listed were varied and appreciated.
212	6	Teacher	Ortega Elizabeth	Line 179 investigations are referred to small portions of an investigation but in Line 180 they are defined as instructional segments and as systems of an investigation. Line 207 Definition of a system stated in the

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				framework is not the same as the definition of a model I am knowledge about-specifically the inclusion of lists. Line 240 Disciplinary Core Ideas included in grade 5, but the table displays some ideas addressed in grade 3 & 4. Line 250 Revise 'research in Earth' to research on Earth and in space sciences' Line 255 Revise 'when adapting the CA NGSS to their classroom to 'When adapting the CA NGSS,' Line 272 Capitalization is needed for the Sun Line 273 Last column, under Patterns, delete bullet point Line 273 Consider revising the Summary of DCi. Change 'among' to 'within our.' Change '...condensation and crystallization, and precipitation as well as downhill flows on land.' to 'condensation, crystallization, precipitation and downhill flows on land.' Line 285 Revise 'What causes the patterns and cycles of stars, planets, and the moon? To and the moon' to 'What causes the cycles of stars, planets, and moons? Line 307 Revise "I=Once the role is taught' to 'Once the rope is tight' Line 315 Consider having two figures rather than one. Line 329 Insert 'to' between students and analyze Line 397 Revise 'multiple days' to 'the week' Line 473 Revise 'renumber the objects, and write...' to 'renumbered the objects, and wrote...' Line 564 Revise 'the group believed explained' to 'the group explained' Line 576 Insert a comma after discussed
213	6	Teacher	Garcia Robert	Line 8: subdisciplines; sub-disciplines line 3546: I don't see the purpose of the "Why?" before the next sentence "students begin..." line 3704: This is interesting piece of information about the different pull of gravity on earth. I was just having this discussion with my class the other day that Gravity on earth is relatively the same with some slight differences. This example validated my claim and even provided more evidence than I was able to share with the class when we had this discussion. I would definitely have more confidence explaining this difference in G because of this paragraph starting at line 3704 Line 3713: A good app I have found for this purpose is called "Technique" it has slow motion video capability with a clock that reads to the 100th of a second and you can see the clock with each video frame. It is a blessing for any physics teacher in secondary education Line 3716: This is a great idea, to first teach Newton's laws of motion then move into the force of gravity, use the app to collect data, discover that falling objects motion is increasing as it falls and then using what they learned about the laws of motion to conclude that some force must be acting on the falling object because its speed is constantly increasing as it falls. Line 3726: This sentence beginning "The moment that this force acts unbalanced on an object, there will be a net transfer of energy and the potential energy will covert to motion or vice versa." It took me a few reads to completely understand, there may be a better way to say this.
214	6	Other	Walters Lora	1758 Does instructional segment mean unit? 1765 "systems" should be capitalized. 1769 "ecosystems" should be capitalized. 1784 Not all words are visible in the table. 1794 In the first sentence of the summary of DCI there is a comma that can be taken out. 1834 Sentence is not finished, section is not finished. 2085 Crosscutting concepts spelling error

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215	6	Teacher	Leon Alicia	page 87 (Course mapping) Performance expectations addressed table (summary of dci) - is informative and helpful for a teacher and can help when teacher is developing daily objectives. Teacher can use the same language used in the table provided to create daily targeted objectives. Snapshot of what teacher can do with lesson is also helpful especially for new teachers who need ideas for lesson and what it can look like. Vignettes are extremely specific and portrays details that can be used by other teachers delivering the same lesson.
216	6	Teacher	Pando-Hernandez Leslie	Lines 1758-1759-Add the word "of" to read "instruction of instructional segments." Line 1780- eighth instead of eight Line 1784- The table that starts on this line is cutting off the first line of text "instructional segment" Lines 1789 and 1790 not needed, delete these lines Line 1794 The table that begins on line 1794, under Summary of DCI: Delete the "s" on Fossils in the first line of text. Fossil record, not Fossils record Line 1795 The table that begins on line 1795, under Summary of DCI: How are students expected to "explore the variation in traits in their own school population as well as examples from other organisms." I don't like this lesson or direction. how are students to explore variation in traits in their school population. Not all schools have the same population. Line 1798-Delete this line Line 1801- The table that begins on line 1801, where it reads "Students engage in a culminating activity examining changes in marine mammals over millions of years." That lesson is very specific, are there resources for us? Line 1804-Extra line, delete it Line 1914- "read different about different" What did they read? A word needs to be added between different and about Line 1933- Mr. R, R is omitted Line 3374-diversity is spelled wrong
217	6	Teacher	Caira Sara	7th Grade Discipline only- Lines 1758 & 1759 Change wording for instruction instructional segments Lines 1763 - 1769 - Look at capitalization Line 1780 should be eighth Line 1784- chart cut off Line 1791- Chart- Fix spacing under Highlighted DCI Line 1794 - Chart cut off , spacing under Highlighting DCI Line 1795 - take out Students explore the variation in traits in their own school population as well as examples from other organisms. Not all school populations are the same!! Confusing! CHECK ALL SPACING UNDER HIGHLIGHTING DCI Line 1933 Should be Mr. R Line 1957 What is EEI? Future resources? California's Environmental Principle IV: What is this? Never heard of this principle!
218	6	Other	Ortiz Gina	These comments are specific to Grade 8 - Segment 1 on "Objects Move and Collide." I like the inclusion of the major guiding questions and the organization of PEs so that there is a connection of the Physical, Life and Earth concepts. I like the included vignettes modeling how teaching may look for the topics. I like the idea of having students provide an incorrect and a correct model for understanding.
219	6	Teacher	Wheaton Kyra	Do not move forward with this concept

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220	6	Other	Fairchild Nathan	I found the introduction to the rationale behind the preference for the Integrated Model to be compelling and look forward to using the final copy in professional development. This ideas I would like to begin sing immediately because many of my districts are deciding on a model this year. The section is stronger than I expected and therefore more valuable. I appreciate that in every section it is emphasized that the progressions listed are not required, that there are many ways of grouping the PEs. In Grade 6 (table at line 13 and at 66),These are the pieces of the Framework that appeal to me. I can see the big picture, but with just the right amount of detail so I could move forward were I still in the classroom. I thought greater connections could be made between energy and evolution. Much of natural selection is driven by the need to efficiently utilize energy. Energy wasters tend to be less fit. Obtaining food offers energy but also requires energy, so the energy accounting needs to keep the population/organism in the black. The storylines (lines 15-60, for example) will be valuable to some teachers. I found I had already thought through these ideas from considering the table at line 13. The Instructional Segment Tables (e.g. line 64) felt like a rehash of the storylines and/or the standards. I suppose if a teacher is unfamiliar with the standards and is only using the Framework as a resource, the value increases. Can't the storyline and summary of DCI be combined? Table 2 (line 70) also has some redundancy. I struggle getting teachers to read a 10 page document much less this volume. Placing Human Impacts into Unit 4 is interesting. One could argue that Human Impacts belong throughout the year. Also that from a student point of view a complete unit on Human Impacts may be less engaging, particularly if presented in spring. The rationale behind this could be presented more clearly. I think teachers will love the vignettes!
221	6	Other	Bethune Robert	Teachers are quite leery of the integrated model. Their comfort zone is still with the disciplinary model.
222	6	Teacher	West LAUSD (no name provided)	Comments on Seventh Grade: General comment: Requires students to think at a level beyond their comprehension at that age. With so many contents we need to integrate, we don't have enough time to dig deeper beyond the surface level information and allow inquiry-based activities. Page 78; line 1275-1265-- if there's no timeline, then how do we know how long we should spend for each discipline and content? New teachers, especially, should have some kind of average timeline for guidance. Page 79; line 1310-- big concern about knowing the difference between chemical and physical changes. California standards have this content be introduced in 8th grade so will the seventh graders be taught this in the previous grade?
223	6	Teacher	Goldfein Jenna	In the introduction 6-8, on line 88-89, I believe more information should be supplied about the ability of teachers to "fluidly" move from a single discipline to the integrated model. I see there are references provided, but maybe more specific recommendations about seeing the vignettes or misconceptions sections would be good.

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224	6	Other	Stiles Evan	The integrated model seems less coherent and grade level appropriate on the whole, when compared to the Discipline Specific model. Prior to the CCSS being adopted, math teachers frequently complained that the spiraling model lead to too little time on each topic. The integrated model does not provide, I think, enough age appropriate continuous time on new concepts such as cell organelles, atoms and subatomic particles, and tectonic plates. Although it's supposed to link related, real world ideas, I think that jumping from ideas such as uneven heating of earth and its relation to weather, to particle movement and kinetic energy, though related, are too disjointed for 6th graders to conceptually master. That being said, some standards like the data-driven such as MS-ESS2-2, easily supported by maps and graphs, are not appropriate for 6th grade math and graphing literacy abilities. Instrucional Segment 2 of 6th grade includes ES-PS3-4 requires an understanding of particles that does not flow conceptually from discussions of heating of Earth and motion of fluids on a large scale. Additionally, may require introduction to atomic structure (overwhelming) IS 1 for both 6th and 7th deal with structure of matter/organisms, and molecular/atomic motion, but the amount of time between those two instructional segments means much of the foundational information will need to be revisited, and likely retaught. I would greatly prefer the Discipline Specific have more age appropriate data collection expectations.
225	6	Teacher	Portillo Melissa	p. 178, Line: paragraph 3, line 2 Really think the storyline for 8th grade is very useful. Could be made more practical if linked to a snapshot or vignette that addressed that concept. Storyline would be EXTREMELY useful if it had a counterpart storyline in English and Math common core standards so that the progression could be adapted across disciplines. p. 186, Paragraph 1 Provide list of content-specific vocabulary or highlight/underline academic words students should be able to use correctly after teaching the segment. For example, mass, velocity (instead of "speed"), collide (instead of "bang"), etc. In order to help relay this to English teachers or math teachers too.
226	6	Other	Sartin Heinrich	My suggestion is about the use of "direct" vs. "indirect" with respect to the sun's light and how it reaches earth. On line 812 and in the "correct" student response in the diagram directly above it and on lines 853, 4466, and 4467, the term "direct light" is used. The use of the terms "direct" and "indirect" can lead to student misconceptions about how light is transmitted from the sun to the earth. Unless the light from the sun is somehow reflected before it reaches earth (as it is when the reflected light from the moon reaches earth in the form of moonshine), then the light that reaches the earth is reaching it directly. Line 817 correctly uses the term "angle of incidence" when referring to this phenomenon.
227	6	Other	Jacotin Kelly	Cells and cell function would fit better into 7th grade curriculum. Life Science in 7th grade is based upon and builds from the foundation of cellular biology. National Next Generation Science Standards have it in 7th. Putting cells in 6th is poor correlation with national standards and expectations.

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228	6	Teacher	Rodman Cristin	I really prefer the integrated model. It makes more sense and seems more effective.
229	6	Other	O'Connor Dawn	Throughout the document i.e., line 1407 -Please remove the questions addressed to the reader throughout the document Grade 8 chapter -This chapters storyline is not as coherent as the 6th and 7th. We felt that the CCC of stability and change along with Cause and effect might support a more coherent storyline. Instructional Segments (units)-The chart at the front of the grade levels is really beneficial for the classroom reader but the CCC is not explicit to the reader. We felt that the teacher will use the chart as a model and may not remember what all they read in the narrative. We recommend that the chart be expanded to include the CCC explicit. We recommend the explicit labeling of the IS as a model in the title! Just to confirm to teachers that this is one way and knowing that some people may not read the document but rather review the graphics and tables. Snapshots and Vignettes-These are so needed to assist the teacher in translating theory into action! This was important to think about how to translate. Provide a rationalization of the decision of the bundling of PE's-A quick snapshot of the decision of which PE's to bundle would help others in going through the process of selecting PEs to bundle.
230	6	Other	Fairchild Nathan	Line 18: Wise to bring out the ways it does NOT align with CCSS. This is unclear in some of the CDE Roll Outs. In one I had to delete a sentence claiming D-S alignment. Line 39 - THANK you for calling out that Earth Science is inherently inter-disciplinary! Can we get it out of 9th grade in high school? Most of the introduction makes it clear that this model works, but has challenges. Excellent. My comments in terms of streaming from the Integrated Model still apply. I like that an effort was made to make this model work, because for some of my schools they believe it the only model they can use.
231	6	Other	Bethune Robert	This is easier for teachers to get to. It requires less PD and just an additional focus on NGSS, especially the engineering practices.
232	6	Teacher	Vohra Ashima	1)in reviewing the integrated model , like the 3D approach and inclusion of earth/ life and physical science at each grade level of middle school but wonder about its implementation and adoption if new books based on these guidelines are not made available 2) In reviewing the topic on Systems which encompasses human body system, earth system and provides comprehensive knowledge on the word SYSTEM and pictures of the words beyond human body system , I saw how students with different interests can relate to 3) Am not sure how ELD or ESL students will be able to expand their knowledge on words as some of the words used are figurative .
233	6	Other	Jacotin Kelly	Cells and cell function would fit better into 7th grade curriculum. Life Science in 7th grade is based upon and builds from the foundation of cellular biology. National Next Generation Science Standards have it in 7th. Putting cells in 6th is poor correlation with national standards and expectations.

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234	6	Teacher	Berner Jill	Whichever model is used, the application of concrete mathematical models should be an integral part of science and engineering education from 5th grade on. Students can confirm, through experimentation that the motion of a pendulum, the weights on a lever, the height of a rocket, etc. can all be explained and predicted using mathematical equations. This will help that "light go on" in children's minds as to why math is important.
235	6	Teacher	Brandon Linda	These expectations require a 259 page "How To" manual. Where are the moneys for materials, books, and lab supplies coming from? Where are the realistic classroom minute time allocation expectations?
236	6	Other	O'Connor Dawn	p.2 of 259. Instructional Segment 1 is not defined-confusing to the reader. Is this what was commonly referred to a a unit? The graphic has the Word Unit on the left side on Figure 1. p 5 of 249: Summary of DCI needs information about where the DCI summary originated from-primary resource. P 11 of 259: Table 2 needs a title fro the PE's (i.e., PE's addressed). P 15 Figure 3 graphic is hard to see. Line 185 (p.18) move Figure 5 after line 188- easier to follow. Lines 465-485: the strategies being showcased are somewhat repetitive (posters) and no clear strategies for supporting EL's with the language demands. Line 557: stating the students became physical models of all the processes is problematic as we are attempting to support teachers understand what a model is. Line 673-675: Nice way to show coherency and how to build on prior ideas. Line 708-713: add a line about how this supports language learners. Line 795: Figure 13 blurry and hard to read text. Line 875-880: Does this clearly describe the assessment boundary or providing for multiple entry points. Page 77: Easy to make a connection to EEI here. Line 1407: Remove rhetorical questions- Line 1442-3 and then 1447-8 is a weird transition for the reader. Line 1489-1498: Not sure if it conveys the ideas clearly enough? L. 1497-1499- awkward. Line 2277: Please remove the question to the reader. Page 167, Line 2920-31. It is unclear who she is in the reading. Move Figure 4 to Line 2959 from 2971. Line 3045: "push or pull fro a resolution"- change to reach a consensus. Line 3051- consider adding a suggestion to use a video clip from the movie Gravity as a phenomena for visual learners/language learners. Line 3388: posted students???Line 3417: Sun-centered model is being asked about BUT the lines 3411-12 talk about another model. Confusing. Overall the design of vignettes and snapshots is supportive of building understanding of the shifts. Need more explicit connections to needs of EL's though. Chapter 8 is lacking coherency; using the CCC of Cause and Effect would assist with this issue. The lack of 3-D on the Grade Level Storylines is concerning- teachers may take these graphics out of context and this is one dimensional. Need to label this or add the other 2 D into the graphic.

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237	6	Teacher	Martin Ferne	The guiding sentence for the 6th grade Story Line currently reads, "Climate arises from system interactions and strongly influences organism structures and behaviors." I would like to see the focal point of that sentence (and the first words in the sentence) be "system interactions" so that the cross cutting concept is what drives the curricular integration. Perhaps wording like, "System interactions influence climates and together, in turn, organism structures and behaviors."
238	6	Teacher	Wilson Annette	Introduction to 6-8 The footer needs to have "Graes" changed to Grades Line 16: refers to which course should be changed to refers in which course. Lines 18 and 19: The parentheses are not necessary. Recommended text: not the only way to sequence instruction. Lines 22 and 23: End the sentence after year. However, each lesson may... Lines 24 and 25: Suggested text: ...that works best for student learning, available resources, and local context, (Our concern that student learning is deemphasized when considering which progression that works best.) Line 30: Remove specific after specified; it's redundant. Or change to "identified specific PEs" Line 67: The parentheses after structure." should not have the space. Line 80: The citation should be included in the quotations with a period after as in line 97 on page 5. Lines 83 and 84: pedagogical content knowledge should have (PCK) after it since PCK is used in line 85. Line 93: Change simple to simpler Line 104: Should Framework really be capitalized? Line 106: Change Cross disciplinary to Cross-disciplinary Grades 6-8 Preferred Integrated Model Line 17 or in general: Figure 1 refers to Unit 1, Unit 2, Unit 3, etc. on Line 17, the wording changes to Instructional Segment 1 but is referring to Unit 1. Please consider using Unit 1 or IS 1, but not both; it's confusing. Line 32: does causally related need to be in bold. Line 39: does determine need to be in bold. Line 205 to 216: Engineering Connection: I am really struggling with the idea that we would teach 6th grade students about organ and tissue donation. This seems like a very controversial topic that can bring up many feelings and fears for students who are so young. Consider using different Engineering Connection. Line 931: Final Note regarding instead of re
239	6	Teacher	Perry Daniella	Our school has been using the integrated model this year, and so far it's going okay. I think the progression is good. However I wonder if teaching ecosystems without evolution is wise, as evolution provides a lot of the background information for population changes and how animals relate to their environments. It makes more sense to me to teach evolution with ecosystems. I found myself explaining things about adaptation during the ecosystems lessons.
240	6	Teacher	Loeb Deborah	7th & 8th grades are gutted and fragmented. We already tie everything into Big History.

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241	6	Other	Rege Dawn	<p>Integrated Model Comments: 1, 7: “primary goal is to show a potential way to bundle the PEs” Be even clearer about what you want teachers to do. Should teachers be bundling their own thing or should you follow the bundles that are shown in the framework. Use stronger language like “this shows one of many ways to bundle the PEs” 1, 11 “Climate arises from system interactions and strongly influences organism structures and behaviors” When you approach the cell with the idea of it being a system it makes sense to start with it. 1, 11 What about all the work people have been doing bundling on their own? The framework should provide some guidance for what to do if this possible storyline doesn’t align with what they have created? Are there things that we should take into consideration about these possible storylines as we think about changing our existing bundles. Provide guidance on HOW to bundle and how these bundles were created There should be language that encourages teachers to design regional-specific learning line 17-58: The way that the instructional sequences are building on one another is useful. 1, 26: Helpful that this describes what was done in grade 5. 5, 62: Change the word “unit” in the table to “IS” like it is in the rest of the grades 157: Add a overarching guiding concept for the year for the 8th grade storyline Why are there PEs (like ESS2-4) showing up in more than one instructional sequence in 6th grade (and possibly 7th and 8th grade)? How is a teacher supposed to interpret that? Does this mean that this is a more important PE? Why did they repeat? 5, 62: What is the reason for having Table 1: Summary of the Integrated Grade 6 and Table 2: Grade Instructional Segment 1? We feel like having the two types of tables is redundant. We like everything that is in the Instructional Segment table - the guiding questions, highlighted SEP and CCC. We think that the table 1 and table 2 for each IS should be combined into one type of table. Provide indications to teachers about how to use the guiding questions, highlighted CCC and SEP for each IS. For example, should those be presented to students to guide the learning? 43, 669 and many many more The EEI curriculum was generated prior to the NGSS is and is not three dimensional. The framework makes it seem like teachers are expected to use EEI to teach the NGSS. Not all the investigations in the EEI are three dimensional. It should definitely be listed as a resource but based on the number of references there were to the EEI in this chapter, a teacher would assume that this curriculum is an NGSS exemplar, which is not true.</p>
242	6	Teacher	Brandon Linda	<p>These expectations require a 257 page "How To" manual. Where are the moneys for materials, books, and lab supplies coming from? Where are the realistic classroom minute time allocation expectations?</p>
243	6	Teacher	Puckett Kathryn	<p>The Discipline Specific Model is the most appropriate in my estimation. The structure and emphasis of subject material is most age appropriate in this model. Most specifically, the teaching of sexual reproduction in Grade 6 would be less effective due to maturity levels of 6th graders.</p>
244	6	Teacher	Loeb Deborah	<p>Some topics are duplicated (fossils eg), some are avoided (organ systems eg).</p>

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245	6	Other	Rege Dawn	<p>Comments about introduction: 3, 52-53: this is an embarrassing statement to make since everything is already organized around the value of the preferred progression. possibly state instead that they reorganized the standards to create a discipline specific model 5, 106 table 2: we appreciated this table and what it communicates. it will plate tectonics is in grade 7 so row 4 should state “heat flow → plate tectonics... 6→ 7 & 8→7 * possibly use a different color than red for the discipline specific column. the color communicates an error or a problem, consider using a blue instead of red. took a long time to make sense of the arrows, in the header row between prerequisite and application add a descriptive word for the arrows like “is foundational knowledge to understand” or possibly have a sample sentence that describes how to read the table. should this table be a concept map instead of a table This is an improper use of the asterisk is confusing. It should be at the heading and explaining the heading rather than running all the way down the column 5, 103: perhaps use the word introduction instead of remediation - teachers will need to address the missing content, not remediate 2, 37, Table 1: It is hard to read what the Integrated course is with this based on its current structure. Either rearrange based on the preferred integrated as the leading structure, or create two different tables one for integrated and one for discipline. What is a subtopic? How do they compare to the DCI component ideas? Would it be possible to list specific component ideas instead of the “subtopics”. We want to see consistent language between the NGSS and this document. We are concerned that a group of teachers will try to align this to the NGSS and it won’t match. While it will take more space, this should read the same as the DCIs. For example, instead of “Water Cycle, Weather, Climate” write out “The Roles of Water in Earth’s Surface Processes, Weather & Climate” 1, 19: “Table 1 shows a comparison of which DCIs are emphasized in the PEs required at each grade level in the two models” This is not what the table is showing. We found the introduction chapter to be a nice foundation and well worth the read. More than any document this gave me the best sense of the progression and what I am going to be teaching and how the learning will progress. It was also useful to see how the concepts get messed up with the discipline specific model. 3, 46: put the information about the full events into the document instead of the website as websites don’t last - how long will this link truly be live and updated for?</p>
246	6	Other	Murphy-Shaw Marian	<p>Page 2 Table 1: As each section of Integrated is addressed early in this chapter a column showing PE connections to prior grades, right here, might be helpful. Within this chapter noted limited examples of mathematical and computational opportunities (high school did better) were given, it needs more. This is needed to support departmentalized middle grades to connect science to math. More direct connections to informational text use in grades 6 and 7, seemed OK in grade 8. The idea of connecting engineering to societal challenges could be clarified with a few examples in each of the core discipline areas.</p>

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247	6	Teacher	Fischer Jill	I would like a document which has the integrated story line and the guiding questions (such as those for 6th grade that are found on pages 1, 6, 8, 10,13) summarized into one page for EACH grade level. Is just too much information to sift through otherwise.
248	6	Curriculum Specialist	Malek Ladie	Grade level charts: "Unit" is too confusing. Stick with "Instructional Segment" or "Segment". Or better yet, do away with labels. The labels imply an order that may or may not work. e.g. are you suggesting starting Gr 6 with cells? Really? Not ideal. Or start Gr 6 with weather, then cells, then more weather and climate in IS2? Too disconnected. Also remove sequential language such as "Students begin their explorations in Instructional Segment 1 (IS 1)..." Same reasons as above. Just leave the grey lines and use the green sentences as your headings and explain the interconnections. But DEFINITELY please avoid the word Unit. This will get too confusing in PD as these are not units of study.
249	6	Teacher	Miller Kim	I like the theory of integrated science, but the implementation worries me. Having taught middle school math and science for 23 years, I like to be very clear about what is the theme of my main units, what are the subunits, and how do subsidiary topics and lessons all fit together. I want them all to flow together nicely. I'm not afraid of change if it's for the better, I just need to be convinced. I'm concerned that some of the NGSS thematic integration statements are misleading and the basis for integration may become disingenuously contrived. Two examples: I. Quote from Public Review Draft Framework: "A primary goal of this section is to provide an example of how to bundle the PEs into integrated groups that can effectively guide instruction in four sequential Instructional Segments. There is no prescription regarding the relative amount of time to be spent on each Instructional Segment. As shown in Figure 1, the overarching guiding concept for the entire year is that, 'Climate arises from system interactions and strongly influences organism structures and behaviors.'" -CA Science Framework Draft Ch. 6 p. 1 My comment: This is an example of the problem I have with the integrated model. Do we really believe that an *entire year's overarching guiding concept* would be that climate strongly influences organism structures and behaviors? Of course climate influences organism structure and behavior, but so do a host of other factors – the needs for locomotion, nutrition, shelter, reproduction affect behavior and structure, while physiological requirements of respiration, excretion, circulation affect structure... Of course all these factors are influenced by the biome (hence climate) but it is misleading to present climate as the major factor, which this statement seems to do as an overarching guiding concept. II. Quote "Grade 8 – Instructional Segment 4: Sustaining Local and Global Biodiversity Guiding Questions: *What are the characteristic properties and behaviors of waves? *What human activities harm Earth's biodiversity and what human activities help sustain local and global biodiversity? *How does communication technology encode information and how can digital technologies be used to help sustain biodiversity?" from p. 232 of Draft Science Framework, Table 8 My comment: The

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				<p>instructional segment is on sustaining local and global biodiversity. The first guiding question has very little to do with this topic. Seriously, I'm going to get the students really excited about the theme of biodiversity and then study waves? Please. The second guiding question is GREAT! It makes total sense as a subsection of the Instructional Segment. The third guiding question is one of those I would say is really "stretching" to make a lot of disparate topics fit together. Yes, you can put them together, but is it *truly meaningful* to instruct students that the third major guiding question about how we can save biodiversity is to wonder how analog and digital signals combined with software and circuit boards can help us sustain biodiversity? I'm probably missing something here, but I would think that there would be other, more relevant issues to consider as logical subtopics of "Sustaining local and global biodiversity" – like a study of WHY we'd want to (basically that it takes time to create what Earth had 100 years ago). Subtopics could be: biomass related to diversity (ecological effects), a history of the fossil record diversity, appreciation of the time it takes for such diversity to evolve, a comparison of Archaean vs larger organisms' genetic diversity and evolution, etc. I would think those subjects would much more closely correlate to the main theme than a contrived discussion of the use of digital technology to sustain biodiversity.</p>
250	6	District Administrator	LeBarron David	<p>It appears to be developmentally appropriate and does align with the math/ELA common core standards. May not always be cognitively age appropriate. The overall storyline through the grades is understandable and sensible. Good incorporation of Performance Expectations. Depth of knowledge seems limited due to sporadic topics. As the framework notes, certain topics become "subsets" and receive less emphasis. Depending on prior science concepts and prior teacher practices is a leap of faith and leads to lots of remedial instruction. Framework quote (p. 158) "The major physical science concepts of Newton's Law and noncontact forces do not readily integrate with major science concepts of evolution, natural selection, and human impact on Earth systems." It seems evident the segments that try to integrate these concepts appear forced/strained. It does not flow like the discipline specific story of energy. Example: Segment 1 MSLS4-1 does not lead to force ideas. Electricity and magnetism became superficial subsets. Waves do not fit with biodiversity.</p>
251	6	Teacher	Ramson Ann	<p>Overall, the summary tables need to be more clear. It is not easy to read and identify how the specific PE's are supposed to be addressed with each DCI. The examples are helpful but this is a lot of information for teachers to take in and dissect. There needs to be more clear statements of the standards. Need to have the DCI actually written out on this document as well. The PE's are written out below but the DCI's are never clearly stated. This poses a major problem in clearly understanding what the standard is asking. Just noting the title of the DCI is not going to clarify what the standard is asking to address. The repetition of the PE's causes confusion and needs clarity. If PE's are going to be repeated, it needs to specify in the PE what the</p>

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				<p>focus for that segment is. A great example of where they do this well is in 8th grade ESS1-1. The first time you see that PE it states that the focus is seasons then the next time you see it it states the focus is moon phases. That helps to clarify what to address in each segment. Many PE's are repeated along with the same DCI's. These need to be clearly explained on how to address these differently in each segment. Preferably no PE's or DCI's would be repeated, this would help to eliminate confusion among the teachers. It is also helpful to clarify in the Summary of DCI where the DCI's are being addressed. They do this nicely in most of 7th grade by listing the specific DCI's in the summary with the explanation. 6th and 7th grade need to look more like 8th grade since PEs and identified as being the focus or just applied and the specific DCI of that PE is identified. DCI's that do not seem to be addressed anywhere in middle school: PS3.C: Relationship Between Energy and Forces LS1.D: Information Processing (might be used if the one that is listed in segment 3 is supposed to be LS1.D instead of LS1.A) PS3.D: Energy in Chemical Processes and Everyday Life</p>
252	6	Teacher	Ramson Ann	<p>6th Grade Specific Comments: Repeated 6th grade PE's/ DCI's ESS2-4 Repeated in Segment 1 and 2 ESS2.D: Weather and climate ESS2-6 Repeated in Segment 1 and 2 and 3 ESS2.C: The Role of Water in Earth's Surface Processes PS3-4 Repeated in Segment 2 and 3 PS3.B: Conservation of Energy and Energy Transfer LS1-4 (it is not defined at all which DCI this goes with) Repeated in segments 3 and 4 LS1.A: Information Processing (I believe this should be Structure and Function). More clarification on this is needed. I'm not sure this is supposed to be listed here at all. This scope seems to go with LS1.B only. LS1.B: Growth and Development of Organisms *It is unclear as to which DCI is supposed to address LS1-4 as one of these goes with LS1-5. This needs to be stated clearly in the document. LS1-5 (it is not defined at all which DCI this goes with) Repeated in segments 3 and 4 LS1.A: Information Processing (I believe this should be Structure and Function or this should be LS1.D). More clarification on this is needed. *In Segment 3 under the Highlighted DCI they have LS1.A listed as Information Processing when it should be listed as Structure and Function. This is an error in the document. I'm not sure this is supposed to be listed here at all. This scope seems to go with LS1.B only. LS1.B: Growth and Development of Organisms *It is unclear as to which DCI is supposed to address LS1-4 as one of these goes with LS1-5. This needs to be stated clearly in the document.</p>
253	6	Teacher	Ramson Ann	<p>7th grade specific comments: Repeated 7th Grade PE's/DCI's LS2-1 Repeated in Segment 1 and 4 LS2.A: Interdependent Relationships in Ecosystems ESS3-1 Repeated in Segment 1 and 4 ESS3.A: Earth's Natural Resources PS1-2 Repeated in Segment 2 and 3 PS1A: Structure and Properties of Matter PS1.B: Chemical Reactions PS1-5 Repeated in Segment 2 and 3 PS1.B: Chemical Reactions PS1.B also is used to address PS1-6 ESS3-1 Repeated in Segment 3 and 4 ESS2.A: Earth's Materials and Systems *In 7th grade Segment 4 it has DCI- PS1.B listed as Structure and Properties of Matter, it should be Chemical Reactions, this is an error in the document. It is possibly supposed to be PS1.A instead but it needs to be corrected. 8th Grade specific</p>

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				Comments: In Segment 3 There are two LS3.A's listed. One of them is incorrect. The one that is Variation of Traits should be LS3.B. This is an error in the document.
254	6	Other	Janzen Jennifer	Chapter 6 - Introduction: - Line 37: Table 1. Comparison of when DCIs are primarily addressed in the two middle school models. No revision - really like. This table is a strength of the introduction of the middle school chapter - IMPORTANT COMMENT/SUGGESTION: Line 93-105: Topic on discipline progressions: - fleshing out the idea that there is a difference between coordinated science and integrated science. We suggest possibly including Robert Sherriff's table in CSTA newsletter that details out the difference between coordinated vs. integrated. (have some type of language that talks about the hybridization of the PE progression (transition) that shows moving away from the old standards to a coordinated and then to an integrated - Line 106: Table 2 is hard to read. For example, the prerequisite Heat flow to Plate tectonics show grade 6 to 6, but it should read grade 6 to grade 7 Chapter 6 Grade 6 Integrated - Line 9-12: "There is no prescription regarding the relative amount of time to be spent on each Instructional Segment. As shown in Figure 1, the overarching guiding concept for the entire year is that, "Climate arises from system interactions and strongly influences organism structures and behaviors." - Bold or emphasize this section! - Line 14: Really like the figure 1 "Integrated Storyline" but it conflicts with the "instructional segments" in Table 1 Line 62. We suggest providing a definition of what an "instructional segment" is and how it is different than a storyline/unit of study. - Page 11, Line 70: Table 2 - Table is a good summary of the segment but it doesn't show the connections to CCSS (we recognize that the connections are shown at the end of the vignettes but it should also be included in the table) - Line 72: The Instructional Segment 1 Teacher Background and Instructional Suggestions was beneficial for teachers to see what is need to teach the DCI within the 3 dimensions for the segments. Well done! - Page 89 Line 1398-1408: A very relevant consideration is that CA NGSS also does not mention the periodic table of the elements until high school. This omission represents a very significant departure from most current practices, especially in California where the previous science education standards included the periodic table in grades 3, 5 and 8. May be a good thing, since now less student misconceptions. Students have a better understanding and can build. Will be interesting to see the future with these changes - Page 157 Line 2811: The Storyline doesn't have an explicit theme like the Grade 6 & Grade 7 Vignettes: - Weaved through the document and gave a picture of the classroom - Strength: Focus on ELD strategies

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255	6	Teacher	Fischer Jill	inconsistent / interchangeable usage of Unit and IS and Unit on Figure 1 for each grade level Figure 1 (the Integrated Storyline) for 6th and 7th grades, shows 4 "units" where as in 8th grade, they are identified as "Instructional Segment" or IS. In the other tables for each grade level, is consistently referred to as Instructional Segments. The phrase of "units" is less intimidating. Paging is off in the document... so could not easily provide page number on which each table shows up. I'd add the guiding questions onto the table 1 for each grade level. Reading through almost 300 pages is not a timely event. A lot of work went into all of the samples, however that in itself could be taken and made into a curriculum. The state could save a lot of money by just producing their own curriculum, like we used to do back when my father first started teaching.
256	6	Curriculum Specialist	Malek Ladie	Ch 6 intro below Line 37, Table 1 comparing Integrated and Discipline Specific, the X is missing for Cells and Body Sys. (goes in Gr. 7 column)
257	6	District Administrator	LeBarron David	The storyline within a grade level seems more logical and cohesive, and it allows for greater content depth (ex. Cells with genetics > evolution/ecosystems). The 8th grade energy narrative is pervasive and ties all concepts together throughout the year. It creates a cohesive storyline for the crosscutting concepts of energy flow, cycles, and conservation. Within a district that has junior highs, rather than middle schools, it's stressful to have to rely upon the 6th grade teachers to teach core concepts, so this would be less of a concern with this model. This model would require less money for lesson resources and teacher training. This model is sequenced like the 6th through 8th 1998 standards, so some teachers may be less likely to change their old ways.
258	6	Curriculum Specialist	Malek Ladie	Grade level charts: "Unit" is too confusing. Stick with "Instructional Segment" or "Segment". Or better yet, do away with labels. The labels imply an order that may or may not work. e.g. are you suggesting starting Gr 6 with cells? Really? Not ideal. Or start Gr 6 with weather, then cells, then more weather and climate in IS2? Too disconnected. Also remove sequential language such as "Students begin their explorations in Instructional Segment 1 (IS 1)..." Same reasons as above. Just leave the grey lines and use the green sentences as your headings and explain the interconnections. But DEFINITELY please avoid the word Unit. This will get too confusing in PD as these are not units of study.
259	6	Teacher	Miller Kim	I like the theory of integrated science, but the implementation worries me. Having taught middle school math and science for 23 years, I like to be very clear about what is the theme of my main units, what are the subunits, and how do subsidiary topics and lessons all fit together. I want them all to flow together nicely. I'm not afraid of change if it's for the better, I just need to be convinced. I'm concerned that some of the NGSS thematic integration statements are misleading and the basis for integration may become disingenuously contrived. Two examples: I. Quote from Public Review Draft Framework: "A primary goal of this section is to provide an example of how to bundle the PEs into integrated groups that can effectively

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				<p>guide instruction in four sequential Instructional Segments. There is no prescription regarding the relative amount of time to be spent on each Instructional Segment. As shown in Figure 1, the overarching guiding concept for the entire year is that, ‘Climate arises from system interactions and strongly influences organism structures and behaviors.’” -CA Science Framework Draft Ch. 6 p. 1 My comment: This is an example of the problem I have with the integrated model. Do we really believe that an *entire year’s overarching guiding concept* would be that climate strongly influences organism structures and behaviors? Of course climate influences organism structure and behavior, but so do a host of other factors – the needs for locomotion, nutrition, shelter, reproduction affect behavior and structure, while physiological requirements of respiration, excretion, circulation affect structure... Of course all these factors are influenced by the biome (hence climate) but it is misleading to present climate as the major factor, which this statement seems to do as an overarching guiding concept. II. Quote “Grade 8 – Instructional Segment 4: Sustaining Local and Global Biodiversity Guiding Questions: *What are the characteristic properties and behaviors of waves? *What human activities harm Earth’s biodiversity and what human activities help sustain local and global biodiversity? *How does communication technology encode information and how can digital technologies be used to help sustain biodiversity?” from p. 232 of Draft Science Framework, Table 8 My comment: The instructional segment is on sustaining local and global biodiversity. The first guiding question has very little to do with this topic. Seriously, I’m going to get the students really excited about the theme of biodiversity and then study waves? Please. The second guiding question is GREAT! It makes total sense as a subsection of the Instructional Segment. The third guiding question is one of those I would say is really “stretching” to make a lot of disparate topics fit together. Yes, you can put them together, but is it *truly meaningful* to instruct students that the third major guiding question about how we can save biodiversity is to wonder how analog and digital signals combined with software and circuit boards can help us sustain biodiversity? I’m probably missing something here, but I would think that there would be other, more relevant issues to consider as logical subtopics of “Sustaining local and global biodiversity” – like a study of WHY we’d want to (basically that it takes time to create what Earth had 100 years ago). Subtopics could be: biomass related to diversity (ecological effects), a history of the fossil record diversity, appreciation of the time it takes for such diversity to evolve, a comparison of Archaean vs larger organisms’ genetic diversity and evolution, etc. I would think those subjects would much more closely correlate to the main theme than a contrived discussion of the use of digital technology to sustain biodiversity.</p>
260	6	District Administrator	LeBarron David	<p>It appears to be developmentally appropriate and does align with the math/ELA common core standards. May not always be cognitively age appropriate. The overall storyline through the grades is understandable and sensible. Good incorporation of Performance Expectations. Depth of knowledge seems limited due to</p>

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				sporadic topics. As the framework notes, certain topics become “subsets” and receive less emphasis. Depending on prior science concepts and prior teacher practices is a leap of faith and leads to lots of remedial instruction. Framework quote (p. 158) “The major physical science concepts of Newton’s Law and noncontact forces do not readily integrate with major science concepts of evolution, natural selection, and human impact on Earth systems.” It seems evident the segments that try to integrate these concepts appear forced/strained. It does not flow like the discipline specific story of energy. Example: Segment 1 MSL4-1 does not lead to force ideas. Electricity and magnetism became superficial subsets. Waves do not fit with biodiversity.
261	6	Teacher	Ramson Ann	Overall, the summary tables need to be more clear. It is not easy to read and identify how the specific PE’s are supposed to be addressed with each DCI. The examples are helpful but this is a lot of information for teachers to take in and dissect. There needs to be more clear statements of the standards. Need to have the DCI actually written out on this document as well. The PE’s are written out below but the DCI’s are never clearly stated. This poses a major problem in clearly understanding what the standard is asking. Just noting the title of the DCI is not going to clarify what the standard is asking to address. The repetition of the PE’s causes confusion and needs clarity. If PE’s are going to be repeated, it needs to specify in the PE what the focus for that segment is. A great example of where they do this well is in 8th grade ESS1-1. The first time you see that PE it states that the focus is seasons then the next time you see it it states the focus is moon phases. That helps to clarify what to address in each segment. Many PE’s are repeated along with the same DCI’s. These need to be clearly explained on how to address these differently in each segment. Preferably no PE’s or DCI’s would be repeated, this would help to eliminate confusion among the teachers. It is also helpful to clarify in the Summary of DCI where the DCI’s are being addressed. They do this nicely in most of 7th grade by listing the specific DCI’s in the summary with the explanation. 6th and 7th grade need to look more like 8th grade since PEs and identified as being the focus or just applied and the specific DCI of that PE is identified. DCI’s that do not seem to be addressed anywhere in middle school: PS3.C: Relationship Between Energy and Forces LS1.D: Information Processing (might be used if the one that is listed in segment 3 is supposed to be LS1.D instead of LS1.A) PS3.D: Energy in Chemical Processes and Everyday Life
262	6	Teacher	Ramson Ann	6th Grade Specific Comments: Repeated 6th grade PE’s/ DCI’s ESS2-4 Repeated in Segment 1 and 2 ESS2.D: Weather and climate ESS2-6 Repeated in Segment 1 and 2 and 3 ESS2.C: The Role of Water in Earth’s Surface Processes PS3-4 Repeated in Segment 2 and 3 PS3.B: Conservation of Energy and Energy Transfer LS1-4 (it is not defined at all which DCI this goes with) Repeated in segments 3 and 4 LS1.A: Information Processing (I believe this should be Structure and Function). More clarification on this is needed. I’m not sure this is supposed to be listed here at all. This scope seems to go with LS1.B only. LS1.B: Growth and Development of

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				Organisms *It is unclear as to which DCI is supposed to address LS1-4 as one of these goes with LS1-5. This needs to be stated clearly in the document. LS1-5 (it is not defined at all which DCI this goes with) Repeated in segments 3 and 4 LS1.A: Information Processing (I believe this should be Structure and Function or this should be LS1.D). More clarification on this is needed. *In Segment 3 under the Highlighted DCI they have LS1.A listed as Information Processing when it should be listed as Structure and Function. This is an error in the document. I'm not sure this is supposed to be listed here at all. This scope seems to go with LS1.B only. LS1.B: Growth and Development of Organisms *It is unclear as to which DCI is supposed to address LS1-4 as one of these goes with LS1-5. This needs to be stated clearly in the document.
263	6	Teacher	Ramson Ann	7th grade specific comments: Repeated 7th Grade PE's/DCI's LS2-1 Repeated in Segment 1 and 4 LS2.A: Interdependent Relationships in Ecosystems ESS3-1 Repeated in Segment 1 and 4 ESS3.A: Earth's Natural Resources PS1-2 Repeated in Segment 2 and 3 PS1.A: Structure and Properties of Matter PS1.B: Chemical Reactions PS1-5 Repeated in Segment 2 and 3 PS1.B: Chemical Reactions PS1.B also is used to address PS1-6 ESS3-1 Repeated in Segment 3 and 4 ESS2.A: Earth's Materials and Systems *In 7th grade Segment 4 it has DCI- PS1.B listed as Structure and Properties of Matter, it should be Chemical Reactions, this is an error in the document. It is possibly supposed to be PS1.A instead but it needs to be corrected. 8th Grade specific Comments: In Segment 3 There are two LS3.A's listed. One of them is incorrect. The one that is Variation of Traits should be LS3.B. This is an error in the document.
264	6	Other	Janzen Jennifer	Chapter 6 - Introduction: - Line 37: Table 1. Comparison of when DCIs are primarily addressed in the two middle school models. No revision - really like. This table is a strength of the introduction of the middle school chapter - IMPORTANT COMMENT/SUGGESTION: Line 93-105: Topic on discipline progressions: - fleshing out the idea that there is a difference between coordinated science and integrated science. We suggest possibly including Robert Sherriff's table in CSTA newsletter that details out the difference between coordinated vs. integrated. (have some type of language that talks about the hybridization of the PE progression (transition) that shows moving away from the old standards to a coordinated and then to an integrated - Line 106: Table 2 is hard to read. For example, the prerequisite Heat flow to Plate tectonics show grade 6 to 6, but it should read grade 6 to grade 7 Chapter 6 Grade 6 Integrated - Line 9-12: "There is no prescription regarding the relative amount of time to be spent on each Instructional Segment. As shown in Figure 1, the overarching guiding concept for the entire year is that, "Climate arises from system interactions and strongly influences organism structures and behaviors." - Bold or emphasize this section! - Line 14: Really like the figure 1 "Integrated Storyline" but it conflicts with the "instructional segments" in Table 1 Line 62. We suggest providing a definition of what an "instructional segment" is and how it is different than a storyline/unit of study. - Page 11, Line 70: Table 2 - Table is a good summary of the segment but it doesn't

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				show the connections to CCSS (we recognize that the connections are shown at the end of the vignettes but it should also be included in the table) - Line 72: The Instructional Segment 1 Teacher Background and Instructional Suggestions was beneficial for teachers to see what is need to teach the DCI within the 3 dimensions for the segments. Well done! - Page 89 Line 1398-1408: A very relevant consideration is that CA NGSS also does not mention the periodic table of the elements until high school. This omission represents a very significant departure from most current practices, especially in California where the previous science education standards included the periodic table in grades 3, 5 and 8. May be a good thing, since now less student misconceptions. Students have a better understanding and can build. Will be interesting to see the future with these changes - Page 157 Line 2811: The Storyline doesn't have an explicit theme like the Grade 6 & Grade 7 Vignettes: - Weaved through the document and gave a picture of the classroom - Strength: Focus on ELD strategies
265	6	Teacher	Fischer Jill	inconsistent / interchangeable usage of Unit and IS and Unit on Figure 1 for each grade level Figure 1 (the Integrated Storyline) for 6th and 7th grades, shows 4 "units" where as in 8th grade, they are identified as "Instructional Segment" or IS. In the other tables for each grade level, is consistently referred to as Instructional Segments. The phrase of "units" is less intimidating. Paging is off in the document... so could not easily provide page number on which each table shows up. I'd add the guiding questions onto the table 1 for each grade level. Reading through almost 300 pages is not a timely event. A lot of work went into all of the samples, however that in itself could be taken and made into a curriculum. The state could save a lot of money by just producing their own curriculum, like we used to do back when my father first started teaching.
266	6	Curriculum Specialist	Malek Ladie	Ch 6 intro below Line 37, Table 1 comparing Integrated and Discipline Specific, the X is missing for Cells and Body Sys. (goes in Gr. 7 column)
267	6	District Administrator	LeBarron David	The storyline within a grade level seems more logical and cohesive, and it allows for greater content depth (ex. Cells with genetics > evolution/ecosystems). The 8th grade energy narrative is pervasive and ties all concepts together throughout the year. It creates a cohesive storyline for the crosscutting concepts of energy flow, cycles, and conservation. Within a district that has junior highs, rather than middle schools, it's stressful to have to rely upon the 6th grade teachers to teach core concepts, so this would be less of a concern with this model. This model would require less money for lesson resources and teacher training. This model is sequenced like the 6th through 8th 1998 standards, so some teachers may be less likely to change their old ways.

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268	6	Other	Janzen Jennifer	Chapter 6 Discipline Specific Model - Introduction - Phenomenon (what is phenomenon? - Definition) should be addressed through. Add possible/suggested phenomenon in the tables about the instructional segments. The issue of phenomenon always needs to be highlighted (a guide that shows how the authors/writers that were including suggested phenomenon within segments chose their examples of phenomenon) - suggestion: what was the process in order to design this process. Vignettes: - Weaved through the document and gave a picture of the classroom - Strength: Focus on ELD strategies
269	6	Other	Stillittano Marissa	2/37 Good-- great comparison chart for clarity 3/58 Good-- examples of approaches in other countries 3/62 Can you provide a table of exact countries and structures (a visual) will help clarify system 5/106 Table 2 Chart is unclear-- what information is being shown? What is trying to be conveyed is good, but the chart is not reader-friendly 2/14 Good-- table showing the integrated, overall storyline 158/2822 Remove line 158, Keep it positive 78/1268 Good visual, summarizes their storyline well. Is this the suggested storyline for implementation? 3/29 Why are certain words bolded? 82/1345 Summary of DCI, why the specific river example? 163/2855 Be more specific, What is the specific connection between motion and fossil record? 86/1354 and 100/1660 Like the tables clarity and guiding questions 86/1354 Environmental Principles and Concepts seem out of context in this section. Where does this fit into the guiding questions within the instructional segments 5/259 Summary of DCI, The summary does not seem reader friendly. We think it is a formatting issue. Adding bullets rather than narrative with the PE number related to it in parentheses 11/70 Good- offering guiding questions helps to anchor the focus 14/112-120 detailed text with alternative system models based on boundaries, This seems unnecessary and confusing. Teachers need relevant examples they will use 14/121 need examples of individual and group parts of a system. A suggestion: give an example of an assembly line activity-- alone less is accomplished, together more is accomplished, but system can fail without you 18/182-188 This is confusing for teacher and student to understand. I like the simplistic idea of a bicycle parts vs. properties. Parts of the system that work together to have properties of: speed, comfort, safety etc This is a much easier way to explain/understand
270	6	Other	Hinckley Matt	This is a great explanation, but I worry that the examples would be used as curriculum guides by stakeholders.
271	6	Other	Duong Annie	Lack explicit instructional strategies and connections to literacy instruction to scaffold for ELs and special needs students.
272	6	Other	Barnett Teresa	Snapshots should have overarching view of progressions through and beyond unit Vignettes need to be tighter and need to be more 3-d focused; not so detailed on lesson plan. Should highlight guiding questions more, rather than tucked away at the end.

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273	6	Teacher	Carroll Diana	<p>This comment applies to the section entitled: Introduction to Grades Six through Eight. Table 2 is the crux of the argument against the discipline specific model and could make a bigger impact with some additional explanation. I would suggest adding the following sentences after the last sentence just before Table 2: "For example, as can be seen in the first row of Table 2, using the preferred integrated model, students would learn the prerequisite content, gravity and forces, and apply those concepts to astronomy both in the eighth grade. In the discipline specific model, more is expected of the teacher and the student as teachers will be expected to teach and students will be expected to learn content, in this case astronomy, without having been provided with the prerequisite content, gravity and forces until the eighth grade." I would suggest making the formatting of the material presented in this section the same for each grade. There are subtle differences which if corrected would make it easier for the reader to compare the information from grade to grade. Just one example, and I see quite a few others, is that a statement is made in the 7th grade section which draws the reader's attention to the summary sentence for each unit. Such a statement is missing for both the 6th and the 8th grades.</p>
274	6	Teacher	Snyder Lisa	<p>General Comment: It would be helpful to have ELD Connections boxes similar to what is available in the K-5 sections. Line 66 (Summary of DCI) - This section is very unconnected and choppy. It just appears as if it is a series of cut and pasted sentences with no transitions or connections. Line 68 (Summary of DCI) - Starting with the 11th line from the bottom "Animals engage in characteristic behaviors ..." to the end. Once again, it just appears as if it is a series of cut and pasted sentences with no transitions or connections. These sentences do not contain any references to effects of Global Warming on Living Systems (the topic for this instructional segment.) Line 173 - It would be helpful to reference the number reference for the EEI Units (i.e 5.3.b is the unit Changing States: Water, Natural Systems) Line 669 - same as Line 173 (5.3.c Precipitation, People, and ...) Line 866-868: THIS STATEMENT IS INCORRECT!!!! The equator does not pass through Mexico and a little below Florida :(This entire paragraph needs to be re-written. Lines 952-954: confusing wording Lines 960-967: confusing wording regarding "features" vs. "traits". Is eye color a "feature" or a "trait"? Is blue eyes a "feature" or a "trait" Line 1016: The Learn Genetics website has been redesigned. The footnoted link does not connect to Sexual vs. Asexual Reproduction. Lines 1142-1146: The two diagrams seem to be at a higher level than 6th grade. Line 1183: is there a source for "computer analyses of business-as-usual climate change scenarios"? Line 1256: same as Line 173 (6.6.a Energy: Its Not All... and 7.3.e. Responding to ...)</p>

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275	6	Teacher	Hegdahl Lisa	Intro p 4 In 83 - More important than university learning within a discipline is the pedagogical content knowledge. pg1 In3 Inconsistent use of Chapter Title. What is it? pg3 In 49 Delete "interesting" from all text, not just here. This is a value laden statement. Also P18 In 189 ALL 6-8 Current format of DCI , PE, etc. are in a non familiar format with colors common to NGSS Make the form look identical to the original NGSS architecture. If teachers, new to NGSS, are given a new format in the learning progression, they will balk at having to learn the different representation. Put all of the things in the same relative places. pg 13 In 95-98 Delete the word “the” at the beginning of each bullet. p14 In 121- 143 Students need to do more exploring on their own before the teacher provides information,reading, & writing assignmt. Too teacher directed. Where is the guiding question in the instructional sequence? p11 In 70 Add emphasis or more information in the instructional sequence text. Do teachers know what to do with guiding questions? P26-34 In 294- Would have been a great opportunity to explain how using science notebooks would be good to add. pg 21 In227 There is a long vignette for IS 2 - No vignette in IS 1. pg 43 In 673 performance expectation MS-ESS2-6. Don’t just use codes for PEs. p50 In 779 "We can safely assume.." Students who live in low altitudes may not know.. Say, "Based on (give ES citation from previous grades)" Don’t assume student knowledge. Students should develop their own models of this phenomena & use that to discuss the topic. Teacher is giving content away. Students are not constructing it on their own. p51 In 806 Students should investigate first - then teacher if necessary. 55 In 865 Let students explore temperature, densities before the teacher explains the answers. p56 In 888-890 include patterns when discussing this. Get students involved before giving right answers. p 57 In960 Poor writtenly - confusing
276	6	Other	Sussman Art	Very detailed comments and revisions were provided by me (Art Sussman) through direct email to Bryan Boyd at CDE, Matthew D'Alessio, and Maria Simani
277	6	Teacher	Schmidt Karen	Chapter Number & Title: CHAPTER 6 GRADES 6THROUGH 8, INTRODUCTION Page # Line # Original Text Recommended Text Rationale for change Page 1, lines 24-26 As districts consider the progression that works best for their resources and local context, they should be aware of the historical context, rationale for each model, and potential limitations of each. Add an additional sentence, “Districts may find it useful to develop Science Principles that are agreed-upon goals for science learning in all schools.” My district, Pajaro Valley Unified School District in California, created a Science Steering Committee to develop principles for science learning. Participants were volunteer teachers who understood NGSS. These agreed upon principles now serve to guide us in creating our course outlines for middle school integrated courses, and for selecting story lines, curriculum, and projects that connect our students to our local community and geography. Chapter Number & Title: CHAPTER 6 GRADES 6 THROUGH 8, PREFERRED INTEGRATED MODEL Page # Line # Original Text Recommended Text Rationale for change Page 2, Line 14 Grade 6 Integrated Story Line: Climate

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			<p>arises from systems interactions and strongly influences organism structures and behaviors. “Systems on Earth interact to cause climate, which strongly influences organism structures and behaviors.” I think that the systems theme is even more important than the climate theme. Also, I like to use active verbs to show cause-effect relationships, so “systems interact” is a better a statement to help us see that relationship. Page 2, Line 14 Unit 1: A cell, a person and planet Earth are each a system made up of subsystems. Unit 1: “Planet Earth, a person, and a cell are each a system made up of subsystems.” I would be consistent with the order from largest system to smallest system. That also makes more sense if you end with the idea of “subsystems.” You should be getting smaller. Page 2, Line 14 Unit 2: Weather conditions result from the interactions among different Earth systems. Unit 2: “Systems on Earth interact to create local weather conditions.” Again, I prefer action verbs instead of passive sentences to show cause-effect relationships. Also, using the words “local” and “conditions” emphasizes the difference between weather and climate (spatial and temporal). Page 2, Line 14 Unit 3: The amount of energy transfer needed to change the temperature... Remove this PE from Unit 3 and add it to Unit 2. Energy transfer fits much better with Unit 2 concepts and the engineering PE listed there. Unit 3 is already very packed with life science PEs and climate PEs. Pages 21-25, Lines 227-292 Instructional Segment 2 Snapshot: Motions and Thermal Energy Move Snapshot examples to an Appendix or separate document related to Middle School NGSS Unit Planning Although the snapshot is informative, it disrupts the flow of reading about the overview of Grade 6 units. Pages 26-45, Lines 294-719 Instructional Segment 2 Vignette: Interactions of Earth Systems Cause Weather Move vignettes to an Appendix or separate document related to Middle School NGSS Unit Planning Although the vignette is informative, it disrupts the flow of reading about the overview of Grade 6 units. Teachers would find it difficult to locate this vignette buried in this long document. pp. 61-64, Lines 1003-1065 Instructional Segment 3 Snapshot: Asexual and Sexual Reproduction Move Snapshot examples to an Appendix or separate document related to Middle School NGSS Unit Planning Although the snapshot is informative, it disrupts the flow of reading about the overview of Grade 6 units. Pages 69-73, Lines 1114-1179 Instructional Segment 4 Snapshot 1: Global Warming Move Snapshot examples to an Appendix or separate document related to Middle School NGSS Unit Planning Although the snapshot is informative, it disrupts the flow of reading about the overview of Grade 6 units. Pages 74-77, Lines 1194-1243 Instructional Segment 4 Snapshot 2: Monitoring and Minimizing Human Environmental Impacts Move Snapshot examples to an Appendix or separate document related to Middle School NGSS Unit Planning Although the snapshot is informative, it disrupts the flow of reading about the overview of Grade 6 units. Page 78, Line 1269 Grade 7 Integrated Story Line Order of units should be changed to 3, 2, 1, 4. The storyline should begin with your Unit 3: Natural processes and human activities have shaped Earth’s resources and ecosystems. Follow with your</p>
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			<p>Unit 2: Matter cycles and energy flows in living systems and Earth systems. Then continue with your Unit 1: Living and nonliving things are made of atoms. Finish by tying it all together in your Unit 4: Human activities can help sustain biodiversity and ecosystems services in a changing world. The PEs in Unit 3 fit better with the overall course theme stated for Grade 7: Natural processes and human activities shape Earth's web of life. To meet the coherence principle, I would start the course with those PEs. Also, Unit 3 PEs are the most tangible and familiar to students, and will elicit prior knowledge that can be built upon. The PEs in Units 3 and 2 are the most connected to Grade 6 and should be easy to build upon. Unit 1 PEs are the most abstract and difficult for students to grasp, especially in grade 7, and should not be taught at the beginning of the year. To make the storyline coherent and developmentally appropriate, I would move from the human scale of everyday life (your Unit 3) to the larger scale of cycles and systems (your Unit 2, which is somewhat familiar from Grade 6). Then dive down to the tiny atomic scale (your Unit 1) and finish to up all scales together (your Unit 4). Pages 95-99, Line 1554-1658 Instructional Segment 1 Snapshot: Extended Atomic and Molecular Structures Move Snapshot example to an Appendix or separate document related to Middle School NGSS Unit Planning Although the snapshot is informative, it disrupts the flow of reading about the overview of Grade 7 units. Pages 102-117, Lines 1668-1941 Grade 7 Instructional Segment 2 Vignette: Organism Physical and Chemical Changes Move vignettes to an Appendix or separate document related to Middle School NGSS Unit Planning Although the vignette is informative, it disrupts the flow of reading about the overview of Grade 7 units. Teachers would find it difficult to locate this vignette buried in this long document. Pages 137-153, Lines 2286-2685 Grade 7 Instructional Segment 4 Vignette: Ecosystems Services and Biodiversity in California Ecosystems Move vignettes to an Appendix or separate document related to Middle School NGSS Unit Planning Although the vignette is informative, it disrupts the flow of reading about the overview of Grade 7 units. Teachers would find it difficult to locate this vignette buried in this long document. Page 157, Line 2811 Grade 8 Integrated Story Line: MISSING STORYLINE STATEMENT Add overview storyline: "Natural laws that shaped Earth's past operate throughout the universe." Grades 6 and 7 have an overview storyline statement, so one is also needed for grade 8 in order to be consistent and coherent. The suggested storyline should emphasize Scale & Proportion because in Grade 8 the concepts expand student thinking about space and time. Page 157, Line 2811 Grade 8 IS 1: Up close: Objects Move and Collide Make the first Instructional Segment be about Earth's History and Life's Evolution, with topics in the order of: evidence from fossils, geologic time, natural selection, and genetic mutation. IS 1: "How did life arise and change on planet Earth?" I prefer a Driving Question in place of a statement for an instructional sequence because an interesting question better meets Principle 7, Student Motivation and Engagement. A very generalized statement for the unit goal tends to be boring and difficult to grasp. I have found that an</p>
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				<p>opening unit on Fossils is an extremely engaging way to begin the school year. It easily allows the teaching of many SEPs, especially Engaging in Argument from Evidence, and Asking Questions. The EEI Curriculum unit 7.4.g called “Extinction: Past and Present” works well here to bring local relevance. Beginning the course with fossils also helps meet Principle 6, Attention to Equity, as all students (including ELs) can easily engage with hands-on experiences using fossils. Page 157, Line 2811 Grade 8 IS 2: Noncontact forces influence phenomena locally and in the Solar System. Make the second Instructional Segment about Human Impacts on Earth, with PEs in the order of: changes to environments can affect probabilities of survival, increases in human population and per capita consumption, and mutations and genetic technologies (MS-LS 4-5). IS 2: How have humans impacted evolution on Earth? This story line is not connected to anything interesting and does not meet Principle 7, Student Motivation and Engagement. Instead, let’s continue my suggested Story Line above. After Earth’s history and evolution, it makes sense to tackle the human impacts PEs along with some technology PEs. Humans have impacted populations of other species, which is explored well in the EEI curriculum unit 7.3.a called “Shaping Natural Systems through Evolution.” The story line is coherent when you connect together the human impacts that influence the evolution of other species on Earth—that is, our use of genetic technologies, selective breeding, and our impact on the climate and habitats on Earth. Page 157, Line 2811 Grade 8: IS 3: Evolution explains life’s unity and diversity on Earth. Make Instructional Segment 3 be about worlds beyond Earth and ultimately about, Space Exploration, with PEs: Waves and their applications, Forces, Motion and Stability, Energy, Engineering Design. IS 3: “How do humans explore space and worlds beyond Earth?” After studying Earth’s history and current human impacts, it makes sense to move to human exploration beyond Earth. That drives questi</p>
278	6	Other	Topps Jo	<p>Comments on 6-8 Intro Lines 10-13 Both integrated and discipline specific models are developmentally appropriate and focus in depth. The current wording makes it sound as though the integrated is developmentally appropriate and the discipline specific has an in-depth focus. Possible rewording: “CA NGSS defines two possible progressions for middle school: the preferred Integrated Model which interweaves science disciplines at each grade level and the Discipline Specific Model where one science discipline of science is taught at a specific grade level. “ Lines 28-70 Inclusion of the historical background of the two 6-8 grade models is important to the field. Line 106 Table 2 needs more explanation. Comments on Grade 8 Integrated Line 2805-2806: Delete this comment: “Grade 8 presents the greatest challenge within the three middle school grades with respect to integrating the content throughout the year. The major physical science concepts of Newton’s Laws and noncontact forces do not readily integrate with the major life science concepts of evolution, natural selection, and human impacts on Earth systems. It is not necessary for the reader to know that integration is challenging. Line 2819: Omit “flowing” Line 2856: Omit “huge amount of”</p>

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				<p>Lines 2866-2870: Omit tentative language, i.e., “Students can...” “ the class could...” Line 2838: Change “bang into each other” with “collide” Line 2885-2889: Delete discussion on vocabulary. “On the other hand...a person’s everyday experiences.” This discussion is not necessary here. It should be addressed in instructional strategies. Lines 2896-2897: Replace , “in order to use common words about motion” to “in order to develop an understanding of the ways in which objects move.” Multiple experiences phenomena are more important than assigning vocabulary to the phenomenon. Lines 2901-2902: Rewrite the first sentence to “This vignette presents an example of how teaching and learning will look in the classroom.” Line 2903: Change “them” to “students”. Pronouns are confusing. Line 2910: Change “She” to “the teacher”. Pronouns are confusing. Line 3045:Change “Mrs. V” to “Mrs. Z.” Lines 3146-3147: Change “Just quickly reviewing” to “ A quick review of “ Line 3158: Change “NGSS” to “CA NGSS” Line 3175-76 Important point! Line 3177: Are we using misconception or preconception? Be consistent. Please make sure that only one term is used and defined for the reader (perhaps in a sidebar.) Line: 3268: Add “Newton’s” to Second Law. Line 3292: Delete “bunch.” Replace with “rather than separate and isolated topics.” Line 3326: Needs a transition paragraph for the reader to be reminded of how the instructional segments are integrated with each other, otherwise, this is an example of coordinated science. Lines 332-333: Typo on a hard return Line 3341: CA NGSS Line 3346: Be specific in the vignette when students are developing models and when students are using models. Line 3352-3353: “The vignette presents an example of how teaching and learning may look like in the classroom when the CA NGSS are implemented.” Change to The vignette presents an example of how teaching and learning may appear in the classroom when the CA NGSS are implemented. Line 3402: DELETE! “Ms. O offered extra credit to any team that wanted to...” We do not need to promote poor teaching practices! This is an equity issue-only the overachievers have an opportunity to learn more. Access is for all students. Line 3406: Delete: “While only a few groups started these research projects” We do not need to promote poor teaching practices! This is an equity issue-only the overachievers have an opportunity to learn more. Access is for all students. Line 4179: Delete “bad,” substitute with appropriate language. Line 4189: Change “black” to African American Line 4447: need URL</p>
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**Please note that survey responses have been populated directly from submissions and have not been edited.*

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279	6	Teacher	Deich Molly	MS-PS1-2. Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. [Clarification Statement: Examples of reactions could include burning sugar or steel wool, fat reacting with sodium hydroxide, and mixing zinc with hydrogen chloride.] [Assessment Boundary: Assessment is limited to analysis of the following properties: density, melting point, boiling point, solubility, flammability, and odor.] Line 3193: In order for these science ratios to make sense, students need to specify the units of measure for each component of the ratio and also of the resulting number, such as a speed or a density. The concept of density can be complicated to teach and learn. In the citations above, middle-school students' scientific fluency around density is assumed to be at the level of a scientist's understanding of the concept. I feel that teachers need to be very careful in how they incorporate density into their lessons; otherwise, students may be saddled with a well-cemented conception that the more massive an object is, the denser it is. My doctoral dissertation at UCSC (Deich, 2015) focused on the roles of modeling and classroom dialogue in how 6th graders make sense of mass, volume, and density. What became absolutely clear in my research is that unless students are given plenty of time to construct their own understandings of mass-to-volume ratios, their conceptions of density (either as an analytical tool or as a characteristic property of matter) tend to get stuck in a conflation of mass with density. The concept of volume needs special attention in middle-school curricula. Students often find it challenging to estimate or predict volume because it is three-dimensional, phase-dependent, and is measured in both liters and in cubic units. Further, the measurement labels do not necessarily match the nature of the material being measured (e.g. centimeters for a liquid).
280	6	Teacher	McCluan Jennifer	It would be helpful to separate each grade level into separate chapters given the length of each segment. The resolution on the overview/storyline tables at the beginning of each grade level could also be improved. Consistent language (either "Instructional Segment" or "Unit") would build cohesiveness. The storylines of 6th and 7th grade integrated are cohesive and quite strong, but 8th grade seems disjointed and less cohesive. It is challenging, given the performance expectations assigned to 8th grade (they are difficult to connect), but modeling could be used more explicitly as a way to connect instructional segments.
281	6	Other	Markus Doron	pp. 87-91 (7th Grade, Unit 1) Comment: Good conceptual background, but there are no suggestions of hands-on activities to teach concepts p. 89 It should be noted that CA NGSS in middle grades includes the first three of these features, but does not refer to the existence of electrical charges within atoms (or use the terms electrons and protons). Clearly, middle grade science teachers should know these atomic electrical charges, but what about middle school students? (Replace this entire example/snapshot with something better.) MS Students are not expected to know about electrons, however the snapshot on pp. 95-96 refers to covalent bonding (see figure 3), and the reading that students are supposed to annotate for hw discusses

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				ions and shows chemical formulas with positive/negative signs. How are students supposed to understand the chemistry if they are not taught about electrons and the periodic table? This example does not seem relevant. p. 129 line 2183 them thar hills “them thar hills” correct punctuation pp. 136-150 Instructional Segment 4 Vignette The vignette is not a helpful example for most middle school teachers who do not have ready access to a nature site. p. 192 lines 3440-3445 Grade 8 IS Vignette #2: The activity described in this vignette entails the use of technology which most MS classrooms do not have. Description of an activity that doesn’t require technology would be more helpful to most MS teachers. p. 220 line 4017 Hyperlink link to HHMI resources Link is to the video, but not to printed resources p. 221 line 4046 organisms produce for more organisms produce far more word choice p. 222 lines 4059-4060 Long periods of time enable a sequence of change at the species level of many small changes, each of which At the species level, long periods of time give rise to many small changes, each of which Clearer wording
282	6	Curriculum Specialist	McGill Melody	In the prior grades chapters, the ELA/ELD connections and Math connections are embedded in the text next to the section where they are addressed (CH. 4, K-2 pgs. 30 & 31). For the upper grade levels (6-8 and High School) they are not as clearly identified. It would be useful for teachers to have them stand out similar to the K-2 chapter. The set up of the table outlining the Instructional segments in the K-2 and 3-5 chapters (Chapter 4, page 7) has a nice setup that is easy to read and follow. The tables for the instructional segments in the 6-8 and the High School should be in the same layout. Thank you for the summaries for each instructional segment. This will help focus the content for each section.
283	6	Teacher	Flanagan John	The CA NGSS Version of the Integrated model is not as thematically connected as the National NGSS version is. The topics don't blend into each other that well and therefore force students and teachers to do a lot of jumping around - something which is especially detrimental to ELL and low SES students, who find the language dependent thinking, in depth discussion, & creation of explanatory models difficult enough. If CA does not want to go the more common sense route of following the National NGSS plan (which would clearly allow for greater sharing of ideas and access to a wider variety of professionally developed curriculum, age appropriate activity tool kits & software tools), then it should greatly revise or rewrite the 6-8 integrated model. Here are a few suggested changes: Move ecosystems to 6th grade (or stick with biomes, which fit nicely with climate) and put cellular biology in 7th grade. Each grade should have some physics, which would create a more natural platform for teaching the engineering process (simple machines in 6th grade, Newtonian physics in 7th, circuits, magnets & electronics in 8th grade to blend with the 8th grade study of wave theory). Each grade should also have some chemistry (properties of matter, basic kinetic molecular theory, heat transfer & density in 6th, intro to the periodic table, chemical properties & common, naturally occurring reactions in 7th, electron structures, dealing with temperature & pressure, experiments with

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				<p>predicting chemical reactions and more advanced energy concepts in 8th). Any division will continue to work with human impact & engineering. Middle school students still need plenty of concrete concepts and obvious connections. Too much abstraction and they get intellectually disengaged, distracted & lose the thread of instruction - even when they are engaged in meaningful hands on activities & discussions. Keep in mind that this is an age when large numbers of students drop out of math & science psychologically and decide it's not for them. We can't afford to get it wrong with this transitional age group in my opinion.</p>
284	6	Other	Tupper David	<p>Intro chapter softens the difficulty of making the choice between integrated vs. discipline specific. Doesn't adequately explain why integrated was preferred and the challenges of the discipline specific. Doesn't lay out the benefits of both or the cons of both or why one works better. More philosophy and pedagogy of why would be helpful. (although storylines help) I understand that CDE wants to support both models, but the SEP and CFCC were very clear in calling out the discipline specific model as weaker for students, more difficult to implement successfully, etc. I would like to see the discipline specific model, de-emphasized or relegated to the appendix. The spirit and intent of NGSS will not be realized if we move a little content around.</p>
285	6	Other	Sargent Cynthia	<p>I like the grade 6-8 "year at a glance" chart (see line 14 for the 6th grade version) and wish there were consistency of using this format in the other grade levels. I do not like the tables summarizing the instructional segments (see line 62 for 6th grade). It's not helpful to have PE codes. Teachers should not have to look these up to make sense of the table. Also, by always providing summaries of DCIs you're emphasizing content over practices and crosscutting concepts. (This comment applies to all grade level chapters) There should be clear summaries/explanations of all 3 dimensions and how they work together in the instructional sequence. Otherwise do not have the DCI summary at all. Rework it to be an "instructional sequence summary" not a DCI summary. I like providing guiding questions but I don't like the tables like the one at line 224. Keep the original architecture of NGSS for all the other stuff in that type of table. "Highlighted" means what? That it's part of a PE and emphasized? That it's not part of a PE but it supports learning? Both? Keep the original architecture and then make "amendments" if needing to add in related SEPs/CCCs. NGSS connections are formatted differently in snapshots and vignettes yet seem to have the same info. keep consistent formatting. Text between vignettes seems to dictate teacher/student activities (i.e.: it seems like curriculum more than illustrative examples). Keep the illustrative examples to the snapshots/vignettes and keep the text in between focused on how 3D learning unfolds through explanations of the use of guiding questions, general explanations of the types of activities but not so much detailed specifics.</p>

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286	6	Teacher	Brockway Eric	<p>General comments regarding the Framework for Grades 6-8 Preferred Integrated Model: 1. In general, this is an informative framework that provides suggestions regarding a reasonable and practical approach to implementing CA NGSS. The storylines and associated vignettes provide a point of reference for teachers to consider when developing and implementing NGSS-aligned curriculum. However, one concern is that the storylines will set precedent as the preferred approach and curriculum will be developed solely based on these storylines. California is on the cutting edge of educational research and implementation, and often serves as a guide for other states. If this Framework is published, it will likely be adopted by other states in the future. Despite the disclaimers that appear at the beginning of each section explaining that the Framework is intended to serve as a guide, it is possible that it could become the ultimate source of how to implement NGSS. In order to honor the integrity and flexibility provided by NGSS, the potential future use of this document should be considered prior to publication. 2. The document reads as if written by multiple authors, which is expected given the size and scope of the document. In order to confirm continuity within the document, we recommend technical editorial review and minor revisions within sections of the document to reflect consistent voice, level of detail, and formatting. For example, in the Grade 6 Introduction, the summary uses bold and italicized formatting to highlight important connections of the storyline to science and engineering practices and cross cutting concepts; however this is not carried through to the Grade 7 or 8 Introductions. Similarly, the acronyms (CCC, SEP, etc.) are not introduced or used uniformly throughout the Grade sections. 3. Grade 6 Summary, Line 27, includes a helpful statement of assumptions regarding prior learning and establishes a boundary for future instruction; however the phrase “various Earth systems” is vague. It is assumed that the user of the Framework would concurrently refer to the elementary school standards, so this comment recommends either referring to the elementary framework, or including a brief explanation or definition to clarify this statement of assumptions. 4. Grade 6 Summary, Lines 29-43 provide a summary of the IS 2 and 3 storylines; however it seems like the point of the summary and the associated vignette is that NGSS provides an opportunity to expand the scope from local to regional to global systems. Recommend simplifying the language. 5. Grade 7 Summary, Lines 1277-1278: “Natural processes and human activities shape Earth’s web of life” is an arbitrary statement. The NGSS PEs and Framework storyline seem to emphasize the concept of cycling of matter and energy. Recommend revising the overarching guiding concept to include cycling of matter and energy. 1. Grade 8 Summary, Figure 1 (pg. 157) row headings are not consistent with Grades 6 and 7 Figures. 2. Grade 8 Summary, Figure 1 (pg. 157) IS4 Title, “Wave-based technologies assist human efforts to sustain biodiversity” is confusing. Additionally, we respectfully disagree that the NGSS PEs require investigation of humans sustaining biodiversity. 3. Grade 8 Summary: Summary should focus more on explaining and</p>
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				<p>justifying the proposed storyline. As currently written, the Grade 8 Summary does not provide a clear technical explanation for the proposed storyline, as is provided in Grades 6 and 7 Summaries. Recommend revising summary such that it provides (a) a clearer connection between the storyline and the specific elements of NGSS; (b) cohesive explanation of how the storyline is intended to fit together; (c) justification for grouping the topics as shown in Figure 1 (p. 157). 4. Grade 8 Summary, Lines 2822-2823: While we agree that the Grade 8 material is difficult to “integrate” in the sense of intertwining a single storyline, the language in this sentence is subjective and does not provide a summary of the content presented below. Suggest deleting sentence. 5. Grade 8 Summary, Lines 2836-2839: Language in this sentence is subjective and does not reflect the technical scientific discourse promoted by NGSS. Suggest simplifying sentence to include only the key objective concepts that are relevant to the Grade 8 standards.</p>
287	6	Other	Galisky John	<p>Line 859 Figure 16 Thermal Energy and Wind Convection Cells Drawing is too complex. Use a drawing that includes Hadley cells without tradewinds. Lines 865-872 The description of the drawing is incorrect. It says the equator goes through Mexico just south of Florida, but this is not the equator; it is 30 degrees latitude. The equator is the line going through Brazil labeled 0 degrees Equatorial Low. Line 1221 Change "solar cells" to "solar panels" or "solar modules" or "photovoltaic system." A solar cell supplies only enough power to charge a small battery. Lines 1883-1885 This needs more explanation. How do the students' drawings show that one molecule has more potential energy than another molecule? Maybe show an example of what the drawings would look like. Page 116, Line 3159, Line 3558, Line 4797 Introduction to every "Vignette Debrief" says, "core ideas in space science (Moon phases and the solar system)" but only one of these vignettes is actually about phases of the moon. Lines 2154 and 2156 Change "oceanic crust (lighter green)" and "oceanic crust (labeled number 3) to "continental crust" in both cases. Lines 2822-2825 Cut these two sentences that foreshadow a weak instructional sequence. It may have been a "challenge" but the reader should not be told it is too challenging. Paragraph should start with "As shown in Figure 1, each Grade 8 Instructional Segment tells a coherent story..." Line 4356 Figure 21 Model of a Typical Wave Delete diagonal line running through graph</p>
288	6	Curriculum Specialist	Passmore Casey	<p>I really hope that a Table of Contents for this chapter gets created; anything over 50 pages needs one. I had to make one in order to make sense of all the pieces.</p>
289	6	District Administrator	Duong Annie	<p>Lack explicit instructional strategies and connections to literacy instruction to scaffold for ELs and special needs students.</p>
290	6	Teacher	Spitsen Lisa	<p>Figure 3 Line 135. The picture from a primary grade level does not really fit into a 6th grade document. It would be better to have a 6th grade document as a replacement. Maybe a student writing a paper or a math problem.</p>

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291	6	Curriculum Specialist	Sussman Art	Very detailed comments and revisions were provided by me (Art Sussman) through direct email to Bryan Boyd at CDE, Matthew D'Alessio, and Maria Simani
292	6	Teacher	Flanagan John	The straight discipline model is not as bad as the integrated model, because the topics are more clustered. but there is a very heavy emphasis on genetics and not nearly enough basic physics. Students are expected to do engineering projects with little instruction about simple machines, circuits, etc. 6th grade faces the potential challenge of student resistance to covering earth & planetary science that was just taught in 4th & 5th grade. They'd be better off doing the basic version of Newtonian physics that 8th grade currently has. 8th grade has plenty to deal with in chemistry and wave theory. They can also deal with more advanced concepts in physics.

Chapter 7: Grades Nine Through Twelve

Comments (293-393)

#	Ch.	Title	Reviewer	Comments
293	7	Teacher	Irwin Christine	These models give districts ideas on how to teach "all standards for all students". I have three main questions . . . How do the courses in this model meet the traditional "biology, chemistry, physics" courses that the UC/Cal State colleges require for a-g compliance? Secondly, is the state of CA going to change the graduation requirements from 2 to 3 years of science? This Framework pretty much demands it or districts will not meet the "all standards for all students". Lastly, what about students who are AP or IB? The closest any AP course is to teaching ANY Earth Sciences is AP Environmental Science . . . How do districts get those students to learn the Earth &Space sciences? How do you get students who are very low skilled in math to learn the physics & chemisrty standards?
294	7	Teacher	Galvan Bernedette	I totally vote for more grants and scholarships to be available for science teachers (even possible stipends or pay raises) so more people are attracted to teaching science. A three course model is minimum at a HS level. Our Forensic and Biotechnology academy in our HS there is a 4-8 year of science model jus to get into these cutting edge fields and excel.
295	7	Other	Durant Jayne	Students did most of this "stuff" in middle school. They are BORED! Why not provide an education that is based on new information.
296	7	Teacher	Munsell Mary	Integrated science has tried and failed repeated for a variety of reasons. NGSS tries to force integration without thought to the fact that California requires 2 years of science and colleges prefer to see specific

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				courses. Trying to force 4 years of science on every student so they can take a CAASP test their junior year does not benefit the students, just the politicians.
297	7	Teacher	Dutta Debolina	Earlier I wrote that the 4 year model is the better model, but after looking more closely, the 3 year model is the way to go! It's more interdisciplinary and allows for seniors to take an elective course of their choosing. I AM IN FAVOR OR THE 3 YEAR MODEL!
298	7	Teacher	Irwin Christine	How does a four course model work if the exam is given in the junior year? A quarter of the standards have not been taught in this model.
299	7	Teacher	Galvan Bernedette	I totally vote for more grants and scholarships to be available for science teachers (even possible stipends or pay raises) so more people are attracted to teaching science. A four course model is ideal at a HS level. Our Forensic and Biotechnology academy in our HS there is a 4-8 year of science model jus to get into these cutting edge fields and excel.
300	7	Teacher	Durant Jayne	Due to the low grade level reading ability even science textbooks are too complicated for many students to understand let alone original documents. And again students have touched on these subjects in middle school and so are bored.
301	7	Teacher	Grudin Tara	Please just use the Next Generation Science Standards
302	7	Teacher	Munsell Mary	Slightly better than the 3 year model, but again not all students should not have to take 4 years.
303	7	Teacher	Gilliland Kaitlyn	I think the way you've set up the progression of the subjects in Biology is extremely logical, and will be easy for students to follow. I also like the way that you have outlined the standards that each section of instruction meets. I would like to see more examples of how to introduce these subjects to students who may not have a strong background. Some of the cross cutting concepts are a far reach from the content covered, so making those connections extra clear to educators would be useful.
304	7	Other	Mattsson-Boze Joanna	The High School Four Course Model for Physics was very well laid out. I was especially impressed by the snapshots of classes taught. I would like to see more crosscutting happening in schools between subjects. The connection that I saw between Physics and Geometry showed a step in the right direction. I also liked the ties to real life. No matter how small the tie is to real life situations, it is always more engaging for the students to see either how they could use the concepts or how the concepts are presented.
305	7	Teacher	Dutta Debolina	Given that credentials will most likely remain single subject for high school science courses, I am happy to see that the four course model was provided. I reviewed the Biology section in detail and really like the way that the NGSS CCC, S&E Practices, and DCI are interwoven and laid out. The "chunking" of the DCI really make sense. The incorporation of S&E practices are clear and coherent. PLEASE finalize this version of the biology 4 course model!

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306	7	Teacher	Callahan Stephen	There is a typo in the chart below line 102. The document refers to the history of Planet Earth as PS1.C. In actuality it is ESS1.C.
307	7	Teacher	Reese Dean	In the High School 3-Course Physics with Earth and Space Science Integrated chapter I have the following comments: 1. Unit 1 seems to skip over some concepts that are fundamental to the Newton's 2nd Law performance expectation such as: Free body diagrams, acceleration, vectors, velocity and other motion concepts. 2. The snapshot on line 276 dives into Earth Science concepts (geomorphic features) without leading up to them or reviewing them in the framework before the snapshot. 3. There is a general concern that earth science concepts need to be emphasized more in the framework due to the fact that many physics teacher are unfamiliar with them and will need to understand them in order to teach them. 4. There could be more mention of math and ELA/ELD standards throughout the document to make connections with other subjects.
308	7	Teacher	Da Costa Cora	Too much of a burden for Biology and unreasonable to incorporate Biology and Earth science. This would truly take away from Biology. One positive is that you would cover Earth Science standards and prepare students for the state assessment.
309	7	Other	Hollister Ryan	As an earth scientist that teaches, I find lines 20-46 in the physics/universe model extremely offensive. Amazing teaching starts with amazing content knowledge from which stories can be told and curiosities piqued. "Learning with the students" will fail miserably and I am flabbergasted such language was included. It seems to completely dismiss that actual content experts exist in their fields and that they are beneficial to the teaching profession. I got into teaching not because I loved teaching general science, but because I have a passion for sharing my earth science knowledge using guided and unguided exploration labs. My goal is to create geoscientifically literate citizens that will be able to solve a host of California's biggest environmental and natural hazards to turn our currently polluted and very uneducated San Joaquin valley into an educated, sustainable and healthy place to live. cursory inclusion of earth science concepts will inevitably fall flat due to the fact that many physics/biology and chemistry teachers have very limited knowledge or content mastery in the earth sciences. Whats worse, is many of the teachers I've worked with in other subjects consistently overestimate their earth science skills and knowledge. It's embarrassing. The stated hope that professional development will increase confidence in content ability is misleading in several ways and . First, such professional development would need years of exceptional collaboration and content education that many districts would realistically not sufficiently support because they don't know how! Secondly, many teachers I've worked with have high confidence in their content knowledge but in reality have such a basic understanding of concepts that they end up teaching half-truths or create activities that serve no real purpose.

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310	7	Teacher	Lucero Rocky	The Living Earth Line 36 instead of saying “zooms in more” and having to explain what that means, use the words in parentheses. I liked how important vocabulary was bold and italicized Was nice to see the gray boxed scenarios. Those could be used as lessons. Line 254 Change ending with a “.” after “work” start new sentence with “Therefore,” End of line 265 start of 266 No need for “The Matter” Line 741 Effect not Affect
311	7	Teacher	Lam Tam	Line 18: “teaching a course” is missing the word “of”. Line 46: “Need to zoom down in” doesn’t need the word “down”. Line 75: “(MS-LS2-3) analyzed” needs a comma separating them. Line 180: “not all need too” requires the proper “to”. Line 200: “how they sound alarms to protect their family instructional segments against snakes”. This sentence is awkward and needs revision. Line 200: “The group instructional segments now randomly wander”. Awkward sentence and needs revision. Line 200: “water buffalo as group counter attack lions”. Change to “water buffalo, as a group, counter attack lions” Line 211: “‘undisturbed’ Students” needs a period between them.
312	7	Teacher	Haut Jennifer	Modifications to Instructional segment tables for each unit: (Please email me for example of table format. jhaut@tusd.net) 1) Add the guiding questions in the instructional segment tables in the unit descriptions beginning on line 55 to Table 1 Summary table of the units. Put guiding questions after performance expectations row and before the 3 dimensions in the table. 2) Keep the format of the 3 columns for the highlighted SEP, DCI, and CCC, but add color to the 3 dimensions to coordinate with the NGSS standards.
313	7	Teacher	Whaeton Kyra	The only reason that I can see that this model moved forward (versus an integrated approach) is that someone was being lazy about adjusting courses for the UC system, which only addresses 10% of the students population. Students are unable to effectively analyze man's impacts with out having all of the earth science taught first. Plus, as an AP Environmental Science teacher, I find that the seniors do better than the juniors. This is most likely because of maturity and increased exposure to world events. We currently teach Biology to freshman and we see close to half of the students in our College Prep courses with grades less than "C"s. We are in Fremont, which has a low percentage of free and reduced lunch students. Looking at the course sequence, there is NO OPTION that is reasonable for freshman. The integrated model would allow for a grade level appropriate education for ALL students in the state of California. My other concern is standardized testing and a 2 year graduation requirement. At least with an Integrated approach students will have been taught science from Physical, Life and Earth. The state needs to go back to the drawing table and acknowledge that the proposed "Chemistry" course is about 25% of current standards and thus should not be labeled as such. I can not stress enough that the Integrated Model needs to be reopened as the main suggested option. I have spent many hours working on my district team evaluating the sequencing of the new NGSS material. We concluded that the suggested Integrated Model was the most

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				logical and could easily be tailored to our District needs. If the State of CA does not have an Integrated recommendation, then it will be much harder to find textbooks that support the California NGSS.
314	7	Teacher	LAUSD South/West (no name provided)	pg 47 line 657-658: Acknowledges that instructional segment 8 is linked with instructional segment 1 on line 658, but they insert ecology instead. There is a lack of continuity/sequence in inserting segments 5, 6 and 7 before segment 8. The order should be segments: 1, 8, 2, 9, 10, 11, 7, 4, 3, 5, 6. Seg 1, 8 - DNA Seg 2, 9 - Genetics Seg 10, 11, 7 - Evolution Seg 4, 3, 5, 6 - Ecology
315	7	Teacher	Da Costa Cora	Preferred model. FLOW and subject matter seems more reasonable for a 1 year time constraint. Con: Not sure all students would take 4 years of science, thus they may not be prepared for the State assessment.
316	7	Teacher	Hollister Ryan	This is a preferred model. I don't agree with the sequence of the ES model, but I really enjoy the latitude afforded for place-based learning, as it should be. The four year model still requires great collaboration amongst different fields of science with the cross cutting concepts but will allow content experts to share and add a greater breadth of knowledge while teaching within their area of expertise.
317	7	Teacher	Royer Jackie	Many of the science teachers I work with or know, myself included, find it easier to do our jobs well if we are given a clear outline of the content we need to teach. If there is a clear outline of necessary content for each grade level, then as a high school science teacher I will have a better idea of what my students should or should not know when entering my class. These PEs are okay, but I really need to know exactly what content I should cover. If I know what content is needed, then I am able to spend more more time on developing lessons and activities to teach those conpts as well as assist my students in then reaching a given PE. Concerning students not memorizing what ionic and covalent bonding involves: wouldn't students need to learn and memorizes the properties of different types of compounds in order to be able to use evidence they collect while testing compounds to then classify them as ionic or covaleent. An assessment boundary says that complexchemical reactions will not be assessed, so isn't it somewhat misleading to then use complex chemical reactions when studying Le Chatelier's Principle. Several of Mr S's systems were complex reactions, I think it's confusing to students to say we won't be tested on something, but then we see it used as an example all the time. An example shows a system involving the equilibrium between solid salt and it's aqueous ions. The solid is referred to as being precipitated, this seems contrary to what is generally taught concerning a precipitate; a precipitate is the insoluble product formed in a chemical reaction. The example has it as a reactant, it seems like this would confuse students, it confused me. Concerning that students should be able tp predict trends rather than memorize them, but wouldn't students then need to memorize information concerning the number of valance electrons, and the relationship between the number of energy levels and the electron's attraction the the nucleus.

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318	7	Teacher	Gandhi Dipa	<p>CHEMISTRY FRAMEWORK: Line 43 - 61: NGSS leaves implementation of curriculum to individual teachers, districts, states, etc. I worry about the consistency of basic information students are learning with such a broad brushstroke. Though I believe in teacher individuality and tailoring to students' needs but will students be college ready for a college level Chemistry course? This is an overarching concern I have about science education in general. Line 96 & 97: Raoult's Law IS important to cover as a principle that aligns with the idea that sum of the whole is equal to the sum of its parts. This principle can be found in many examples in nature, math and other branches of science. Covering it in Chem would be a good way to bring in interdisciplinary concepts. This allows students to notice patterns and consistency in all subjects that is critical to creating their OWN patterns. Line 320 - 327: Students SHOULD and NEED to be introduced to terms such a proton, neutron and electron as early as elementary school but DEFINITELY in middle school. Waiting until high school to even HEAR these words is setting them up for an uphill battle when we have topics that assume their basic knowledge of subatomic particles. NOT a good idea to wait until students are "developmentally ready".</p>
319	7	Teacher	Moore Caren	<p>Line 41-45 The body systems have been taken out of the standards. I agree that is what the students are most interested in. However since they are not in the standards it does not make sense to extend lessons to include it since there are so many other topics that we are required to cover. Line 49-52 In relation to "They should make sure that the selected topic is deeply linked to the CA NGSS so that students utilize their knowledge of the DCI and crosscutting concept (CCC) to understand the topic or use the scientific and engineering practices (SEP) to learn about the topic." This contradicts what is written in lines 41-41 (giving examples of organ and tissue donation, diseases, etc. The body systems and viruses have been taken out of the standards (with the exception of the circulatory system). Therefore, they are not "deeply linked to the CA NGSS". Either bring back the body systems into the standards, or take out the examples of linking to body systems since they are not deeply linked to the CA NGSS. Personally, and from experience teaching in the classroom, students LOVE the body system units. I do not understand why they have been taken out of the high school standards. This is what interests students the most, and you have taken it away. Line 82 Reference is made to ALS and organ donations. These are not deeply linked to the CA NGSS standards. Line 104 HS-LS1-3 typo...stomate...should be stomata Line 117 are called out as eliminate the word "out as", not necessary. Line 124-132 Starting at "For example, and ending at organisms had in common." Should be indented since it's an example. Line 162 The note attached to superscript 2, quick growing plants . Please provide the exact links of the companies that maintain normal and mutant seeds. Line 176-179 An example of using the respiratory system is mentioned, the respiratory system is not "deeply linked to the CA NGSS</p>

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				standards and should not be used as an example as stated in lines 49-52. Please choose an example that is deeply linked to the CA NGSS standards.
320	7	Teacher	Arechiga Angela	High school Life Science lines 143-157: This section discusses protein synthesis and it appears that there is a contradiction each in wanting students to know the process but not focus on details. Yet, later it asks for students to know the micro level of the process. line 196: Why perform investigation on mutants? Line 225: Guiding question why is fidelity is being used to describe cell function-how are cells faithful? line:357 it unclear if students need to know the process of light independent/dependent reactions or just overall process. line 565-575: Shouldn't there be more engineering involved, not only a report line 823-825: what statistical math should be used? Seems like Hardy-Weinberg should be taught but it's not clear. Further clarification needed on the math. line 871: what concepts of probability are being referred to here?
321	7	Teacher	Whitacre Arielle	line 82: term "Fidelity" in the summary of DCI for instructional segment 2 seems like an awkward choice of word to use and the meaning is not clear as written. Line 84: Mathematical and computational thinking of carrying capacity...what is meant for the calculation. Line 143-157: this section discusses protein synthesis and it appears that they need to know details of the process, including how to use the codon chart. But starting on line 157 it says that it is not necessary to provide the details of translation process or have them memorize the codon chart. So it appears contradictory. Do they or do they not need to be given information on the process and do they need to still be able to "use" the codon chart, without memorizing it. Line 225: Guiding question uses the term "fidelity". What is meant by this term again? Line 357: It is unclear if students need to know that the process is broken down into the two steps of light independent and dependent or if they just need to know the process overall?Line 569-575: Wasn't this section supposed to be the big "engineering" component to life science? There should be more engineering involved in this component, and it doesn't seem like there is much engineering. Line172-179: the phrase says develop a model,but they are using a model that already exist,not developing their own Line 521: again students are using a model not developing a model. Line 711: students are being encouraged to use a model but the standard doesnt ask them to use or develop a model. 747: being asked to use a model but the standard doesn't reference using a model. 823-825: is the statistical analysis being referred to Punnett Squares? 825: discusses frequency of distribution of traits(Hardy Weinburg)but the clarification statement says students wont be tested on Hardy Weinburg. Line 825 implies they need to know it,so it is confusing. The math being asked for is unclear. 871: What concepts of probability are being referred to here? Life Science
322	7	Teacher	Moore Caren	Line 219-221 Starting with "Teachers' can highlight, and ending with save lives." students need to know the structure and organs if they are going to expand this activity to include the importance of organ transplants and how the organs work to save a life. However, there is no standard in the high school CA NGSS that

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				allows the students to learn this information. Please include the body systems into the CA NGSS, it is vitally important the students have a better understanding of how their body works. Line 225 LS3-1 Why don't students need to know the steps of mitosis? They need them to help understand meiosis.
323	7	Teacher	Ahlgrim Jenny	<ul style="list-style-type: none"> • line 49: – CCC and SEP should be Crosscutting Concepts (CCC)... • line 63 – 76: I feel May 2015 draft, lines 61-83 provides clearer explanation for this section. • line 77-78: there should definitely be a time frame (i.e. % wise) for how much time to spend with each section. (This is included in May 2015 draft, line 85). The following is all from line 81, Table 1: overall Table is good, easy to understand, but following I feel needs addressing: • in Instructional Segment 2: Highlighted CCC: Systems and Models should be bulleted. Also, not sure of the use of the word “fidelity”. • in Segment 6:in Summary of DCI, last sentence, replace “others” with “humans”, or replace “others have” with “that have been”. • Segment 7:in Highlighted SEP, un-italicize “Engaging...” . Also, Summary of DCI wording seems off...”ability for gene pools in populations to be passed on...” • Segment 8: Summary of DCI’s – wording seems off, perhaps it should say “The history that led to the understanding of the structure of DNA.” Also, perhaps “Students will learn that DNA provides the instructions, in the form of a code, and how that code is transcribed into mRNA and then translated into protein.” something like that. • line 90: Segment 10 – Summary – “commonalities”?, should include “similarities in DNA sequences”, also “and is discussed...” is redundant. • Segment 11: in Summary – “is addressed” should be “are addressed”? • Segment 12: Summary is run on sentence, should be made into at least two. • line 104: in Table HS-LS1-3 “those” should be “that” • line 108 – lines 118 fix spacing, too close together • line 1036: “skulls or beaks or shells...” change to “skulls, beaks, or shells...” • line 1040: “environment. For”
324	7	Teacher	Sherman Marcus	On page 52 (and others), under the Clarification and Assessment Boundary must be in red to be consistent with the NGSS standards released previously. In addition, all Science and Engineering Practices should be green, DCI's in orange, and the CCC's in green to be consistent with the NGSS standards released.
325	7	Teacher	Wheaton Kyra	Why is this on the table if only 2 years of science is required to graduate. The college bound seniors that want an extra year will be taking AP courses to supplement their education.
326	7	Teacher	Lim Michael	A weakness is that segment 1 is starting with combustion which requires scaffolding. The teacher must know the background of the student before teaching the course. A strength of this segment is that energy is a very important disciplinary core idea. The atomic theory is something students cannot see or experience. The Chemistry in the Earth System makes strong connections of what the students have heard regarding global climate change, ocean temperatures, and nuclear processes in the core of the Earth.
327	7	Teacher	Kessler Rachel	Regarding Chemistry Only -Mmakes chemistry SO much more accessible and tangible by looking at it's role in earth processes (rather than just random and abstract concepts). It is definitely chemistry for the "regular

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				<p>person" versus math/science minded (which I think is a good thing overall*). The analogy of learning a language via immersion vs. in a traditional classroom setting (vocabulary, grammar, etc) is how I keep thinking of this model...it's so much more immersive! -There is SO much less math, but still a place for stoichiometry where it makes more sense when applied to production of CO₂). -I can also see where you can still apply nearly all the concepts we already teach (the one's people were worried about- like acid/base and gas laws in the ocean solidification part). -The only thing that really seems like it's missing is Nuclear & Quantum Theory/Wave relationships (not that I mind). Instructional Segment 3 is pretty similar to what we already do, just more inquiry based. I was surprised to see that this is the first time student's will be introduced to subatomic particles- that will be interesting. In that same section- I do NOT like the suggestion that students can use paint chips to simulate periodic table arrangement. We already do an activity like this and they do fine recognizing actual patterns using properties of real elements. -I like the vignettes too- esp how the evaluation of online resources/articles is included, and then revisited when they do research. -The only E/S piece that seems a little random to me is the plate tectonics in Segment 2. I get why they put it there- heat transfer/convection cells/states of matter- but it seems weird to talk about sea floor spreading and subduction without then talking about earthquakes/volcanoes/ etc. Just feels a little disconnected. *My biggest concern with it is that it doesn't prepare kids for AP chem (especially on the 4x4 where we don't really have time to add extra content).</p>
328	7	Other	O'Connor Dawn	<p>Several-Many examples of classroom activities will not demonstrate the science ideas described in the text. 195-Original text Heat and Energy in the Earth System-We appreciate the relationship between energy transfer at the molecular level and energy flow on the geological scale. 1082-Original text Disrupting Equilibrium in the Ocean-We appreciated the connections between chemical equilibrium and ocean acidification. Need examples of specific phenomena for instruction for each of the vignettes. Add to the table with the guiding questions, etc.</p>
329	7	Teacher	Lim Michael	<p>A strength of this model is that electron configuration is skipped over and more time is spent on</p>
330	7	Teacher	Minassian Vahan	<p>In the Earth and Space Sciences document, page 1 line 16-17, I understand the title of Segment 7 is Star Stuff but it sounds weak. Yes Star stuff is a great line from a Carl Sagan quote but not for a title of a segment please change it to Star Matter or The Matter of Stars. In the Earth and Space Science document page 79 of 108, line 1317-1318, Sentence needs to be omitted, "However, Science does not always need to be practical." No added sentence. In the Earth and Space Science document page 87,88 of 108 In the snapshot ESS the HR diagram that is chosen is very weak, You explain star type and luminosity and temperature in the paragraphs above but then use a scatter plot of the HR diagram. Please change the diagram to include at</p>

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				minimum All groups of star type, supergiant, giant, white dwarf, and main sequence. Also include Spectral Types O K F M etc.. A more encompassing HR diagram is very beneficial, don't forget the colors of the stars.
331	7	Teacher	Berrner Jill	If you're still reading my comments, I salute you... Although the word is thrown around, high school models both lack a systems approach. Students at this age know that nothing operates in isolation. Project-based inquiry should be the norm. It would echo the "exploratory" ideals NGSS outlined with younger children and provide student motivation. Also, no student should be allowed to graduate without having conducted an experiment using the scientific method.
332	7	Teacher	Pringle Kenneth	This is the most practical model since many students will want to take an AP course or will desire to pursue other interests and only take three years of science. I have deep difficulty with the current recommended curricula as laid out in the document " High School Three Course Model – Chemistry in the Earth System: Integrating Chemistry and Earth Science." Perhaps the authors have the luxury of seeing the entire scope and integration of topics prior to and in the high school years, but I am disappointed in the lack of direction provided for the chemistry curricula in the outline. There seems to have been a great deal of thought given to the Earth Science component and how students are to investigate the increase in carbon dioxide and its affects on climate and environment and how that might relate to chemistry, but chemistry seems to be less clearly laid out. Do you recognize that you are now allowing any science teacher to teach the "integrated" chemistry curricula but you are not guiding teachers who are weak or new to chemistry on how the core principles of chemistry and of "thinking like a chemist" are to be taught? The draft should make it clear how and when the mole will be taught; when to introduce molar concentration and pressure, which are both essential to equilibrium; clearly delineate kinetics as a chemistry topic; etc. Moreover, the topic of heat transfer is a physics or physical science topic, and the introduction of plate tectonics and the separation of our plates is a topic often covered in biology in the evidence for evolution. Chemistry could be better integrated with the absorption of infrared by different molecules or the release of heat energy in the Earth's core through nuclear reactions. These "disconnects" are why I feel that the committee should first develop the chemistry curricula to make a more seamless connection with Earth Science. I will continue in an email sent to the address below. Thank your for your attention. ken
333	7	Teacher	Crowell Tom	the 3 course model is set-up, as currently written, to keep in place the status-quo model of science used in 9-12(bio, chem, physics). what will take place is that the teachers of bio, chem, and physics will "hit on" earth science topics, not covering them in detail. I don't disagree that advanced students could take courses designed to fulfill ngs requirements at a fast pace, allowing advanced science courses to be taken in grades 11 + 12. teachers who have dedicated their careers to teaching earth science classes are in a position that

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				they must create new classes and course materials. what should be given thought to is creating a physical science class as one of the courses with the other two being life/bio and earth.
334	7	Teacher	Brandon Linda	These expectations require a 106 page "How To" manual just for the Living Earth section. There are three sections totaling over 300 pages. Where are the moneys for materials, books, and lab supplies coming from? Where are the realistic classroom minute time allocation expectations?
335	7	Teacher	Lawless Andrea	This is in reference to the living earth course. I think instructional segments 4 and 5 need clarity. I see the purpose of trying to make connections but as a result both segments are heavily dominated by evolution. There is little clarity on the depth of coverage at the cellular level to organ systems. I would also like to see more vignettes that focus on making the clear connection of the earth science content, this is an area that most teachers will need support.
336	7	Teacher	Cheung James	If we do the three courses (Biology, Chemistry, and Physics), what'll happen to the Earth Science teachers? If we integrate Earth science with the Biology, Chemistry, and Physics, when are we going to have time to teach all these extra standards? Can you put Chemistry/Physics before Biology without running into a lot of problems with the math involved? Can you teach evolution thoroughly before teaching genetics? If we're ordering courses by student interest, isn't Biology generally the most interesting and accessible? [High School Three Course Model – The Living Earth] Lines 199-200 Great example of a simulation/lab about herding behavior. A PD full of these would be helpful. NGSS Biology will teach less concepts in more depth than the current standards, but until we see state testing breakdowns we can't be sure what to omit.
337	7	Other	Glimme Aida	Models are presented but there is confusion with how much flexibility do we actually have. NGSS models presented by Achieve seem to be favoring the fully integrated 3 course model while Ca Framework presents the Modified Science Domain model as the model of preferred choice. If that is not the case, the framework should include other models. We have general concerns with: Alignment of state graduation requirements (2 years) and requiring a 3-course model Credentialing problems with fully integrated science - we have teachers who would not be able to teach all courses and there would be a cost in getting them credentialed limits to elective sciences and AP courses - in our district most students taken numerous science electives and AP courses - this would limit their choice UC a-g approval for new courses Alignment of these courses to SAT subject tests, AP tests etc
338	7	Teacher	Ultican Thomas	This model is reasonable, however high school teachers would be better if top down standards were not imposed.
339	7	Teacher	Loeb Deborah	Disciplines overlap or change. Teachers could switch classes to teach their specialities. MS models do not agree with HS, eg, teaching genetics before evolution (optimal, 6th grade).

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340	7	Teacher	Bennett Michelle	Review of The Living Earth only. -Summary Table - Segment order does not match diagram nor the contents of the rest of the document. -In the high school model, evolution is taught before DNA, mutation, genetics, etc. In middle school, genetics is taught prior to evolution, which seems like a more natural progression. It would be difficult to talk about basic principles of evolution (gene shuffling, genetic drift, mutation, etc.) without a background in DNA and genetics. -Why is segment 6 placed after cells? This unit seems to fit with segment 1. -This is what we feel would be an ideal order... 1. segment 1 2. segment 6 3. segment 2 4. segment 5 5. segment 4 6. segment 3
341	7	Other	Rege Dawn	Overall comment: Please re-define acronyms at the beginning of each chapter. (e.g. DCI, PE). 4, 70: potential "storyline" seems to weaken the strength of the narrative. This is not a story. Instead, use narrative. Science is not a "story." 8, 120: "Forecasts" should be "forecast" 4, 77: "It begins with a tangible example of combustion and food calorimetry, and indeed the combustion of fossil fuels and release of heat, carbon dioxide, and water is a fundamental thread that ties together most of the sections of the course and ensures that chemistry concepts are able to be placed in the context of Earth's systems." Why climate change with food calorimetry? Seems a bit out there and advanced problem and a deep way to start off the course. This is something that is usually done later in the academic year (beginning of Spring in a traditional chemistry course). Usually with a formal discussion of energy. 17, 213: The Zeroth Law of Thermodynamics states that two systems that are in thermodynamic equilibrium have the same temperature and will not exchange heat with each other. This law is not normally discussed within a chemistry course. Description of law doesn't coincide with resources visited. 13, 191: Legitimate safety concern with calorimetry lab and cooking oil in the aluminum can. Could have an oil fire. Please remove oil as an option. Line 1710: States: "Figure 12. Comparison between the color spectra of six different." This sentence is incomplete as is. Add "elements" at the end. 43, 570: "... are MORE able to reproduce". Not all organisms that meet their survival needs can and will reproduce. 45: It is great to see that phylogeny and scientific names have returned to the standards along with the tree of life overall: comment on evolution - it seems like much of the evidence for common ancestry may rely on a previous introduction of DNA and heredity. pg 45 line 610 - 611 pg 46 line 618
342	7	Teacher	Crowell Tom	the high school four course model still allows for physics. physics/chemistry are placed in the physical science portion of ngs. ngs is not going to be the problem, the problem will be to have graduation requirements changed at the state and then local level to 3 years. ngs is going to be developed at site/district levels to maintain status-quo course sequences and minimize any reform.
343	7	Teacher	Brandon Linda	These expectations require a 100 page "How To" manual just for the first of four sections. There are over 400 pages in the High School Four Course Model's instruction booklet. Where are the moneys for materials,

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				books, and lab supplies coming from? Where are the realistic classroom minute time allocation expectations?
344	7	Teacher	Cheung James	[High School Four Course Model – Life Science/ Biology] Line 1715 Great concept map.
345	7	Teacher	Glimme Aida	The framework offers this as a model, however we do not see how this is feasible so why offer it. While there are some benefits we are concerned with: Requiring 4 years of science while the state graduation requirement is 2 Administering the assessment at the end of 11th grade. If the assessment is planned for 12th grade, we would be getting results after kids graduate making them meaningless. This is not an integrated model which seems to be in direct conflict with the vision of the framework and NGSS. This model would be very limiting to science electives and AP courses and would have significant financial impact on districts (facilities, increased number of students taking science and teaching staff.) This requirement would have significant impact on other elective programs which is contradictory to the ESSA which puts a heavier emphasis on VAPA and CTE.
346	7	Teacher	Ultican Thomas	The four science model is often achieved by forcing out fine arts. Again, school districts would be better institutions with less interference often provided by people who have not been in front of a classroom or if they have it has been a decade or more.
347	7	Teacher	Kroeger Ryan	The standards for radioactivity have been included within the physics course (line 529). This is an ADDITION of content that has not been previously taught in physics. This means that within a year of chemistry the students will be covering the content in 7 standards, and within a year of physics, students will be covering the content in 17 standards. This is terribly balanced.
348	7	Teacher	Marrs Barbara	Below are constructive comments and recommendations. Acknowledgement of the many positive Framework points is posted in #19 – Overall Comments. 1st, the Framework’s DCIs are based on the National NGSS, that “all organisms are related by evolution and that evolutionary processes have led to the tremendous diversity of the biosphere.” Also, page 58, lines 880-890 state: “[the quote] ‘Nothing in Biology makes sense except in the light of evolution’. Keeping this in mind as the following instructional segments are discussed, ties should be made to how evolution shaped life on Earth. Aspects of evolution should have been integrated into the previous instructional segments (1-9).” The CA Framework does not reflect this overarching theme of evolution, and does not clearly show how to incorporate it into the segments prior to #10. Evolution is the primary process that connects ALL the segments, and this must be reflected throughout the entire course. 2nd, many of the instructional models suggested are neither practical nor achievable for our public high school students who are at very low-learning levels, and, contrary to what the framework states, come to us with little or no former middle school science knowledge and skills. Many models involve

**Please note that survey responses have been populated directly from submissions and have not been edited.*

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				<p>technology we do not have and/or require expensive lab supplies for which we have NO funds (Lines 169-170, 162, 197-198, 259, 262-263, 442-445). What is needed for most of us CA public high school science teachers are practical instructional examples we can use with our current students and current supplies. 3rd, there are no Model Snapshots provided for Instructional Segments 1-6. 4th, Instructional segments 1 (103-222) & 2 (224-302) should flow from evolution of carbon compounds to cells to multicellular organisms (HS-LS1-1), to the growth and reproduction of multicellular organisms (HS-LS1-4 & HS-LS3-1), and to the function and maintenance of multicellular organisms (HS-LS2-1 & HS-LS1-3). 5th, Instructional Segment 2 page 17, Line 225, includes both HS-LS1-4 and HS-LS3-1. But, the Background and Instructional suggestions only cover mitosis and HS-LS1-4. Nothing is mentioned about meiosis and HS-LS3-1. And, HS-LS3-1 is missing from the Instructional Segment 2 block on Table 1 (page 5, line 83). It should be added after HS-LS1-4, eliminating Instructional Segment 8 (Pages 46-51).</p>
349	7	Other	Martin Jonathan	<p>I think that teaching concepts is a good idea but my concerns are with higher level science courses that will give California students an advantage at a college level gets impacted with this model. I also have some concerns about the amount of material and depth that you would get in each subject.</p>
350	7	Other	Keller Sarah	<p>The three course model appears to be the smoothest transition from our current curriculum. It allows for the flexibility of sequencing, but also acknowledges that modern biology is heavily influenced by chemistry. Where do students have time for AP courses within this model? Is there enough of any particular subject to prepare students for college-level science courses?</p>
351	7	Other	Puraci Sebastian	<p>While this model makes sense on paper; students will benefit of a cross-curricular approach to learning, it would appear as though this model would limit the ability of students to take AP courses. As a former AP student, I would be furious if my educational decisions would be limited to non-advanced coursework. If this model were to address the need for the top-end students to take AP coursework, it would be an improvement. A model that allows students the last 2 years of high school to pick any upper level science class would be best because the flexibility would allow students to focus on what they find interesting and best suite for themselves. Having an integrated model for middle to 9th-10th grade science works because this allows students to discover what field of science they find most interesting. However, not all students can handle 3 years of science, and so they should be given flexibility to decide. If you were a college admissions counselor, would you admit a student who had 3 years of integrated science and 1 year of an AP science, or a student who took biology, chemistry, and at least 2 AP science courses? I personally would select the student who challenged themselves more with the AP coursework. As long as the three year model does not address the needs of higher level students who are college bound, this model needs work. Beyond the theoretical needs of students to be able to connect the sciences, and to think more critically and</p>

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				scientifically, this model is fine....if it were moved down one year into middle school, allowing one extra year in high school for students to take advanced courses.
352	7	Teacher	Nyhoff John	How does AP courses and other upper level courses work in conjunction with the three course model? I like the transition from teaching topics to the NGSS teaching of concepts. However, the guidance offered is very vague. One teacher could teach a concept one way and another teacher teaching the same course could teach the concept a totally different way. Then the concept could be tested in a different from how either teacher presented the concept. I think that students will have a hard time with this.
353	7	Teacher	Stover Michelle	This model seems to provide more in depth of the subject I teach which is chemistry. I do like the way it relates to the real world and how students can see that chemistry is related to the other science courses. I am concerned that the students who are geared towards AP Chemistry may not have enough basic knowledge to away with. College readiness is also a concern. I would like to know how my students can best benefit from it. The main concern I have is how will this benefit my students and how I can help them better.
354	7	Teacher	Rooney Shannon	This is an interesting model that provides some specific details about subject specific material while still allowing for integration of subjects. I find this model effective and the course description gives detailed examples. This allowed me to fully grasp what was being asked of both the teacher and the student. I also feel that this model allows teachers to stay in their preferred subjects a larger percentage of the time. Since most high school teachers have subject specific educations this model seems to be more effective. The Chemistry in the Earth System course guideline was specific, however I am concerned that there is too much material to teach an in depth course around. The Ocean Acidification unit covers the dynamics of reactions. This includes the entirety of a current second semester Chemsitry course. Perhaps combining Segments 1 and 5 (both heavy in combustion reactions) would allow for more time in this section. To fully understand the Chemistry concepts involved, students will need to study more than one chemical system. The ocean environment allows for many reactions to be studied with considerable subject integration. However, to achieve the goal of in depth problem solving and revision, this section of the course should be allocated a larger portion of time.
355	7	Teacher	LaBonte Jenna	For the Chemistry Model in the 3 Course Model, lines 34-35 discuss the fact that teachers who are not confident in a subject area will not teach effectively, this seems to be an argument for not integrating multiple science subjects together, because the teachers will ultimately be teaching out of their comfort zone and therefore not be effective. This sounds like it will do more harm than good, and it is interesting to note that this fact was not mentioned in the other models that were discussed. I am also uncomfortable with the fact that likes 39-44 are basically justifying the fact that it is okay for a teacher to walk into a classroom without a solid understanding of the material that they are expecting their students to learn.This paragraph

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				<p>does not entice me to the NGSS, it scares me for what teaching science will turn into, and it sounds like a "blind leading the blind" type of scenario. For lines 51-53, I do like the fact that it appears that you are trying to give districts options and flexibility for sequencing, and there has been an effort to create multiple ways of approaching teaching science. I also appreciate the attempt to connect the subject matter to relevant concerns and issues that our society is facing, while also making an effort to interest the students with the various course offerings. However, as a Chemistry teacher, the the subjects you are asking them to understand by the end of this course are extremely difficult, and the one chemistry description could take more than one year to teach in the way that it is being described. For example, lines 91-93 discuss applying equilibrium, which is an extremely hard concept to grasp for a high school student, and in my experience, even college students! My other concern is the availability and access to the AP curriculum with these models. When do students take AP? What about the students who want take multiple AP science classes? They won't have the time with these models as they are suggested!</p>
356	7	Teacher	Rooney Robert	<p>The general format of the Living Earth course felt like a Biology course with a smattering of Earth Science topics. The Chemistry of the Earth System felt more like an Earth Science course with a lot of Chemistry. The Physics in the Universe course seemed far more focused on Earth and Space Science, and used Physics as a tool for understanding. Of the three models provided, I did feel that this model best aligned with our current instructional program, but I have concerns about the lack of opportunity for students to take AP science. Presently, many of our students take Biology and Chemistry in their 9th and 10th grade year, then take two (or more) years of AP science in their Junior and Senior years. I am concerned that a rigid adherence to a three (or four) course model will deny our students the opportunity to delve deeply into our AP program. It is important to note that our school has an open enrollment policy for our AP program, and that nearly 50% of our graduates take one or more years of AP Science.</p>
357	7	Other	Pitts Patricia	<p>I like the three course model and the ways in which the courses are integrated. However, I have some concerns on how an AP program fits within this model. Especially since most universities expect applicants to have had at least 2 years of AP course work in science. I would feel better with a two year model, with students having the opportunity to take two AP courses in their Junior and Senior years. I also have some concerns about the level of some of the material and the ability levels of some students, especially special ed students, as our school uses an inclusion model. I believe that some of the physics materials are very high level, and are great for preparing the upper level student for future course work; however, this model would be very difficult for those lower level students.</p>
358	7	Teacher	Hoyt Brian	<p>Interesting concept. Sequencing appears similar to current courses.</p>

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359	7	Teacher	Martin Jonathan	Does this model support AP programs and if so how are freshman students with lower level math skills succeeding in high level college prep classes (as college board has said no real prerequisite for AP courses are needed, ie. a freshman in AP biology or AP chemistry)?
360	7	Teacher	Keller Sarah	The four course model allows us to maintain our current traditional path. The term "star stuff" lacks academic integrity and language. What happened to astronomy?
361	7	Teacher	Nyhoff John	I would like to see how upper level courses (AP for example) would fit into the four course model. There is an opportunity for science departments to better themselves by offering flexibility in their instruction from year to year by including upper level classes. Bringing the lower performing student up is great, and should be done, but the upper student needs to continue on a rigorous pathway also. If this does not happen then the department as a whole will be lessened. I would like to see some examples of possible schedules for students who are struggling and for those who are more advanced.
362	7	Teacher	Stover Michelle	This model will definitely water down subject-specific courses and may not give all types of students the background they need to take higher level courses such as AP courses in science.
363	7	Curriculum Specialist	Rooney Shannon	This model limits student choice in their high school years. I am assuming that students would be allowed to take an AP level course in place of a specific course in this sequence. I feel that the cost of requiring four years of science education for all of our students would be prohibitive for many districts. If the funds are provided by the state to purchase equipment, facilities and staff, this is perhaps a viable model for some districts. However, this model does not allow students the freedom to choose their area of interest in the sciences.
364	7	Teacher	LaBonte Jenna	Because this is a four course model, does this mean that students will not have access to other courses like anatomy and physiology, environmental science, oceanography, astronomy, or the AP sciences? or is each course supposed to be taught as a semester rather than a year?
365	7	Teacher	Rooney Robert	Generally, this model covers content in the most traditional way, but four years seems like a lot of time to cover the listed Performance Expectations. Even though each course is presented in detail, with illustrative examples, it seems to be a "straw man" proposal in the sense of very few districts have (or are likely to adopt) a four year science graduation requirement. Also, if the model is stretched to four years, by definition, one fourth of the material will not be covered before the assessment in the Junior year.
366	7	Teacher	Pitts Patricia	Of the two models, I like this one best, as it appears to provide the most in-depth curriculum. However, as mentioned in item 10, I have concerns on how AP courses fit within these models, and the reasons that those have not been mentioned within these frameworks.

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367	7	Teacher	Hoyt Brian	If students test before their fourth year of high school they may not have the content expected during the four course model. How will AP courses fit into the students schedule to provide high achieving students an opportunity for advanced courses?
368	7	District Administrator	LeBarron David	Chemistry teachers suggest moving plate tectonics out of the Chemistry course. Physics teachers see a better fit in the Physics course. Chemistry teachers feel that teaching plate tectonics during the heat unit is a stretch. Chemistry teachers expressed concern with the sequencing of topics in the 3-year model – topics like calorimetry early in the year require math that students may not be ready for. In general, the sequencing of topics in the 3-course model Chemistry seems very disjointed. There is confusion about the credentialing chart for Integrated Science; It suggests that teaching science is a “free for all” and that all science teachers are eligible to teach all branches of science, regardless of credential. Please clarify. It seems that by adopting a 3-course model and integrating earth science, teachers would be encouraged (required!) to really change their teaching to meet NGSS practices. The design of the Biology course integrates the best with Earth Science. Physics integration works, although is not ideal. Chemistry teachers are struggling with integration of topics, particularly plate tectonics. Teachers are generally concerned about the apparent lower rigor in the 3-course model (fewer math-related topics in chemistry and physics, less cell and molecular biology in life science). In addition, teachers are concerned about whether the 3-course model courses are truly college prep and will meet UC Regents admission standards.
369	7	District Administrator	Janzen Jennifer	Would like acronyms to be written out for first draft. Difficult for teachers to understand, helps make it easier to read - lower cognitive load Chapter 7: Grades Nine Through Twelve - What would you title the courses in transcripts? Would it still be
370	7	Teacher	Just Shana	While the 3-course model is fine as one option, it is not truly an integrated model. The NGSS left open multiple possible ways to arrange the content. In this framework, you seem to have limited the options for Districts to only two possibilities. The 3-course model does not fit within the AP/IB course structure. A 3-course model choice would necessitate a separate "track" for advanced students. Advanced students would take AP/IB and others would have the 3-course model. In addition, since only two years of HS science are required, many students would not actually take all 3 courses. Perhaps my biggest concern is that the writers of the NGSS purposefully were elevating the Earth Sciences as equal to that of the Life and Physical Sciences. The 3-course model undoes this work. Intentionally or not, this model implies that Earth Science is not worthy of its own course, whereas Chemistry and Physics, which were grouped together for the NGSS under Physical Science, each get their own separate course, even though the content assessed under each doesn't take a full year course. Teachers who are time-crunched trying to teach Biology, Chemistry and Physics courses will be tempted to skip the Earth Science portion altogether. For example, in this model, you

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				are asking teachers to teach all of the Biology content plus 1/3 of the Earth Science content in one year. Accomplishing this while maintaining the integrity of the inquiry nature of the NGSS will be difficult.
371	7	Curriculum Specialist	Brydon Barbara	The big picture at the beginning is useful.
372	7	District Administrator	LeBarron David	The 4-course model appears to have more rigor than the 3-course model. In integrating Earth Science, it takes away from some of the specialized content that makes each course unique and interesting. Teachers are concerned that science electives, and possibly career pathway courses, will be difficult to place using a 4-course model. When will students have the opportunity to take these specialized courses? How can a 4-course model truly prepare a student for a standardized NGSS exam in their third year of high school? It is understood that 4-course does not mean 4 year, but courses that are shortened (or even integrated as the 3-course model proposes) will be lighter, perhaps on content and practice, than a traditional full year science course. Teachers are generally concerned about how 4-course model courses will align to UC Regents admission standards.
373	7	District Administrator	Janzen Jennifer	4 Course model looks traditional - Storylines seemed slapped together - Bio Started with LS-1, but not the most logical - Sequencing has rationale for ESS, but did not need to be taught that way Vignettes: - Weaved through the document and gave a p
374	7	Teacher	Conn Michael	1) If there is not specific mention of a requirement that hands on lab activities be done, there will be few if any resources allocated to doing labs. 2) Can you have a book of sample lab activities or even a list of sample labs appended so administrators know that hands on (as well as virtual) activities are needed, and funds for them need to be found. 3) Can you have one of the performance tasks contain at least 1 question about how to use laboratory equipment in an experimental, laboratory setting (like on the AP exams) ?
375	7	Teacher		Standards seem very vague.
376	7	Other	Stillittano Marissa	Intro: overall, really appreciate the level of detail within each course map. (intro) 4/105-180 really appreciate having guiding questions to consider as districts have discussions about how to create courses and pathways. (intro) 7/182-191 If a teacher has a "science: geoscience" credential, can this teacher teach the courses in the 3yr model with earth science embed throughout biology, chemistry, and physics? For example, if the class is called biology, can the geoscience credentialed teacher teach the course since earth science is embedded? whole document: 106 pages that are mostly text are overwhelming. Can it be more concise? Vignettes as a sidebar? 11/73-76 We like knowing what middle school students have already learned. whole document: The level of detail for a teacher who says "just tell me what to do" is appreciated. It's a good starting point. Suggestion regarding vignettes: have more examples, but present them as summaries with links to the full sequence. This may smooth out the reading while also providing specific

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				teaching exemplars. We like the storyline and the teaching level. Can some of the exemplars/5E models be shorter? These don't always HAVE to be multiple days to be effective 5E lessons. 1615 onward: There is a lot of detail in the background section. Who is the intended audience? Is this more for textbook developers? Administrators? Is this a suggestion for professional development? Chemistry: 2/10-26 really like that they infuse higher level earth phenomena that usually is not taught until college 2/34-38 This is a concern for integrating content. I appreciated that the comment was in the framework because it will bring attention to the district that professional development is required. This will help to advocate for the teachers that training is a must have! The additional comments will be e-mailed since they will not fit in this box.
377	7	Curriculum Specialist	Henderson Kenelee	It would be helpful if that within the narrative in the introduction to the model there was a graphic showing the ESS PE's distributed in the three courses. Examples of incorporating the Earth Science into the biology, chemistry, and physics is well done. Biology: The examples within the "model" curriculum outline is very good. In the chemistry section lines 724-731 do a good job of connecting the story lines for segments; the vignettes are good with helpful graphics; like the idea that the implementation strategy serves as a starting point; like the connections to common core and crosscutting concepts. Chemistry concern revolves around a lack of credentialed chemistry and physics teachers if the three course model is chosen by our district. We are also concerned about our Earth Science colleagues that do not have additional authorizations on their credentials.
378	7	Other	Duong Annie	Lack explicit instructional strategies and connections to literacy instruction to scaffold for ELs and special needs students.
379	7	Teacher	Paymer Silja	It seems like there is too much in the physics course. With that much content, it would be challenging to get the depth desired in the NGSS goals. It seems like nuclear reactions should be at least introduced in Chemistry along with electromagnetic spectrum being combined with electron configurations. While physics re-addresses the spectrum with waves, it helps if students know where the spectrum comes from from the chemistry perspective. I am not saying this from the set in my ways physics teacher, I am saying this as a Physics and Chem teacher thinking about coherent instructional sequence.
380	7	Other	Barnett Teresa	Less of focus on content – need more on how to put it together. HS teachers generally have strong content knowledge, but will benefit from clarity about how to make this shift in teaching practice. As with the other grade specific sections, the high school sections should be more focused on how to engage students in the NGSS practices, how to use the cross cutting concepts as lenses for exploring phenomena. More clear examples of this -- what it looks like in a classroom, what STUDENTS are doing and saying (not just what teachers are doing and saying).

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381	7	Curriculum Specialist	Sussman Art	Integrating Life: Line 356: Table 1 should be attributed to: From Dr. Art Sussman, courtesy of WestEd. Line 1696: Sussman (not Sussmann) Line 1722: attribution should be Figure by Dr. Art Sussman, courtesy of WestEd. Line 1821-1822: Citation should be: PBS LearningMedia. 2015. Carbon Dioxide and the Carbon Cycle. Arlington, VA. http://www.pbslearningmedia.org/resource/pcep14.sci.ess.co2cycle/carbon-dioxide-carbon-cycle/ Integrating Chemistry: Line 804-805: attribution should be: Figure by Dr. Art Sussman, courtesy of WestEd. Line 970: attribution should be: Figure by Dr. Art Sussman, courtesy of WestEd. Integrating Physics: Line 1702: add the word "stars"
382	7	Teacher	McCluan Jennifer	The Living Earth and Chemistry of Earth segments are strongly written with cohesive storylines. The SEPs and CCCs are clearly articulated with clear examples. The vignettes are excellent, and give teachers a clear sense of what NGSS and 3D learning would look like in the classroom. If any additional vignettes could be included, that would be very helpful. The same strengths cannot be said of the Physics in the Universe chapter, particularly the articulation of the SEPs and CCCs.
383	7	Other	Markus Doron	50 "This is a good way to put life science standards in the context of an Earth science problem..." This segment is positioned at the end of the year as an application of life science DCIs in the context of more sophisticated problems and positioned within earth science standards. Presumes that this course comes before a physical science course. 85-87 "Density independent factors often relate to interactions with other earth systems, such as weather pattern changes or catastrophic events, like hurricanes, floods, earthquakes, and volcanoes." 94 "EPCs II and IV" Define EPCs in this segment 110-116 Simulations can demonstrate the effect of resource availability on populations. Graphs from simulations or activities can be used to help illustrate different population growth patterns, such as exponential or logistic growth, and allow students to estimate carrying capacity. This entire section needs reworking. Is the focus on simulations or graphs? What trends are we looking for? Why is "N" mentioned without explanation or definition? 151 "Students can develop models on paper, with technology, or use organic chemistry molecule kits to show how simple inorganic molecules are made into larger organic molecules, and how they cycle back to simple inorganic molecules. Grammar 175-198 I disagree with the focus of organized, group behavior on altruism. Altruism is an acceptable example, but there is far too much emphasis in the storyline on that one example. 271- 286 I question the necessity of having a discussion of carbon atoms and covalent bonds (bonding in general), or creating structural models of glucose from carbon dioxide and water. 694-695 Discussing the scientists themselves science is a human endeavor. Sentence fragment- not entirely sure what the author is trying to say here. 744-745 Again, helping them make predictions of the effect of mutations. Sentence fragment and awkward sentence

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384	7	Teacher	Van Dordrecht Anna	In working with teacher leaders, all were overwhelmed by this model. The sequence and examples are well laid out, but combining earth science into the other three subjects seems cumbersome. Concerns were also brought up that this doesn't do justice to earth science and thereby doesn't reflect the bold move made in the national NGSS to highlight earth science so prominently. Could this be addressed in the introduction with explanation given for how to fully honor earth science content within the other disciplines?
385	7	Teacher	Smith Mandy	Same general concerns as the 4 course. The continuity between disciplines is lacking and will be confusing for teachers. In some of them the Instructional Segments have the same DCIs and PEs, but different SEPs and CCCs, for example: Physics - Instructional Segments 1, 2, 3, 5 are the same DCIs and PEs as the 4 course however they have listed different Science and Engineering Principles, Cross Cutting Concepts and DCI Summaries. I think these need to be consistent.
386	7	Curriculum Specialist	Henderson Kenelee	All courses: The Summary of DCIs is good; the start of each segment with the guiding questions, SEPs, CCs, prior to the explanation of the instructional story line is very helpful in keeping the 3D perspective focused and up front. Example instructional scenarios and graphics are very helpful. Lab suggestions are useful. Physics: It would be helpful if there were more examples and diagrams of what is meant by computational modeling. Chemistry: Like the inclusion of classic experiments and timing for instructional segments makes sense. Do have a concern regarding alignment with expectations of UCs; because of past practice, it is difficult for High School teachers to trust or depend on the lower grades to have provided the type of instruction for lower grades to have mastered underlying concepts.
387	7	District Administrator	Duong Annie	Lack explicit instructional strategies and connections to literacy instruction to scaffold for ELs and special needs students.
388	7	Curriculum Specialist	Sussman Art	Earth and Space Science Line 212: attribution should be: Figure by Dr. Art Sussman, courtesy of WestEd. Line 241: Table 1 should be attributed to: Table by Dr. Art Sussman, courtesy of WestEd. Line 310-311: attribution should be: Figure by Dr. Art Sussman, courtesy of WestEd. Line 478: attribution should be: Figure by Dr. Art Sussman, courtesy of WestEd. Line 1908-1909: Citation should be: PBS LearningMedia. 2015. Carbon Dioxide and the Carbon Cycle. Arlington, VA. http://www.pbslearningmedia.org/resource/pcep14.sci.ess.co2cycle/carbon-dioxide-carbon-cycle/
389	7	Curriculum Specialist	Pedersen Sharon	Many high schools offer courses in environmental science, marine science, agricultural sciences and human anatomy and physiology, there should be some discussion as to how these courses can fit into the frameworks.
390	7	Teacher	Van Dordrecht Anna	The model is very clear. However, both the three and four year models do not address the discrepancy that the state has not increased the high school science requirement beyond two years. Districts are free to increase their own requirements, but it leads to issues with funding as well as having the space and teachers

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				necessary. This leaves teachers feeling discouraged and that they are being set up to fail. Is it possible to address this discrepancy in the introduction? It could go a long way to simply acknowledge that there is an issue that needs to be resolved.
391	7	Teacher	Minassian Zovig	Life Science/Biology: Line 84 - Instructional segment 10/11/12: Natural Selection: The Highlighted DCI should probably include "Stability and Change." In Instructional Segment 11: The Summary of DCI only focuses on Darwin's contribution to the theory of evolution. Shouldn't other scientists, especially more current ones, be included in addition to Darwin?
392	7	Curriculum Specialist	Aust Andrea	For Physics, KQED has a collection of media resources that would enhance the vignette on page 48. This could be added around line 831: "Mr. H presents a video (http://ww2.kqed.org/quest/2014/11/20/darfur-stoves-project/) of a similar real-world design challenge that a UC Berkeley engineering physicist and mechanical engineer faced. They were tasked with designing a more efficient wood-burning cookstove for families in Darfur. Students watched the video and read more about the story in the related e-book (http://learning.kqed.org/ebook/cookstoves). Students took notes on the engineering design process, including the criteria and constraints of the project, the different iterations of the cookstove's design and the final design solution. They referenced their notes and applied the ideas as they were completing the Solar Cooker Engineering Challenge." The end of the video mentioned above, "Darfur Stoves Project," discusses how approx. 4 million people die every year from diseases related to smoke inhalation from cooking fires. The challenge proposed in this vignette could focus on the need for a clean-burning solar stove in order to reduce these deaths. The entire "Engineering Is Saving the World with Cookstoves" media collection can be found at http://ww2.kqed.org/quest/collections/engineering-is-cookstoves/
393	7	Teacher	Smith Mandy	Biology - Their segments are straight from NGSS DCIs, they did not group anything. They added specific examples NOT originally in the DCI in the DCI Summary. I do not think these belong here and should be listed later in the Instructional Segment overview. Chemistry - There are 3 PEs that are repeated in Physics HS-PS3-5, HS-PS3-4, HS-PS-3-3. They list DCI content that is aligned to PEs that they do not have listed - biggest example is HS-PS3-2. They also list PEs and then not all attached DCIs. They have ESS DCIs listed in Segment 5. They list Electrical 'stuff' DCIs in Segment 2 DCI Summary, but then list the PEs in Segment 3 (but do not summarize the DCIs here). The whole addition of these DCIs is interesting as well - not sure they really want them here, they just want something like it. Physics - This one was done the best in my opinion and I would like to see the others done more like Physics. No issues other than the 3 PEs that are repeated in Chemistry HS-PS3-5, HS-PS3-4, HS-PS-3-3. ESS - The DCI summaries are extremely short. They also list DCI highlighted that are not aligned to the PEs and then do not list the DCIs that are aligned to the PEs. Example: Instructional Segment 1: HS-ESS2-6 and HS-ESS2-7 are only aligned to DCIs in the ESS2.D: Weather and

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				Climate and ESS2.E: Biogeology DCIs and only the ESS2.E DCI is listed. The other DCIs listed ESS2.A and ESS3.A are not aligned with the PEs listed. I feel that these Instructional Segments were created around pre existing units of study and not the standards themselves, because of this they repeat PEs in Instructional Segments. Specifically with PEs HS-ESS 3-1 (repeated in 4 segments) and HS-ESS 3-5 (repeated in 3 segments) they need to be aligned with at most 2 Instructional Segments, or clarify which part of the PE is to be taught in each segment.
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Chapter 8: Assessment of Student Learning

Comments (394-418)

#	Ch.	Title	Reviewer	Comments
394	8	Teacher	Galvan Bernedette	Assessment needs to encompass both written and hands on skills of each student. We cannot just have A students that do not know how to imagine and create and work in a team.
395	8	Teacher	Durant Jayne	Once again it all looks good on paper, but becomes impossible to carry out due to the high number of students within each class. As a teacher I would have to be spending all of my waking time creating and grading these kind of assessments and would have very little time for teaching let alone taking care of my own family. There are a multitude of needs withing the classroom. Students with IEP's, 504's,
396	8	Teacher	Trammell Rozalia	Districts are bent on doing common assessments that follow a strict testing time frame. This will also force the teachers to follow (basically) scripted teaching so that all the students are in the same place at the same time. This is what we are currently doing and is very restrictive and very limiting. It does not allow for creative ways to bring the concepts to life for the students.
397	8	Teacher	Munsell Mary	I really don't like having all students tested on the physics standards. Not all students take physics, nor should they have to. I bet the politicians love it though.
398	8	Teacher	Nickel Loren	The examples of assessments and hands-on learning opportunities were varied and I will be using some of them in my classroom.
399	8	Teacher	Kato Mark	ASSESSMENT CHAPTER Line 109. Examples of assessments. What about daily or weekly "openers"? What about daily or weekly quizzes? These are more "traditional" methods that are still effective in the classroom. Line 292. A KWL chart is shown but it would be helpful if you provide an example of a filled-out KWL chart. Line 535-537 "Using the Human Scatterplots technique, the teacher quickly sees that students differ in their predictions and confidence in their answer." Please briefly explain the Human Scatterplots technique. Line 577-580 "Using the Sticky Bars strategy to anonymously display students' ideas, the teacher and the class

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				<p>could instantly see that most students believed the phases of the moon were caused by the shadow of the Earth on the moon.” What is the Sticky Bars strategy? Line 1113-1114. Indentation error? Line 1170-1171. Link does not work. Line 1215-1216 “Student understanding of the disciplinary core ideas, scientific and engineering practices, and crosscutting concepts defined in the CA NGSS cannot be captured in a simple set of multiple-choice questions.” The word “cannot” is too strong. Although this statement is later qualified, introducing this section with that sentence is misleading. Some multiple-choice questions are thought-provoking and challenging. Perhaps this sentence is not even necessary. It is an opinion. Line 1225-1226 “The information would be presented in a series of tabs that the student would click on.” Sentences should not end in a preposition. Line 1291. Although holistic and analytical rubrics are explained, please provide an example of a holistic rubric and an analytical rubric. What are the categories of assessment in each rubric type? Line 1576. The instructions are to use an Apple iPod to collect data. Are there iPods still? Perhaps an iPad or iPhone are more current tools. What about Android devices? Line 1598. Are there student examples of the Mars habitat lab? I would like to see pictures of student work.</p>
400	8	Teacher	Sohn Thomas	<p>Line 8: Redefine three-dimensional learning. Line 41: I do not believe that the assessments give the policy makers a true picture of the effectiveness of the policy. If there is a breakdown in either the teachers or students then the policy, is not being reflected accurately. Line 55-56: Why no mention of Diagnostic Assessments? Line 55-56: Why the mention of Short Cycle twice? Seems redundant. Line 94-102: Indicates that the only summative assessment is the state test. Line 118-119: Does state provide for the cost of technology? Line 294: It states that KWL charts can be used at any grade level but it is continually referenced for K-2nd Grade (Line 286 and 298). I understand that this is an example but it is slightly confusing. Line 312: Sentence structure error ... where have students two to five... Line 357: It says Figure 4 but the actual figure is labeled as Figure 6 Line 417-419: By your own definition, why is diagnostic assessment part of formal assessment? Assessment becomes formative only when either the teacher or the student uses that information to inform teaching and/or to influence learning (NRC 2014; Shepard 2005; Wiliam 2007). Figure 6: Key Strategies and Example Techniques... - The whiteboard provides another example of the confusion between diagnostic assessment and formative assessment. Line 836-841: Why the use of different terms? Instead of summative as mentioned earlier, it is referred to as post-assessment. Pre-assessment is used instead of diagnostic assessment.</p>

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401	8	Teacher	Vo Khanh	<p>Assessment Chapter Lines 5-17 The phrase "three-dimensional" seems to be redundant. It would be helpful to provide concrete examples. Lines 55-62 It is helpful that short cycle, medium cycle, and long cycle is defined. Since three dimensional assessments are stressed, it would be helpful to provide a concrete example of what this assessment would look like in a short cycle, medium cycle, and long cycle here. Lines 160-197 It was helpful to have figures to reference as concrete examples of sample student responses. Perhaps, we could have extra samples illustrating different levels of student work ranging from high to low achieving. General Statement about Formative Assessments - The detailed breakdown of giving formative assessments was helpful. It would be helpful to include suggestions for reteaching concepts with these examples for the students who are struggling to understand the material. Perhaps it would be helpful to include this information in the assessment-centered teaching (ACT) portion of the text around line 715. Lines 742-761 When referencing quality tools for measuring student learning, is this the same thing as a rubric for measuring student progress on a standardized assessment? Lines 763-776 When referencing quality use, it may be clear to state it as data analysis of the quality tool or rubric. Lines 778-788 When using the phrase sound interpretation, this sounds like a process of self reflection by using the data collected from the assessment. General statement about refinement - Incorporating some new strategies should we use to reinforce the three dimensional aspect of our assessment. The strategies listed are strategies that are already in place. I anticipate that there will be struggles with the incorporation of the new parts of the assessment process using these strategies as they are the same ones already in place.</p>
402	8	Teacher	Goldfein Jenna	<p>It will be exciting to see what standardized tests for NGSS will look like. I can't wait.</p>
403	8	Teacher	O'Connor Dawn	<p>Relevant page/line number 96: Increase references to the three dimensionality in all assessments. 94-103: Remove references to end of course exams, since it will be impossible to test the entire range of DCIs, SEPs, and CCCs in a single administration. 99: Original Text "State standards"; Revised text "Performance Expectations"; Determine the language we will use to describe the new CA NGSS and consistently use that language throughout. Condense the document and provide a 5 page or less executive summary for use by administrators. 194: All examples should be 3-dimensional, not 1-D or 2-D and should also provide example scoring guides.</p>

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405	8	Teacher	Gettman David	Line 260, Table 4, Diagnostic/Formative Assessments Row, Examples of Strategies Column. The Individual Whiteboards strategy should be connected with Grades 9-12, and the Formative Assessment Probes connected with Grades 6-8. Otherwise the chapter is well written.
406	8	Teacher	Brandon Linda	These expectations require a 104 page "How To" manual. Where are the moneys for materials, books, and lab supplies coming from? Where are the realistic classroom minute time allocation expectations?
407	8	Teacher	Cheung James	Line 68 Great diagram about assessments. Lines 199-206 Great example of old tasks vs new tasks. Are classrooms going to get more technology if we're expecting high schools to perform more technology-oriented tasks? Is state testing going to be largely performance task-based, with little to no multiple choice? Is any testing going to be multiple choice? If not, can we as teachers move on from multiple choice testing to other types? If state testing will use electronics/programs, are teachers going to have access to help students practice using these items?
408	8	Teacher	Glimme Aida	The chapter seems to be written in a manner that is more understandable by a teacher. Examples of student work and actual assessments are beneficial.
409	8	Teacher	Ultican Thomas	Assessment should be the responsibility of teachers not the state.
410	8	Other	Rege Dawn	overall: good to see that assessments range from formative to anecdotal (during class time to see progress in student learning) to summative pg. 7, figure x.x -reference to short, medium, and long cycle was an interesting way of thinking about assessment -shows trajectory of assessment 251-260, table 4 -liked section that calls out examples of different kinds of formative assessment -criticism: should the document primarily cite Page Keeley? she's going to make a lot of money because it's a commercial product. Possible to use materials that are not associated with a specific author? there are other strong examples out there -maybe include ideas of how a teacher might create a probe in general sheds light on interdisciplinary assessments, how to assess three dimensions simultaneously very focused on performance assessment, good that assessments involve multiple modalities for various types of learners evidence centered design process is interesting, presented very clearly 175 - 187 volcano assessment example is confusing, not clear how these models are different -it should be more clear which student work sample is correct vs. incorrect -section is confusing in general -example only shows one component of the multiple component assessment suggestion: present with a rubric showing four levels of proficiency with the concept it would be nice to see examples or vignettes or snapshots of what some of the different assessment strategies look like in the classroom 578 examples such as sticky bar strategy should be hyperlinked to an explanation of what they are

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411	8	Teacher	Keller Sarah	The assessments to student learning are not defined. As an educator it is difficult to begin with the end in mind when there is no end to begin with. What will the assessment look like? How will I know? What if the first three years I'm teaching are not at all preparing students for the assessment and they fail?
412	8	Teacher	Rooney Robert	What the assessments will look like and how they will be graded has been an unanswered question during my four year involvement with the NGSS. It is concerning that little new information is forthcoming after this long.
413	8	Teacher	Hoyt Brian	There is no clear guidance for what is expected on student assessment. Example exams, tests, assessments would be great.
414	8	Teacher	Lee Kathy	Assessment looks more project based and applicable for 21st century learners.
415	8	District Administrator	Janzen Jennifer	Intro: Introduction is repetitive: We understand this might be necessary to reach all readers; however, perhaps another edit would allow this section to read more cohesively and coherently. Page 3 Line 7-12 - Great explanation of 3D learning. DON'T Delete! Page 4 Line 67 - Figure 1: Continuum Assessment Graphic...GREAT! Page 4 Line 78 - This type of assessment is intended to assist learning and is referred to as assessment for learning. - All assessments are intended to assist learning. In fact, this type of assessment is intended to evaluate instruction and the help the teacher pace, reteach or amend instruction in immediacy. Page 5 Line 55 - End-of-course tests are used... - There is a little confusion about the tenses. Sometimes "are used" is used and at other times "can be" or "should be." Page 5 Line 108 - This is a comment on the "expansion" of assessments: - Another way to look at the assessments in short term = as Individual assessment; for the medium cycle = is individual as well as collective students over concepts; and summative is = individual, and collective classwork, over concepts and units and the entire year's content. - The summative assessments should also reflect application: therefore the three levels of assessments should be viewed as following: understanding a concept; internalizing a topic and its related concepts; and then finally the ability to apply the knowledge and concepts. As the introduction is written, there is no change in the definitions of assessments and how they currently look. Page 8 Line 43-47 - The intent is to allow everyone within the educational system to make informed decisions regarding improved student learning, teacher development, instructional program modifications, and changes in policy [NP1] (Popham 2000). - How is this different from current assessment non-NGSS systems? IMPORTANT COMMENT/SUGGESTION Page 9 Line 132 - Performance expectations are statements about what students should know, be] able to do and understand by the end of each grade level. - Rephrase order: Performance expectations are statements about what students should know, understand, be able to do by the end of each grade level. For logical progression. Page 13 Line 220 - Evidence-centered design process: Awesome! IMPORTANT COMMENT/SUGGESTION Page 16 Line 237 - Evidence statements: Tying the evidence statement into the

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			<p>evidence design process. How can the evidence statements be used as part of the evidence based design process? A pathway to use these evidence statements beyond the information listed here. IMPORTANT COMMENT/SUGGESTION Page 17, Line 260: - Instead of giving specific strategies for specific grade levels, provide ALL the strategies and then demonstrate what the various levels would look like. “Here are some examples of strategies” and then stating what the strategies would look like in the lower levels and upper levels (ie. science notebooks) - When giving examples of strategies, they gave examples of strategies by grade span. However, the strategies are excellent strategies for all grade levels and the framework has limited themselves by doing that. The strategies that they have put, the framework had left out verbal assessments and other types of assessments. They have given a limited Page 17 Line 260 (Table): - Diagnostic assessments: add non verbal indicators, hand signaling, and partner talk. Summative assessments: None of the assessments provide the opportunity to define, design, create and present tasks. Page 17, Line 260 (Table 4) - Strategies: It is not a complete list. We can add so much more and it probably belongs in a separate document or appendix. Add a statement: suggestions made are not intended to limit. - Classroom assessments: on the right side of the table, they list examples of strategies (exit cards, KWL charts, notebookings). Be explicit: “assessment strategy” and not just strategy. Remove grade levels because there is no point in making it grade-level specific. Page 19 Line 292 - KWL Chart - Should be What I think I know Chart - This is actually mentioned in a later part of the document. “What I know” is dated and currently, it is recognized that since student prior knowledge may actually be erroneous, it is important to acknowledge that all prior knowledge may not necessarily be exact. There are numerous references to be found online from numerous organizations. Page 22 - Enjoyed the examples of the formative assessment probe. Liked the fact that they had “what is the bubbles” examples probe Page 24-25 Line 431 - Rather than checking all correct answers and putting a check next to incorrect ones, the teacher tells a student, “three of your answers are incorrect; find them and fix them.” - The problem with that is that the students have it wrong because they do not know that it is not right. A better way might be to work in tandem, compare their answers and see if they can come up with which ones are wrong. - And/or they can provide the opportunity to explain their answers (opportunity for discourse) Page 31 Line 553 - A Think, Pair, Share - Think, Ink, Pair, Share - Again this is dated. The strategy should be Think, Ink, Pair Share. Often students get distracted or side swiped as one person takes over the conversation of the other person has such an overwhelming forcefulness or idea that they forget their own point of conversation. Page 34 - Examples of formative assessments and 5E lesson sequence: It should be outlined with diagnostic and summative rather than trying to fit into one FA box. Page 59 - Spelling error: “Glaciers (PhET Interactice Simulations 2015)” should be “Glaciers (PhET Interactive Simulations 2015)” Page 69 Line 1356 - Role of teacher vs. Role of student: It’s</p>
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				<p>about the way you ask the questions. You can ask the same question a different way to give you more. GREAT!! IMPORTANT COMMENT/SUGGESTION Page 70 Line 1398 - Table 7: Teachers are going to need examples. Teachers will need specific examples of what each of these elements will look like in the classroom. Either a vignette or add on to the table. IMPORTANT COMMENT/SUGGESTION Page 75 - Computer information: Very impressed with how you plan. Very good example. NAEP (4th and 8th grade ELA and Math) gives the students the ability to experience, manipulate and investigate and think critically.</p>
416	8	Other	Osborne Jonathan	<p>Feedback on Chapter 8 of the California Science Framework Jonathan Osborne, Helen Quinn, Ray Pecheone, Jill Wertheim, Paolo Martin, Nicole Holthuis, Susan Schultz, Anne Ward Stanford Next Generation Science Assessment Project (SNAP) Graduate School of Education, Stanford University. As our work, funded by the S.D. Bechtel Jnr Foundation, is to develop exemplary tasks and models for assessment of the Next Generation Science Standards in California, we have read this chapter carefully and have a number of points we would wish to make about ways in which the chapter could be improved. First, we feel that the chapter is far too long and often reads more like a textbook on assessment. That is not the purpose of the California Framework which should not be a treatise on best practice. Rather the focus of the chapter should be on what it means to assess a science course that consists of the three dimensions of the NGSS – disciplinary core ideas, scientific practices and cross-cutting concepts. Far too often the text fails to make reference to the issue which lies at the core of the challenge of assessing the science laid out elsewhere in the framework. There is for instance, a lack of any exemplification about how assessment in three dimensions might be different from one dimension, such as: reflection on how scoring rubrics might be different, what it means to assess (or not assess) a cross-cutting concept, There is no discussion of the reasoning that might need to go into developing and scoring a three-dimensional assessment, and how related changes to assessment might impact teaching and learning. There are examples of NGSS-aligned tasks, but not a discussion of how these exemplify the three dimensions of these standards. Absent too is any discussion of some of the assessment formats shown and parts of NGSS that they might probe most effectively, such as formats that could be used to probe modeling, systems, planning investigations, evaluating information, etc. Moreover, there is little that relates any one of the forms of assessment to the 3 dimensional learning that is a feature of NGSS Second, the section on Formative assessment needs greater stress on using results of assessment to inform further teaching. The section does correctly define formative assessment initially but then offers many examples of informal and embedded assessments in that it fails to point out that the information from such assessments should be used to make decisions about what to teach next. Assessment is only formative when the information is used to make pedagogic decisions. This is the important feature and each example needs to make that clear. Third when looking at the specific example on Pg. 93, there is not enough</p>

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				<p>information here to follow what the students are doing and why. For instance, what questions are they trying to answer? What data are they collecting? And what does it have to do with Mars? Our feeling was that there must be more directions given to students but what these are need to be made clear to the reader. Moreover, from what is presented it does not look like this assessment will probe MS-PS3-3, 3-5, or 3-5, ETS 1-1,1-2, or 1-3, or really any of the content or cross-cutting concepts cited. In short, is this a good example to exemplify the kind of assessment that is needed for the NGSS. Given that the intent of the curriculum is read from the assessment items by most teachers it is very important that this chapter presents good examples of what is needed and appropriate. Indeed, Ch 12 stipulates that assessments must ‘reflect the 3 dimensional nature of the NGSS’. In which case, it is very important that the examples in the Framework document do likewise. Finally, this chapter is missing any advice about how assessment in three dimensions might be different from one dimension, such as: how scoring rubrics might be different, what it means to assess (or not assess) a cross-cutting concept, and some of the reasoning that might need to go into developing and scoring a three-dimensional assessment., and how related changes to assessment might impact teaching and learning. In addition, it would be useful if the assessment formats discussed which parts of NGSS they might probe most effectively, such as formats that could be used to probe modeling, systems, planning investigations, evaluating information, arguing from evidence etc.</p>
417	8	Curriculum Specialist	Henderson Kenelee	<p>The Figure X.X on pages 6-8 is excellent. The evidence Centered Design Process on page 13 is a great graphic to help in constructing assessment tasks followed by a specific example is great. The research based examples of formative assessments is well done and provide teachers a really strong resource. We are encouraged to know that there is a return to an emphasis on multiple types of assessment. It is very difficult to not dwell on the uncertainty of the nature of the "big" test and the degree to which the State test will place pressure on teachers and students, as past experience weighs heavy on many. So the vagueness (while we do understand why it is vague) in this chapter relating to that piece, is unsettling.</p>
418	8	Teacher	Topps Jo	<p>Line 55-56: “Assessments designed to inform day to day teaching (Short Cycle - Formative Assessment – short cycle)” The phrase, “short cycle” seems redundant. Short cycle assessment discussion is useful. Line 109: Figure X.X: Types and Uses of Assessments Within Assessment Cycles. The weekly, benchmark and annual assessment rows need to be completed. Line 177: Add a PE to make the CA NGSS multi-component task more specific, e.g., MS-ESS2-2. The PE focuses on construct an explanation, so using a model to explain will work in this case. Line 224: Add a PE to make this example more specific, e.g., MS-PS2-1. Line 298: Add a PE, e.g., K-LS1-1. Make this discussion more three-dimensional by having the teacher ask about how students know (by making observations, which is the SEP) and what do they see when they make observation (pattern, which is the SEP). Line 324: Add a PE, e.g., 4-PS3-2. Make this discussion more three-</p>

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				dimensional by having the teacher ask about how students know (by making observations, which is the SEP). Line 295: Add examples of questions related to the CCC of energy and matter from http://crosscutsymbols.weebly.com/ : Where does the energy for this system come from? Where does it go? What does energy do in the system? How is it changed? What is the role of matter in this system? How does it change? How does it enter and exit the system? Is the role of energy and matter in this system similar to other systems I have learned about? How is it different? Engineering(energy)- How can we improve the energy efficiency of this system? Engineering(matter)- If we change the materials, does that improve the system? How do the energy and matter in this system relate to other crosscutting concepts?
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Chapter 9: Access and Equity

Comments (419-441)

#	Ch.	Title	Reviewer	Comments
419	9	Teacher	Galvan Bernedette	There should be more encouragement (grants, scholarships, programs, stipends) for BOTH teachers and students to enter into the science field for teaching and working.
420	9	Other	Durant Jayne	It does not provide access to curriculum for the majority of our students since their reading and comprehension levels are so low.
421	9	Teacher	Trammell Rozalia	It sounds great on paper. But in reality, school districts find many ways to "cheat the system" so to speak and many of those that are on the list do not get the proper support they need.
422	9	Other	DuBois Joy	Well written
423	9	Other	Reese Christy	In the snapshot Snapshot: Learning about Earthquakes in the Seventh Grade Integrated and Designated ELD in Earth Science, there is little guidance for a science teacher on integrated ELD. The majority of the snapshot is about how the ELD teacher uses the science content in designated ELD time. While this is very beneficial for an ELD teacher to see, this document will be more highly read by science teachers from the middle grades. I encourage you to rewrite the integrated section to include how the science teacher clarified intended language and content targets, activated prior knowledge, explicitly taught vocabulary, planned for collaborative conversations that had students use the language of science and used scaffolds to support the learners in reading and writing.
424	9	Other	Frausto Miguel	I focused my attention specifically on the Students with Disabilities section of the chapter. The format of this section, along with the example lessons help SPED instructors develop clear and concise lesson's to help the

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				students reach their academic potential. Most of what this section discussed is currently considered best practice among the SPED community..
425	9	Curriculum Specialist	Zacuto Wendy	In order for all students to have an enriched STEAM education, the integration of subjects can be more inclusive. Flexibility offered teachers is commendable when teachers have the awareness and training to combine elementary disciplines in meaningful ways to address their goals is laudable. My concern is that without greater examples of how this is accomplished, students who come to school with disadvantaged vocabularies and experiences are likely to find science an "add on, " thus short-circuiting their deep understanding of principles and vocabulary with which to describe them.
426	9	Other	O'Connor Dawn	relevant page/line number app. 1055-3 Tiered Intervention- Teachers/schools need more support to assure that tier 1 instruction is high quality General-Need more specific strategies and tools that teachers can use to implement the vision in the framework General-Use technology in framework document to make tools and strategies "come alive" for users. For example; video of teachers implementing strategies General-Bilingual Language support is not addressed at all
427	9	Other	Sherriff Jody	Well written and understandable chapter. Clear definitions and considerations for each of the groups discussed in the chapter.
428	9	Teacher	Berrner Jill	No student should be allowed to graduate without having conducted an experiment using the scientific method. (Imagine the potential of the California Science Fair if every high school student was represented there - instead of the few, under-challenged elite).
429	9	Teacher	Brandon Linda	This document states "The NGSS call for science teachers to provide all students access to a rich and engaging curricula that is appropriately challenging. Responding to this call requires that educators share the responsibility of ensuring equity for several populations of learners who are particularly vulnerable to academic inequities in science and engineering." As with all parts of this document there is no mention of roll out costs, supplies and training. There can never be equity for all students when monies across the board are not equal.
430	9	Teacher	Cheung James	What are some examples of what we should and should not be doing to help our diverse learners?
431	9	Teacher	Loeb Deborah	Everything seems indiscriminate.
432	9	Other	Hoyt Brian	Access to advanced courses will likely be limited if students are having to take a prescribed course list their first 3-4 years of high school. Severely limiting their college prospects.

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433	9	Teacher	Morrison Susan W	My three biggest criticisms in this chapter were repeated use of the phrases "research based" or "evidence based" to refer to programs or approaches not backed by rigorous research but rather by "research" done by the same organizations that are promoting the programs, with no independent confirmation of results, or by research done in school settings that do not reflect normal California classrooms in class size, diversity, or time allowed for teacher prep. Another problem with "research based" is that the term is used to silence teachers' questions and doubts because if something is research-based, then what do mere teachers know? The second was not including parents in the team to help students achieve. The third is not dealing with the time crunch. When do teachers prep for all these elaborate lessons? And if a student needs extra help, when will it be given? If it's during a pull-out, then the student misses regular classwork and falls further behind, a common occurrence in CA schools.
434	9	District Administrator	Warren Glen	I do have a concern here! The standards do not reference school library services, a critical component to any academic research. Libraries must be recognized within the science standards in support of information literacy (question formulation) and equity (all students have access to vetted academic information that supports their own personal inquiry.)
435	9	Other	Hinckley Matt	I am really glad that this was included, and am especially appreciative of the implicit acknowledgement in this section that adequately funding science instruction is necessary.
436	9	Other	Duong Annie	The needs of ELs and special needs students are not fully addressed throughout all grade levels.
437	9	Other	Barnett Teresa	This chapter should be up front, not here as an afterthought. It is a VERY IMPORTANT section, and is critical to the success of NGSS implementation. It should also be written from an "asset based" focus -- the strengths that different students do bring to the learning, rather than from a purely "deficit" lens. The writing of this chapter is not consistent. The section on females in STEM is the strongest section and the rest of the chapter should be modeled on this section.
438	9	Teacher	McCluan Jennifer	Excellent chapter; perhaps consider including a section addressing considerations for gay/lesbian/transgender students

**Please note that survey responses have been populated directly from submissions and have not been edited.*

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439	9	Teacher	Valadez Jerry	Overall, it's a difficult read and appears to be more appropriate for a language arts framework. Line 28 refers to system shifts needed but not clear where they are identified. System changes mentioned in RTI are not clear in how it connects. The direct connections and examples to the science practices(as equity supporting) is limited. Line 57- 91 - too much time spent on discussion of art integration in the absence of discussions on ways to get science instructional time back in the elementary school day. This is also in response to the dearth of mention of the SEPs, and the erroneous repeated mentioning of 'inquiry-based science (i.e. lines 145, 188, 206, 367, 973, 1113, 1237, 1240) - table of actions does not mention instructional time or policy recommendations from the Successful STEM programs report, 2011). Line 111-120 hit on the inequity in access but the chapter provides no strategy in how to impact policy. Perhaps linking to the national STEM goals and the need for equitable instruction time at elementary and middle school. Line 356-57 refers to 'college and ready ready' standards, which will not be part of ESSA.
440	9	Other	Inouye Nathan	“ELA/ELD Connection” boxes (e.g. page 15 or 169) I would recommend that you use the term “Equity & Access Strategy” to prevent a misconception that the identified strategy is only appropriate for a class with ELD students. These recommended strategies to support implementation of NGSS are great and are appropriate for all learners.
441	9	Curriculum Specialist	Kolevzon Grey	Same as above: One's personal connection to the living world is based in direct experience with living systems, especially in a relevant, place-based context. Students in low-income urban neighborhoods do not generally have this experience, and unless financial resources are specifically set aside to enable the vast % of California's students that live in these neighborhoods to have these experiences as part of their schooling (professional development, program coordination, field study trips, project-based learning, supplies/materials, etc.), the enormous effort that went into creating the framework can only be viewed as incomplete and inadequate.

Chapter 10: instructional Strategies for the Next Generation Science Standards for California Public Schools, Kindergarten Through Grade Twelve Teaching and Learning in the 21st Century

Comments (442-476)

#	Ch.	Title	Reviewer	Comments
442	10	Teacher	Galvan Bernedette	There should be a team of teachers that get together to develop a wide range of examples in workbooks for these strategies to be visible and descriptive. Along with reading strategies.

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443	10	Other	Durant Jayne	Information is provided on the strategies that teachers can use but again in order to create and implement these strategies takes a lot of time and planning, a luxury that teachers are not provided. During the summer I work on creating new units and it usually takes about 3-4 weeks to create one unit. Although I can use the unit again every year I have to wait to see the level of my students and adjust the unit accordingly, again requiring time which I am not afforded. There is a lot of talk about using models in these new standards but to this day no one has actually been able to show me what this actually looks like in the classroom. I have some ideas for specific topics but not for everything. Original documents also take time to research and find, especially to match the level of high school students.
444	10	Teacher	Trammell Rozalia	How is this going to change what we are doing now? When push, comes to shove, making sure that the students are going to pass the exams is what has been all important. If the students do not do well, the teacher is to blame - no matter what the circumstances might be. These strategies are great, but take far more time than a district common assessment will allow for.
445	10	Teacher	Munsell Mary	Very difficult to understand how to put this together in a curriculum. My district's superintendent of curriculum currently thinks the only way for our district to meet these standards is to teach physics in biology. I wonder how many other hoops we will try to jump through before abandoning this?
446	10	Other	Shelton Betzabel	This section provides applicable information to the implementation of strategies, as noted with what needs to happen less and what needs to happen more.
447	10	Other	Chaveste Enrique	The document is written in a clear instructional format that is accessible to many people. As a first year teacher, I appreciate the language and clarity. The examples are designed to demonstrate the implementation of these strategies, and work towards an effective teaching practice in the 21st century.
448	10	Teacher	Vu Quyen	In the recommendations for conceptual shifts it states in #2 that student performance NOT curriculum is key. In #4 in states that "students need a deeper understanding of content (which is curriculum). The NGSS will require us to not only teach more concepts/curriculum but also have time for inquiry and higher order thinking (performance) showing their application of the knowledge. In the past we have given info (lecture, worksheets), implemented cook/book labs and then given tests. With the NGSS we will still be giving our students knowledge (discussions, texts, lectures, media, research) and helping them apply it in various ways (ie. labs), and then ask them to show what they know with inquiry labs or student directed projects. We will need MORE time to get through content.
449	10	Other	East Jennifer	The 'More of this-less of that' graphic was really all I needed. The rest is just repetitive.
450	10	Other	DuBois Joy	Provides guidelines for teaching NGSS hand in hand with Common Core concepts
451	10	Teacher	Vu Quyen	1. Using historical case studies LINE 295-Ms. A-The scientific method. You gave an example of what Ms. A was doing with regards to the scientific method, then explained that it can be better by implementing new

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				strategies by listing them on LINE 448. It would be nice if you expanded on this idea by then giving an example of Ms. A's improved lesson plan of the scientific method using the suggestion on LINES 448-458 and then lead into Ms. B's and Mr. C's approach to the scientific method. -By redoing Ms. A's lesson with the appropriate strategies, it allows us educators to look at our current activities and find ways to improve on it. -It would also be nice if at the end of the lesson or throughout the lesson, references to the historical case studies, scie & eng practices and crosscutting concepts, 4 core instruction prac, or the instructional shifts req by CA NGSS is cited. TO BE CONTINUED on scienceframework@cde.ca.gov
452	10	Teacher	Linsangan David	Line 15-17. Consider revising the sentence, possibly separate into two separate sentences Line 36. Change motive to motivate Line 76. Omit "to" Table 1. Less of this....box 1 – consider using a more common synonym for rote Table 1. More of this...box 2 – omit "used" Line 185-187. Consider providing the website link for those interested in seeing the tools Line 245-252: This is a great inclusion and something many science teachers need to read. Table 2: A great inclusion, this piece will work great to help science teachers realize that science does not work in isolation of other school subjects. Line 418: change "separates" to "separate" Line 628-630: Change to, "Useful resources for educators, which are related to understanding how science works and how it is done, are available at the "Understanding Science" Web site at the University of California, Berkeley. Line 696: Change beginning of sentence to: Or, a prototype.... Line 704-706: Very good point, same can be said for teacher created lessons. Line 939-940: Consider revising sentence. Confusing in structure
453	10	Teacher	Gause LeAnn	Chapter 10 – Comments Line 36- change the word "motive" to motivate Line 69- should read "use those ideas"
454	10	Teacher	Flammer Lawrence	Ch. 10: Excellent, especially details for explicitly integrating NOS elements throughout every science course, and at every level, K-12.
455	10	Teacher	Gettman David	Excellent. The writers put a lot of effort into this chapter.
456	10	Teacher	Brandon Linda	If we are to follow all of the NGSS standards and the Common Core Science Standards all teachers will be teaching new material with little if any materials and supplies and a limited knowledge of what is to be expected of them. Implementing instructional strategies will be the least convoluted part of this document and its intent.
457	10	Teacher	Ritchie Susan	Chapter 10- Instructional Strategies line number suggestion 193 keep in this section 267 table 2 3. Providing Developmental Themes and Story lines: " explanation of contagious... at the beginning of chapter" should be after this table 401 This example is very general and might need a more specific example 419 keep in this statement 434-438 keep in this 817 keep in this snapshot 1078 keep in this section on 5E 1216

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				keep in this resource 1347 keep in this table 1408 keep in this table 1552 keep in these examples 1560 keep in resource 1604 there isn't anything in this section on the 'essences of notebooks" ask Kathy DiRanna or Jo Topps 1633 keep table 9 1641 keep resource 2102 keep in this statement
458	10	Teacher	Cheung James	Lines 1225-1279 I wish they gave concrete, real-lfe examples of how project-based learning can teach different topics instead of giving no examples. Lines 1458-1492 There should be more concrete examples of levels 3 and 4 for Webb's DoK.
459	10	Other	Spencer Michael	It is concerning there is no or limited mention of School Library programs and how they support (STEM / STEAM) education.
460	10	Teacher	Ultican Thomas	To bad these are included in a document with the weight of law behind it.
461	10	Teacher	Loeb Deborah	Good examples and suggestions. Implementation & resources?
462	10	Other	Nyhoff John	These were good and I felt that they got the point across.
463	10	Teacher	Stover Michelle	The strategies provided are not sufficient to back up the requirements of the courses.
464	10	Other	Rooney Robert	Three Dimensional instruction is an effective model, but is very time consuming to teach. Many of our teachers have only taught under the California Science Standards, and are justifiably concerned about how student learning will be assessed. Prior to 2014, I heard that the NGSS standards were illustrative examples, and students needed to use 3D learning to examine whatever material they were learning. With the shift to "Every Standard, Every Student", we seem to be moving to the instructional model of the 1991 California Frameworks, which was widely criticized as being too light on content, and a mile wide but an inch deep. What seems to be missing is balance between Science as a Practice, and Science as a Body of Knowledge. The NGSS shift seems too far toward Practice, while the California Science Standards were too much about the Body of Knowledge. A good course in science should use prior knowledge to drive experimentation to extend what students know/
465	10	Teacher	Hoyt Brian	Having additional lesson / content and sample textbooks would be great.
466	10	Curriculum Specialist	Brydon Barbara	Will this be used by publishers and/or provide guidance to teacher preparation programs?
467	10	Other	Wall Michael	The chapter on learning strategies is filled with many great resources and background research, but overlooks the importance of informal learning environments outside of the school as a crucial resource for teachers and students. As stated in Line 1063 "Learning is maximized when students actively apply new ideas after being introduced to them." Informal learning environments like museums, nature/science centers, and

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				<p>even local parks and trails are filled with ways to explore the phenomenon that are introduced in the classroom. In particular, these informal learning environments are crucial to the learning cycle as they provide opportunities to “expand on the new learning via experiences in which they apply their knowledge and skills in new contexts, ranging from hands-on investigations to engineering challenges” (Line 1101). Museums, in particular, have been leading the way in inquiry-based learning. For instance, visual thinking strategies (VTS) have long been in the toolbox of museum educators leading field trips. “Learning by doing” is at the core of this strategy document and informal learning environments are packed with opportunities to learn by doing. I highly encourage you to explicitly call out in this document the value of informal learning environments and field trips in extending learning outside of the classroom. California abounds with opportunities in nature and museums to provide students with those “significant life events” that many scientists point back to as the tipping points that launched them into a career in STEM. This document should point the way to increasing the chances for students to find these both in and outside of the classroom.</p>
468	10	Other	Ellis Kelly	<p>Very good examples and resources for teachers to tap into for developing better Science Instruction. Have some concerns about using the framework links to some of the resources unless someone is going to continually update to be sure links are viable. (Frequent issue teachers face year to year themselves in hunting for resources.) Like the Examples of each DOK starting on page 58. The examples that follow a clear. The additional information on science notebook entries is also very useful. Page 70 and following.) We appreciated the additional ideas for assisting ELs in accessing science. The conclusion on page 97 really highlights many of our concerns relating to the impact of large class sizes, inadequate access to technology, inadequate equipment for inquiry, lack of collaboration time and/or infrastructures that foster collaboration, etc. We are committed to this change and are in the process of conducting needs assessments, however, we do not believe the Nation, State, Local LEAs, etc. have underestimated the long term debilitating effect the lack of resources targeted to science has had on science programs.</p>
469	10	Other	Duong Annie	<p>These are not being addressed in all grade levels.</p>
470	10	Teacher	Pedersen Sharon	<p>I am a little surprised with the emphasis on Cognitively Guided Instruction given the lack of resources for its use in science.</p>
471	10	Curriculum Specialist	McGill Melody	<p>In this chapter you do a great job of addressing 3 different instructional strategies for 3D learning, yet there is one area of weakness. This section does not do a very good thorough job of addressing the use of technology in the science classroom. As more schools and school districts begin to move to the implementation of one-to-one devices for students, minimally addressing technology weakens this area of the framework. The only area that technology is addressed is in the digital technology section on pages 82 and 83. There is no discussion about blended learning and tools that would assist in increasing student</p>

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				centered instruction. Zaption, Blendspace, and Nearpod are all great tools for “flipping” instruction. Under the simulation paragraph (page 83 Lines 1968-1974) you touch upon simulations but do not give any suggestions such as pHET and NetLogo for teachers to look at. Adding more information on effective use of technology is important.
472	10	Other	Bullard Anne	Teachers should be encouraged to use field trips to museums and other community to reinforce classroom lessons. Inquiry-based learning is essential to nurture critical thinking skills.
473	10	Other	Sargent Cynthia	Place this chapter before the grade specific chapters and reinforce within the grade level chapters the application of the instructional strategies described here. That is, make explicit the use of the strategies within the vignettes and provide some explanations of when they are used and why.
474	10	Other	Galisky John	Lines 8-10 Go back to introductory paragraph from Draft 4. This version makes no sense. Line 267 Table 2: Examples of historical case studies #3 Change "contagious illnesses described at the beginning of this chapter" to "contagious illnesses described later in this chapter." Lines 924-926 Either add to this paragraph to show another good example of engineering in HS or cut this paragraph. Lines 929-930 After cutting lines 924-926, cut these lines, too.
475	10	Other	Inouye Nathan	Chapter 10: Instructional Strategies for the NGSS. I appreciate and feel strongly in favor that the CA Science Framework select only 3 instructional strategies in this chapter. This sends the message that we should focus on understanding and implementing well an instructional strategy rather than exploring multiple strategies in the hope that the next one will be “better”. However, I am wondering why CGI was identified as one of the three instructional strategies? PBL and 5E both have evidence/data that they improve student achievement in science. CGI has evidence for improving math achievement, but I don’t believe there is enough data to suggest that it crosses over and is effective in delivering high quality NGSS science instruction. In fact, CGI is less of a strategy but a philosophical approach to guiding learning in mathematics that may have benefits in science but it has not been documented (proven) well yet. As a CDE document that will be reaching teachers across the State I would be cautious to cite this philosophical approach as being 3 dimensional before having more confidence that it. As an alternative, I would recommend that CGI be replaced with another research-based science instructional strategy like the Content-Understanding-Environment (CUE) model from “Designing Effective Science Instruction: What Works in Science Classrooms” by Anne Tweed. In addition, I would like to see more emphasis on the importance of literacy and recommendations on how to implement literacy strategies. Literacy is an enormous shift in implementing NGSS successfully. I would recommend that a literacy framework be provided in the instructional strategies chapter in order to address the important conceptual shift number 6: The NGSS and Common Core State Standards (English Language Arts and Mathematics) are Aligned.

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476	10	Curriculum Specialist	Passmore Casey	Pages 57-63 - The explanation of Depth of Knowledge was very good; I'm not very familiar with DOK and thought it was well explained. Page 82 - The section on Digital Technology in Science Teaching was no inspiring or clear or based in research like other sections.
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Chapter 11: Implementing High-Quality Science Instruction: Professional Learning, Leadership, and Supports

Comments (477-498)

#	Ch.	Title	Reviewer	Comments
477	11	Teacher	Irwin Christine	As a Geoscience teacher, I have a much more integrated science background than my colleagues. I will need minimum professional learning and support. Why was the Earth Science course eliminated and integrated into the bio, chemistry, physics . . . Should be the other way around.
478	11	Teacher	Galvan Bernedette	I totally vote for more grants and scholarships to be available for science teachers (even possible stipends or pay raises) so more people are attracted to teaching science. There should be more STEM instructional leaders at each site and or district.
479	11	Other	Durant Jayne	So far there has been little to no support for implementing these new standards. Administrators and teachers have very little understanding of what we are supposed to do, and there is absolutely no help from the LAUSD bureaucracy.
480	11	Teacher	Chapman Donna	In this section in states that "teachers will receive effective professional learning as well as "time, space and equipment" to teach. Will science teachers have more in-service days to plan? Will we have 1/2 days of no instructional time to take classes and do on line learning? Will we be paid more for the extra education and time we invest?
481	11	Teacher	Perry Aileen	Line 85: The acronym LEA is used for the first time and is not explained. What does it stand for? Line 189: why is this a paragraph with only one sentence. Maybe a bit more explaining what we would find when we click the link. Line 221: Who are the people? "the people in them" This implies the people in the policies. Specifically state who. Line 244: this is another short 2 sentence paragraph. It is vague Line 251; is the paradigm you speak of the principles. You should address this explicitly. The paragraph goes to talk about the teachers. Maybe explicitly state, principals must be able to effectively evaluate teachers therefore should be well versed in NGSS. Line 262: What section are you referring to? If it is a new section maybe a heading is useful. If it is just this chapter of the document maybe select a different word Line 370: where is

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				the said table Line 520: Please explain why this key. You simply give an example with no further explanation. Line 522: if this is a new paragraph, indent. Line 549: Why? What is so good about it? Line 642: Indent new paragraph Line 961: This is the only line of this list with punctuation at the end. Line 1250: Indent Line 1370: Indent Line 1390: Indent Line 1332: needs a space between guardians,families
482	11	Teacher	Rogers Sidney	There were no line numbers on this document so I will refer to page numbers. This too may be a problem since the pages were numbered correctly through page 20. Then I got references like Pg 23 of 20. I'll do my best given these constraints. Page 2: new curriculum materials could read a new curriculum. Page 4: "the QPLS identify" should read "identified" Page 9: should be punctuated local, regional contexts Page 33: should be punctuated continuously, collaboratively Page 38: should read this section discusses Page 42: should read particularly effective practices Page 45: the comma after brain development should be removed Page 48: the word extendedday should be hyphenated or split into two words
483	11	Teacher	Brandon Linda	If educators follow the NGSS standards and the Common Core Science Standards all teachers will be teaching new material with little if any materials and supplies and a limited knowledge of what is to be expected of them. Schools currently have in place science teachers that at the very minimum have a masters degree or its equivalency as mandated by the "No Child Left Behind" act in their selected single subject positions. Why is it that we now have a push to shuffle content specific subjects and grade level certified teachers thereby creating unqualified teachers teaching new subject matter with little or no materials and support. How does this accomplish any advancement for the American education system.
484	11	Teacher	Ritchie Susan	Chapter 11 - Professional Development line number suggestion 27-28 chapter moves from theoretical to more specific points for implementation. At this point, we suggest adding a sentence stating " More specific items to be considered for district implementation will be presented later in this chapter". 60 and 62 when using the word "implementation" change to "implementation and sustainability" 111 thus (written twice) 112-113 This advice is helpful to all readers. 158 D) repeated twice 262 are there 5 or 6 subsections 599 for the first three factors of figure 3, need more details on how to promote a chared vision, plan short and long term and set goals before proceeding w/strategies starting on line 628. line 610 cautions against starting with strategies but a large section on strategies follows. 611 when speaking about the use of data, should refer to Needs assessment and give examples. 711 "as well as" 798 CA CCSSM 841 refer to Figure 3 to help readers make the connection with components 1067 is rubric available on this site? not able to find. 1124 heading "critical issues" is confusing because it is the same term used in figure 3 but is used for a different purpose. Perhaps heading should read "Issues for Program Success" 1124-1186 whole section is a bit choppy, moving from large to small grain size and back. 1128 should "scaling up" be defined here. 1189-90 remove 1st "necessary" in the sentence 1205 add "world" to the end of the sentence. 1254 change "is"

**Please note that survey responses have been populated directly from submissions and have not been edited.*

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				to "are" 1283 space between "extended" and "day" 1283 "programs" plural or possessive? 1287 space between "after" and "school" 1331 space between "guardians,families" 1355 delete word "include" 1384 should network be plural?
485	11	Teacher	Cheung James	When are we going to adopt CA NGSS aligned books? Who is going to make the decision to adopt the books?
486	11	Other	Spencer Michael	It is concerning there is no or limited mention of School Library programs and how they support (STEM / STEAM) education.
487	11	Teacher	Ultican Thomas	Allow teachers to select the curriculum, texts and other materials. As long as top down mandates are the path to improved education, failure in that mission is guaranteed.
488	11	Teacher	Loeb Deborah	Instructions are vague and miss crucial basic content. HS Illustrations and segments are sometimes out of order with respect to each other.
489	11	Other	Rege Dawn	We appreciated how this chapter highlighted the value of partnerships and the inclusion of parents. The professional learning support that is described in this chapter is expensive and is not realistic Add a vignette about what effective professional development looks like. p27, 563 Having specific guidance about science professional learning rather than general ones would be helpful. If you don't have specific p42, 1098 "Teachers work together to..." provide a vignette of what a PLC would look like around science that aligns to this description Coaching references were generic, not specific to science coaching. There needs to be a much greater focus on the funding of this professional development. Schools shouldn't be expected to compete for funding against math and ela Despite it being listed as a topic in the table of contents, FUNDING isn't actually written about How can webinars be used to fill in the void when teachers don't have substitutes for PD days? Who would make those webinars? What would online learning look like? There are many different categories of "new teachers" 1. New teachers to the profession 2. New teachers to a content area 3. teachers who are new to this type of pedagogy 16, 350 "teacher quality being one of the most important influences on student achievement..." We need to say that teacher quality is one of the most important "IN SCHOOL" influence. With the inclusion of Earth science into the traditional high school courses, there needs to be attention to how to build the content knowledge of earth science for those high school teachers. Provide vetted resources and examples for how to build content knowledge - for example, the NSTA resources and others for building content workshops The framework bashed the one-off PDs but provides no guidance or support for finding the funding for more extensive learning opportunities.
490	11	Other	Nyhoff John	Many teachers may not feel comfortable teaching outside their credentialed area. For example a Chemistry teacher may not be comfortable teaching Earth Science concepts. The background knowledge for the teacher assumes that the teacher is well equipped to handle a variety of courses.

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491	11	Other	Rooney Robert	All models presented seem to necessitate a steady diet of consultants and new curriculum. I am concerned about the funding needed to do this.
492	11	Other	Murphy-Shaw Marian	From teacher perspective this chapter is good and can provide the leverage teachers need to move science forward as it should be taught.
493	11	Curriculum Specialist	Stillittano Marissa	5/115 Add one for admin (see p39,1,000: can this be used for admin?), Good continuum for teachers to self assess. 8/156 There is a concern about how the shift will apply to college admissions for students-- there is a gap in transition from high 12/ 263 Offer a pathway/continuum for administrators., How can administration be supported? Can there be clear suggestions? 14/319 Moving from..."People's"-- who are "people's?" Reconsider specific titles. Is this a reference to the 7 conceptual shifts from Chapter 1? If so, can it just be referenced? Can examples be provided for each shift? 18/414 Induction for New Teachers, Should say: Induction for teachers (new to science, California, content change), Good-- The inclusion of induction is important, 17/400 Why is this a table and not a narrative or bulleted list? Reduce statements for what coursework needs to include. 22/522 Good-- Collaborative practice of teachers working together 25/594 Fig. 3 Is this the best graphic to use? Can you provide an example/snapshot/vignette of how you would use this as a tool? 27/645 CSTA, emphasize the importance of belonging to professional organizations, and furthering professional knowledge-- staying current and aware (resources, collaboration etc...) 27/663 Although not included in innovate, omit, Good-- promotion of lifelong learning in content 27/666 add data 30/746 Good-- the inclusion of professional collaborations 34/882 Good-- Continuous improvement -- inclusion of quotations 35/892 Good-- practices and exemplars table 43-44/1138 Good-- provides tools for implementations and resources 45/1187 we like the stress that doing science requires space and equipment and the need for consumables that are readily available 46/1218 Good-consumables are mentioned as a critical component in the science classroom 46/1205 Observable features of our natural???
494	11	Other	Hinckley Matt	I do not disagree with anything in this guide. However, I hope that high-quality professional learning and supports really make it to teachers and their classrooms, and the demand that local education agencies provide these opportunities for teachers should be stridently made in this section.

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495	11	Teacher	Hegdahl Lisa	<p>Overall comment - Some orgs, projs, resources mentioned no longer exist, or will not exist, when this publishes - Ex. CSLNet. Needs to be addressed. Perhaps needs to be noted that this doc was published in 20... & edu. is an ever changing field. p2 In 30 " The core message is that a changerealize the vision of the CA NGSS." Needs to be more prominently displayed P5 In 101 Need link to where graphic came from p 5 In 101 Fig 1 & Fig 2 figures should be stacked. Possible link to CDE graphic. Problem with CDE dates? pg14-15 Table 1 Swap the two columns. Focus on what we should be doing not what we are not supposed to be doing pg10 In 210 "The confluence of three educationalstudent learning" .. highlight or box this. VERY important p16 In 370 "Bybee developed following table" p 17 In 398 References a table. What table? Need Table # or ref. or eliminate this ref. Table needs to be near the ref. p 27 In 655 New text -"1) For example, teachers in out of school programs can coordinate with the regular school-day program teachers to participate in and/or provide professional learning." p 30 In 740 How might teachers learn how to use tools and processes to help organize student exploration? Delete lines 740-744 (questions Already covered in Chapter 12. Don't leave readers with unanswered ques. p39 In 1001 There is nothing about what the administrators need to know to support teachers. There should also be something describing that there is risk involved in changing to this new curriculum. Clarity is needed. pg 40 1018- Should ask them to read the NGSS or the framework also. pg 39 In 1000 To enable administrators to become competent with the CA NGSS, district and school administrators should: To enable administrators to become leaders in the implementation of and competent with the CA NGSS, district and school administrators should: pg49 In 1296 Delete this sentence. This is the first time they tell us what comes next. pg 52 In 1395 Delete examples</p>
496	11	Teacher	Hegdahl Lisa	<p>pg 6 In 115 Graphic needs open end. Add text to indicate there is no real end to this implementation process. pg 17-18 Table 3 box 2 missing CCCs. Need to be inserted. Supports 3-D teaching p 21 In 483 "disciplinary core ideas through the science and engineering practices...." Need to add ccc otherwise it's not 3-D p 24 In 578 "How can...County Office of Education". Combine sentences 1 & 2 and eliminate the use of a question to start a paragraph pg 29 In 730 Delete 'CA NGSS' from the end of the sentence -We haven't been teaching NGSS long enough to say 'Often'. p39 In 1011 Change tp "...instruction that support student and teacher learning." So it addresses both learners P 39 Ln1042 learning aligned with the CA NGSS.learning aligned with the CA NGSS with the understanding that a productive struggle for teachers and students will be inherent in the process. NGSS will not look like the old standards. Students and teachers will both have learning curve as they explore the 3D of NGSS</p>

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497	11	Teacher	Jukubowski Megan	<p>Museums, aquariums, and science centers are listed as partners for teachers and students on the path to science literacy. As purveyors of high-quality environmental science education, NatureBridge feels that additional phrasing including field-based environmental (science) education is worth including in the Framework. Our field-based environmental science activities are designed to support the dimensions of NGSS. We feel strongly that specific mention of these opportunities highlights the value of these experiences, and will lend administrative and district-level support for teachers seeking deep and immersive learning opportunities for their students. Suggested Alterations to Chapter 11: • Page 2, Lines 16-17: “Students will engage in deeper and more meaningful ways, ask more questions, and experience science through investigations [add] in their community, classrooms, and in outdoor and field-based settings.” • Page 9, Lines 162-164: “formal and informal leaning environments that include museums, science centers [add] environmental education providers, and other opportunities are fully engaged...” • Page 27, Lines 650-652: “2) Participate ... (e.g., county offices of education, and informal science sites such as zoos, aquariums, museums, [add] and field-based environmental education providers.)” • Page 46, Lines 1205-1209: “Remember that ... natural [add] world. Throughout the course of instruction, students will complete numerous hands-on investigations and engineering challenges [add] in their community, classrooms, and in outdoor and field-based settings, including teacher and student-designed experiments as they explore science concepts related to a specific phenomenon.” • Page 48-49, Line 1289: “...museums, science centers, [add] and field-based environmental education campuses, not only...” • Page 56, Lines 1510-1511: “...offered by science centers, museums, [add] field-based environmental education organizations, libraries, parks, and community-based organizations...”</p>
498	11	Other	Kolevzon Grey	<p>Individuals that have the "real-world" experience to offer teachers and schools in assisting their shift to using NGSS standards are generally found outside the classroom and outside the public school system. School systems must become more aware of institutional barriers to these individuals' participation, and commit to lowering them if we are to advance beyond where we are, in terms of a base of existing knowledge of how to implement these practices with classrooms.</p>

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Chapter 12: Instructional Resources to Support the Next Generation Science Standards for California Public Schools, Kindergarten Through Grade Twelve

Comments (499-514)

#	Ch.	Title	Reviewer	Comments
499	12	Teacher	Galvan Bernedette	Book companies should work with teachers to develop materials and offer good compensation at each state level.
500	12	Other	White Jeffrey	I would like to suggest the following resource for use: The film, Becoming California, produced by the California Environmental Legacy Project. The film can be streamed at no charge at the website calegacy.org. (Also, this website will soon have five new films available to educators for streaming.) All of these films focus on environmental change in California and include an integrated view of earth sciences and biological sciences, as well as a significant environmental literacy component. Becoming California, a 2-hour film, has been showing on PBS this past year and has reached approximately 30% of the US television market. The potential audience to date has been 80 million viewers. The film was awarded two Emmys in June of 2015 including best documentary. Becoming California was developed with NGSS three dimensional learning as a goal. It has been reviewed by professional science education specialists and is now being integrated into professional development institutes, as well as many classrooms around the state. The film is divided into acts and chapters that make use of segments of the film highly useful for specific educational goals. The Redwood Science Project (a California Science Project) is currently distributing nearly 1000 DVD copies of the film to schools across the state. This film was developed by scientists, science educators, and media specialists with a grant from the National Science Foundation. This film was produced in partnership with the Redwood Science Project, a member of the California Science Project. Additional partners include the US Geological Survey, CA State Parks, and the San Diego Natural History Museum.
501	12	Other	East Jennifer	This is a lot of information that doesn't seem to apply to my current needs. There's a lot of discussion about committees, what should be in place but isn't yet. I want actual resources as I design my curriculum, rather than discussion of what should be in place.
502	12	Teacher	Mead Bill	I am very impressed with the Instructional Resources section. I have a few suggestions. Line 74- "They must on balance meet the intent" to "they must be balanced to meet the intent" I really liked lines 94 and 95. Lines 117-118 could cut down the amount of English Learners as all are ELs. Line 169 is very important. Thanks for including. Line 224- Also so important to see the career pathways in science and I would like to

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				see more connections. Lines 269-274-Extremely important to include in resources to the the big picture and how they work together. Lines 479-484 describes my classroom.
503	12	Teacher	Marsh Danielle	Lines 22-23: three-dimensional learning – Science and Engineering Practices, Crosscutting Concepts, and Disciplinary Core Ideas Line 74: “on balance” reads strange Line 247: “incorporating the three dimensions of the CA NGSS” does not flow with the rest of the sentence Line 304: suggested student assessment tasks Line 377: as described in Line 476: and provide guidance to help Line 563: ad hoc Line 594: remove “and resources” Line 601: remove “and remove” and replace with “, be reviewed...”
504	12	Teacher	Stack-Kitley Susan	I was unable to quickly find these resources. I will go back and investigate these.
505	12	Teacher	Berrner Jill	I don't know if NGSS can dictate this, but the cost associated with these resources will limit some school's/students' access to them. Can you put a cap of per student cost so that all students could have access to materials.
506	12	Teacher	Brandon Linda	This document provides absolutely no concrete and measurable means of support for public school teachers.
507	12	Teacher	Loeb Deborah	Resources appear stretched thin.
508	12	Teacher	Rooney Robert	How will all of this be paid for?
509	12	Other	Murphy-Shaw Marian	Could be a good chapter to provide live links to quality resources such a NSTA in addition to NRC, etc.
510	12	Curriculum Specialist	Malek Ladie	Will Allen bill be suspended for science? Ch 12 IR seems to imply that textbooks are not a requirement for every student. If this is true, can it be spelled out clearly? Or: If there must be a textbook, can it just contain readings and homework and not ALL of the curriculum? Briefer textbooks will cost less, leaving more money for other more important curriculum materials and classroom supplies. And there will be less for students to carry in their backpacks.
511	12	Other	Janzen Jennifer	Page 1, Line 21 - 24 - “Alignment is not a superficial matching of topics covered to those mentioned in the CA NGSS. The concept of three-dimensional learning is defined and explained in the Overview chapter of the CA Science Framework and is a critical element of the vision.” - Strength: Liked how it emphasized the 3 Dimensions and summarized the major changes IMPORTANT COMMENT/ SUGGESTION: Page 5 Line 128 - 130 - Resources that fail to meet the criteria in Category 1: Science Content/Alignment with the Standards, will not be considered suitable for adoption. - Organize Lines 97 - 126 and move to before Line 68 - Either remove from introduction in Page 3 Lines 69 - 70 - Why repeated twice? Seems redundant to emphasize

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			<p>category 1. Reorganize to understand importance of categories Page 8, Lines 233 - 237 - Teacher resources will include discussion of expendable and permanent equipment and materials necessary to conduct activities, guidance on obtaining those materials inexpensively, recycling or disposing of materials, and explicit instructions for organizing and safely conducting instruction, labs and activities. - Strength: Liked how this is one of the components instructional resources need to include for teachers. - Emphasis on obtaining and recycling materials, not just using them IMPORTANT COMMENT/ SUGGESTION: Page 9 Line 263 - 265 - Excerpt: "The instructional resources are grade-level specific and provide instructional content for 180 days of instruction for at least one daily class period, including an estimate of the necessary instructional time." - Suggestion: "...180 days including time for assessment, remediation, extension... estimate of necessary instructional time to include time for student mastery." - Do 180 days include testing? remediation? extension? 180 days seems like a pacing guide, where it will prevent student opportunities to grow, learn, and re-teach. More flexibility needed to include time for student mastery IMPORTANT COMMENT/ SUGGESTION: Page 13 Line 402 - 408 - Excerpt: "Teacher resources supply a differentiated path for all students. In particular, instructional resources should provide guidance to support students with special needs, including standard English learners, English learners, long term English learners, students living in poverty, foster youth, girls and young women, advanced learners, students with disabilities and students below grade level in science skills, three-dimensional learning, literacy skills or mathematics skills." - Suggestion: Additional sentence: "In addition, educational materials should include supplementary material to bridge student understanding, skills, and processes from prior to CA science standards." - Need to emphasize the importance of the transition period between students moving their way through NGSS from K-12. It should not be an instant -- students know something and move from there -- but moving from where students currently are in terms of skills, understanding, and processes. IMPORTANT COMMENT/ SUGGESTION: Page 15 Lines 447 - 452 - Excerpt: "While learning goals may be explicitly stated in the teacher materials, student resources will provide experiences that clearly build to the development of those learning goals without explicitly stating those goals prior to the instruction. In most cases student resources will not begin by stating the expected learning prior to instruction because this interferes with instructional strategies for three-dimensional learning." - Suggestion: "...In most cases student resources will not begin by stating the expected learning prior to instruction because this interferes with instructional strategies for three-dimensional learning, but should include an engagement or essential question to drive student learning." - Strength: Important that the learning goals are not shown to students as they work towards changing their own understanding. - Modification: However, there should still be a focus question / essential question that students are exploring and attempting to explain and elaborate on Page 18 Line 541 - 545 -</p>
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				<p>“Having selected instructional resources or developing a curriculum plan districts and schools will need to ensure that every classroom has access to the necessary equipment and expendable materials and provides the necessary work-space and infrastructure (e.g. access to a sink, or power outlets) to teach the curriculum as designed” - Strengthen safety language - including safety certification? - Needs rationale to follow the safety handbook - Is there legal language to ensure districts to consider safety in budgets? Should the entire part (safety, computers, equipment, renewables, material) be done by districts? OK to be redundant here IMPORTANT COMMENT/ SUGGESTION: Page 18, Line 549 - Excerpt: “Budgeting for science equipment, materials and renewables must be considered as an element in district plans.” - Suggestion: “Budgeting for science equipment, materials and renewables AND CONSUMABLES must be considered as an element in district plans, such as in the LCAP.” - Are renewables the same as consumables? If not, they should be defined. Are both used by students and replaced every year?</p>
512	12	Other	Hinckley Matt	<p>Although this is about curriculum, the instructional resources section must also include the notion that in science, instructional resources include up-to-date laboratory equipment. Many school districts serving lower-income students have adequate instructional resources for science when you count only textbooks as instructional resources, but they have terrible or nonexistent lab facilities. You need to include the kinds of resources in this chapter that actually make teaching science work; you do not need to say what an Erlenmeyer flask has to be in order to be adopted, but you must strongly state that local education agencies MUST fund such resources in order to be in moral compliance with the notion of actually teaching science.</p>
513	12	Curriculum Specialist	Henderson Kenelee	<p>OERs section links given on lines 613-615 are very useful.</p>
514	12	Curriculum Specialist	Aust Andrea	<p>PBS LearningMedia would be a great site to add to the OERs on page 21, line 616: http://www.ca.pbslearningmedia.org/</p>

Appendices

Comments (515-541)

#	Ch.	Title	Reviewer	Comments
515	Appx	Teacher	Galvan Bernedette	<p>These sources were good everyday sources that teachers have access to.</p>
516	Appx	Other	Durant Jayne	<p>REALLY!! More acronyms for the same thing. Why cant we just keep the acronyms we already use? Just because you change it doesn't make it better - it still refers to the same idea.</p>

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517	Appx	Other	Bethune Robert	We need a few more acronyms!
518	Appx	Teacher	Berrner Jill	Appendix C is lacking. 1) It should have precise equations to be mastered at each grade level - even if it's just one equation per grade. (i.e. Grade 4: $F=ma$, Grade 5: $V=IR$, etc.) 2) Knowledge of engineering applications/practices should be included (History IS important)
519	Appx	Teacher	Gettman David	In Appendix C, Progression of Scientific and Engineering Practice in Grades K-12, Page 5, Using Mathematical and Computational Thinking. In the Middle School (Grades 6-8) column, add something in bullet point 4 about also applying mathematical concepts to unit conversions, which is mentioned in the High School column
520	Appx	Teacher	Reese Dean	An appendix showing the progression of suggested science skills that students should be introduced to and then later revisited in later grades until mastery has been achieved would improve the document. The skills that should be included involve measurement with a ruler, triple beam balance, digital scale, graduated cylinder, plotting graphs of independent vs. dependent variables, reporting uncertainty in measurements etc. to name a few. I have not found a place in the current framework where these important skills have been listed and made explicit to the teachers, students, and parents.
521	Appx	Teacher	Gann Kristi	Overall: The writing of this appendix does not seem to flow. There is not a natural flow or organization of the ideas. It seems like a bunch of different ideas in different paragraphs being forced together. Overall: This whole section needs more proof reading and grammar support. Line 34: Trade books? This needs to be explained better or defined. Line 40: A resource was not provided about but rather an idea. This is the only resource presented so far. Change the word "another". Line 45: "Tradebooks" is two words. Line 103-104: Great point; same point that is needed to be expressed above more strongly. Line 242: Wrong word choice: Extended or extends Line 337: Extra space Line 379: Missing a word; maybe "has" Resources Table by line 426: Newsela needs a better description about it being real-time news topics that can be searched by topics and have flexible changing lexiles. Table 1 on Line 445: Table is not formatted in a friendly manner. Recommend making a sub-heading for "grade span: K-2" and then listing all of the books and their information below it in alphabetical order. --- OR dividing the table by grade level topics or DCIs rather than grade spans. As an educator or administrator it takes a lot of searching to figure out which texts apply to your topics. Table 2 on Line 451: Same concern as Table 1. As well as moving the "text" type to be in the column with the actual text.

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522	Appx	Other	Eby Daphne	Appendix A: Overall: The writing of this appendix does not seem to flow. There is not a natural flow or organization of the ideas. It seems like a bunch of different ideas in different paragraphs being forced together. Overall: This whole section needs more proof reading and grammar support. Line 34: Trade books? This needs to be explained better or defined. Line 40: A resource was not provided about but rather an idea. This is the only resource presented so far. Change the word “another”. Line 45: “Tradebooks” is two words. Line 103-104: Great point; same point that is needed to be expressed above more strongly. Line 242: Wrong word choice: Extended or extends Line 337: Extra space Line 379: Missing a word; maybe “has” Resources Table by line 426: Newsela needs a better description about it being real-time news topics that can be searched by topics and have flexible changing lexiles. Table 1 on Line 445: Table is not formatted in a friendly manner. Recommend making a sub-heading for “grade span: K-2” and then listing all of the books and their information below it in alphabetical order. --- OR dividing the table by grade level topics or DCIs rather than grade spans. As an educator or administrator it takes a lot of searching to figure out which texts apply to your topics. Table 2 on Line 451: Same concern as Table 1. As well as moving the “text” type to be in the column with the actual text.
523	Appx	Teacher	Lehnhard Joey Noelle	Appendix A - Recommended Literature for Science Classrooms This is really well written and cited. The case study and pattern of instruction are research-based and demonstrate the best of NGSS implementation. Unfortunately, the vignettes in the grade band chapters DO NOT model the important notes in this appendix, making it virtually useless. Please rewrite the vignettes so that reading does not come first as described in lines 103-109 of Appendix A - rather integrated within the unit as recommended in Appendix A. Here are the page numbers of the vignettes that do not subscribe to the requirements of Appendix A: K-2: 22,33,65,69,92. 3-5: 41
524	Appx	Teacher	Cheung James	[Appendix A] If science teachers are going to teach more literacy, are English classrooms going to teach science and/or use some of these texts? [Appendix E] In high school HIV/AIDS is taught in primarily in Health, with some support in Biology, right?
525	Appx	Other	Rege Dawn	Spell out the acronyms every time that they are used at the beginning of each chapter. You cannot be assuming that teachers will be reading the previous chapters of this large documents. We can imagine printing out and handing out this chapter in isolation to our teachers but without that information they may get lost right off the bat.
526	Appx	Other	Keller Sarah	Appendix B (EEI) is an effective resource and tool for the three course model. I love this! Appendix D for the three-year model is not mentioned above. This fully-integrated model does not allow for enough time for all of the listed concepts to be taught in depth enough for students to benefit.

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527	Appx	Other	Puraci Sebastian	Every Science, every year. This model changes the pedagogical method of teaching completely. Teachers who are not trained in specific subjects will need to educate themselves, or go back to school to get credentialed in subjects they are not comfortable with. However, the mode of professing the information makes sense. The students would benefit. However, I have the same issues as the three year model. AP students will not have the same opportunities as before, and they will suffer come college application time.
528	Appx	Other	Nyhoff John	Need more information on the Every Science Every Year. The flow charts were hard to follow and need more information and examples of how this would work in the classroom.
529	Appx	Other	Rooney Shannon	Appendix D: The three year model: This is a fully integrated course. Similar to my other concerns again is the lack of in depth Chemistry in this curriculum. The freedom to choose a theme to teach around (such as photosynthesis) is an outstanding feature of this model. I also am pleased with the two year option. However, the skill set necessary to move into an AP Science class or a subject specific class includes a significant knowledge base in Chemistry. Again, I would like to see more reaction dynamics included in the course outline; particularly in the second year of the course.
530	Appx	Teacher	LaBonte Jenna	Appendix D. It appears that there was a lot of time "fluffing" up with the beginning of this document for the three year model. I believe that a lot of the pedagogical information, such as lines 28-30, 36-41, and 48-51, can be applied to all of the models, not just the integrated model, because following these pedagogical strategies constitutes good teaching, not just how to teach an integrated course. I also have a huge issue with the portion on the discussion about integration being successful in other countries in lines 60-71. Maybe these countries do a better job of teaching science to their elementary or middle school aged than we do in the US? if they have a better basis of understanding, of course integration in high school would be successful if that is the case, and we should address this with the elementary and middle school curriculums before the high school can begin teaching with this model. The three-dimensional learning section that starts at line 75 is also a chunk of information that I feel could be applied in all of the models rather than just in the three year model, because this is just an aspect of being a good teacher, not just a good integrated teacher.
531	Appx	Teacher	Pitts Patricia	Appendix D is a more complete integrated framework, which I would support up through 10th grade in order to expose more students to all disciplines, and would best fit the lower or special ed students. However, it is very light and does not go into enough depth to prepare students for college courses, or an AP course. Additionally, I think the framework needs to discuss more on teacher preparation.
532	Appx	Other	Hoyt Brian	Difficult to follow. Having a basic outline format would help. Use of acronyms throughout the text after only being cited one time also leads to confusion.
533	Appx	Teacher	Fischer Jill	Regarding Appendix A: Recommended Literature starting at page 25 -29 ... Lists stories and the DCI strand that they match. Took me FOREVER to go back and look and start finding the actual stories themselves

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				<p>within the http://www.californiaeei.org/curriculum/ resource because the units on the curriculum website from EEI do not have direct link nor do they organize based on the story titles. To find the story, had to open a unit that I thought might match the topic, and look at their list of all the components. Then once found a story with title that matches at listed in the Appendix A draft, I opened a story to find it was not in a format that I could just print (due to maps that spread across 2 separate pages. Did find if I applied for a password and looked at the Teacher Edition for the unit, the story was in there, with the page spreads put together in a way that I could print and use in class. The beige background though will cause a ton of printer and copier toner to be used though. Would be VERY useful if in the final version of pages 25-29 included the actual name of the unit that each story is part of, and a note that the "teacher edition" for the unit has the best layout to actually use if needing to self-print it for use in the classroom. The link to the actual curriculum units should also be included ... http://www.californiaeei.org/curriculum/</p>
534	Appx	Other	Janzen Jennifer	<p>IMPORTANT COMMENT/SUGGESTION Appendix D: HS Three-Year Model: Every Science, Every Year - Would require a very special teaching population. In the past, this has led to tracking as bio-chem-physics remained? If this is taken, it needs the district to go this way, it needs to be cautious of tracking students. Classes should not be dumping grounds.</p>
535	Appx	Teacher	Myers Fred	<p>Lots and lots of acronyms!</p>
536	Appx	Other	Stillittano Marissa	<p>Appendix D 10/205-214 Give more detail about the what each credential entails. How will teachers be given opportunities to get the credential they need? Some of our teachers have life science credentials... what does that enable them to teach? 9/196-198 This statement contradicts the all standards all students. The way this statement is interpreted is that the PE in course 3 are not needed for the assessment. Does this mean the assessment will only cover PE in the first 2 courses? Does this mean the assessment will be in 10th grade? What message are you trying to convey here? If districts choose the 4yr model and the 3yr model (discipline specific) will they be adequately prepared for the assessment after 2 years? 7/174 This statement should be in the beginning of each course model for high school. Entire Appendix We are having trouble understanding why the integrated model is an appendix and/or why include it at all? How are we supposed to use this model? Can there be an introduction added to the appendix for the rational as to how districts should use this information, why the integrated model is not fully developed, who is the target audience for this model, 3/59-71 Give us the data that is being referenced here... provide a table with the countries and how they set the education program (who goes on to high school and who goes on to technical... are they tracked and if so what are those tracks). This will give us a better picture of the global world. 1-2/26-58 interesting to consider as talking points for conceptual courses... more engaging to focus on cross cutting concepts and allows for an opportunity to motivate more students to take science. 2/36-38 good that it</p>

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				mandates the sequence so you have access to content that if fundamental first 2/38-41 Nice how they talk about fundamental concepts that are transferrable.... but you can go more in depth if you specialize
537	Appx	Curriculum Specialist	Hinckley Matt	The recommended literature appendix is a double-edged sword: It has a few great resources, but should have more listed. On the other hand, the resources listed in it could be seen by stakeholders as representing "the law of the land."
538	Appx	Curriculum Specialist	Henderson Kenelee	We especially find A-C very useful.
539	Appx	Teacher	Hegdahl Lisa	Instructional Sequence (IS) Define IS in glossary PCK to glossary - referenced Intro of 6-8 Integrated -p 4 In 83 Glossary In CA Framework it appears to be a laundry list of acronyms. For instance ELA/ELD glossary actually added important terms and definitions. Add TOSA add IHE Add EQulP Quality Professional Learning Standards (QPLS).
540	Appx	Curriculum Specialist	Aust Andrea	Appendix A, bottom of page 16- Please amend the information for QUEST to read as follows: KQED QUEST http://www.kqed.org/quest QUEST provides relevant science and engineering multimedia resources for MS and HS students, educators and lifelong learners.
541	Appx	Other	Inouye Nathan	I would recommend that appendix D: HS Three-Year Model: Every Science, Every Year be included in chapter 7. This will allow teacher and Administrator to consider integrated, STEM, project-based, research, elective courses as having equal value as discipline-specific courses

General Comment

Comments (542-638)

#	Ch.	Title	Reviewer	Comments
542	Gen	Teacher	Galvan Bernedette	Provide more opportunities for teacher training in NGSS and STEM.
543	Gen	Other	Durant Jayne	To me this is just another system that is being implemented that will not increase the success of our students. It will probably be scrapped within a few years just like every other new program. Our education system is broken why don't we take a leaf out of our own book and MODEL after the European school system which is way ahead of anything that America has produced in the last 150 years.
544	Gen	Teacher	Rojas Amber	Some sections are extremely long and may deter teachers from reading all of the materials. Can some of the material be summed up in an easy to read table or chart?

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545	Gen	Teacher	Grudin Tara	Please get rid of the NCLB biology test.
546	Gen	Teacher	Stanger-Montano Sarah	I teach first grade and I only read the kindergarten and first grade sections. I much prefer a hard copy for so much reading. I'm sorry to not have very much feedback for you.
547	Gen	Other	Matheny William	You are living in a dream world. This framework is great for a college bound student who buys into it and cares. But there are students who do not do adequately in first grade, but they are passed on. Not just in science but all subjects, they get passed on. Eight or more years of failing, but they get passed on. Then they get to high school and are expected to know this stuff but we have been reinforcing for their entire formative years that it is okay to fail and you get to pass Go. But no more. Who's fault is that? Ours! The Framework will never work until the "system" that rewards failure is fixed.
548	Gen	Other	Mebane Myesha	I am concerned that there will be issues with equity throughout California. Smaller school districts will not afford science teachers with consumable and general lab budgets. My question is will there be additional state funding for science teachers especially those districts that cater to traditionally at-risk populations?
549	Gen	Other	Blake David	What is the preferred pathway, and subject content, from the position of both UC and CSU faculty. What would best prepare students for the university? Additionally we have many students in our district and in the state not take Chemistry and/or Physics because they are restricted based on poor math class scores. This severely limits the broad basics of a science and STEM education for all students. . What is the recommendation for a proper and appropriate high school science course of study for all students? Thank you
550	Gen	Teacher	O'Malley Kim	I really dislike the idea of going integrated in 6-8th grade. It will be completely overwhelming for our students and I don't see any value in going this route.
551	Gen	Other	Schleder Bradley	Overall, the segment organization needs to be improved. For 7th grade the clearest and most useful segment was plate tectonics. Well thought out.
552	Gen	Teacher	Miller Nancy	It appears that this framework was written by scientists who have never been in a middle school classroom.
553	Gen	Teacher	Ellis Peggy	Final thoughts about the framework is that it seems to be written by scientists and others wrote this framework to impress one another and not help the typical classroom teacher. The amount of time and energy we are spending to just make sense of the framework is unrealistic and a waste of time.
554	Gen	Teacher	Mead Bill	If textbook companies follow the science instructional resources when developing textbooks it would really help me as a classroom teacher to see the big picture and inspire students to consider

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				careers in science. I hope all teachers, site leaders and district personnel read this document when deciding on textbook adoption. Excellent job.
555	Gen	Teacher	Vu Quyen	Decrease unnecessary explanation in the introduction. By the time the reader gets to the meaty information, the reader is rambunctiously snoring. If including a concept map, simplify it. More complex it is, most likely a reader will skip it.
556	Gen	Teacher	Perry Aileen	I think there are several areas where thorough explanation of why a particular example was used is needed.
557	Gen	Teacher	Royer Jackie	It is indicated that this document is not dictating the content that should be taught, so if I use my experience as a chemistry major and the experiences of my former students in their college chemistry courses to determine what content I should teach in order for my future students to be successful with this chemistry framework, I will not have time to do what Mr. S does. Mr. S spends multiple days covering topics that I would need to cover in much less time. That is why I strongly feel that we need to be given a list of the content that needs to be taught. Maybe my thoughts of what needs to be covered is wrong, and that I could cover a lot less than I am currently trying to cover. Unfortunately there is no way for me to know if I am covering too much. I feel that I am covering the right amount of content, and I see that I could have my students meet these standards in this document, but I would need a few more weeks of school in order for that to happen. Again I can not overemphasize the importance of being given a list of required content (content, not just PEs) to assist me in educating my students. Reading these PEs and the confusion I am experiencing concerning what content I should teach is causing a lot of stress in my life and is not only making me question my background concerning my BS degree in chemistry, but also in my chosen career. I have a BS degree in chemistry, yet I am lost as to the exact content I should teach in order to meet these PEs. I am at the point where I am thinking that getting out of teaching might be the best option, since I don't know what to do concerning this framework and my teaching, and there is nothing out there to help me. Last of all, as a woman, I am offended that the chemistry teacher used in the chemistry class examples is a man each time. What, no women go into or teach chemistry? Makes me wonder what kind of subconscious message this is sending.
558	Gen	Teacher	Courdy Tyler	This does not take into consideration the need to differentiate instruction. There need to be considerations of what can and how to differentiate instruction. Furthermore, it seems that the use of CCC and Engineering practices are inconsistent and is not 3 dimensional all the way through.
559	Gen	Teacher	Rogers Sidney	My "overall evaluation" scores are only related to my work on Chapter 11.

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560	Gen	Teacher	Ortega Elizabeth	The suggestions for 6 grade discipline specific only address pages 1-28. I did enjoy reading The Middle School Vignette-Using Models of Space Systems to Describe and Explain Patterns of the Moon's Phases, but I'm afraid that some teachers will skim over this important information about how it is important that teachers allow students plenty of opportunities to work with different models. Maybe there is a way to shorten this vignette and include more visuals and still maintain the timeline of addressing these performance expectations.
561	Gen	Teacher	Garcia Robert	I really like this framework overall, it will be very helpful for all science teachers interested in creating an inquiry based science class aligned with Common core and NGSS
562	Gen	Other	Walters Lora	Vignettes are very helpful!
563	Gen	Teacher	Pando-Hernandez Leslie	The vignettes were very helpful. Some of the examples were helpful in the vignettes.
564	Gen	Teacher	Caira Sara	Vignettes are great! Easy to follow and implement as a lesson.
565	Gen	Teacher	Moore Caren	It is way too broad. Students will not have a common understanding of all materials since teachers have so much room to dive into other topics.
566	Gen	Teacher	Arechiga Angela	The math concepts or skills students need to use needs to be clarified further. Engineering process lacking though out, students using models not really developing their own. Need further clarification needed on how students are to develop models and engineering.
567	Gen	Teacher	Whitacre Arielle	The biggest concern is the math statistical analysis and calculations being asked for are still very unclear and confusing. Based on training received the term "develop" a model is being used in this document but based on the descriptions provided students are not developing but using a model. There could be some work in clarifying what exactly students do or don't need to know for certain topics (especially in terms of the level of detail).
568	Gen	Teacher	Moore Caren	There is WAY too much information. Please make the frame work more concise.
569	Gen	Other	Ortiz Gina	For the middle school band, I am happy that the framework shows how a teacher would break of the PEs into four segments (or quarters) of study. This provides an idea for planning a pacing guide for the school year. This makes the connection or inclusion of all the PEs in the time frame allotted from the school year much less daunting.
570	Gen	Teacher	Wasaznik Isabella	In general I feel that the document should be shorter, it's a bit lengthy, perhaps bullet points would be more useful along with some narratives and graphs. 120 pages is too much. The chapters should be grade level specific and not grouped together, this would make it easier to read, save time and avoid confusion when scrolling through a draft of K, 1, and 2 all together.

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571	Gen	Teacher	Collar Theresa	This document was the best explanation of NGSS that I have read to date.
572	Gen	Other	Frutchey Lynne	The textbooks and materials presented in an easy to use fashion are ultimately going to make or break whether or not NGSS will really get in the classrooms. If it is not easy for teachers, there will not be NGSS taught in elementary schools. When teachers are responsible for teaching all areas of the curriculum (multiple subject teachers teaching in elementary schools) science is often overlooked because of a lack of time to plan and implement. However, the document itself looks good!
573	Gen	Teacher	Cho Won	Thank you for working on this. However, I might have taken more time to read and review if I would have known ahead. After all, I am glad to take my time to review for last two hours. I will though take more time from here on till January 19, 2016 to review. I will also share this with teachers at two schools where I work this year.
574	Gen	Teacher	Kossak Scott	Links to multimedia resources that support teacher understanding of the concepts and/or student learning opportunities.
575	Gen	Teacher	Reyes Rose	We as teachers are so used to a certain teaching practice and methodology that it becomes a challenge to stay within the confines of a particular framework definition. Especially when teaching sciences.
576	Gen	Teacher	Lim Michael	These are the combined opinions of Michael Lim, Chris Nsor, Myrna Hipol-Estrada, and Robert Brombach.
577	Gen	Other	Massa Antonia	I support the proposal because it will give students straightforward, unbiased information about donation before they visit a DMV center to get their first license.
578	Gen	Teacher	Andrews Valerie	The framework supporting the standards is very helpful. The "format and Clarity" of the standards individually would receive a "POOR".
579	Gen	Other	Jacotin Kelly	Cells and cell function would fit better into 7th grade curriculum. Life Science in 7th grade is based upon and builds from the foundation of cellular biology. National Next Generation Science Standards have it in 7th. Putting cells in 6th is poor correlation with national standards and expectations. Putting it in 6th seems like a ploy to sell more textbooks specifically to California.

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580	Gen	Other	O'Connor Dawn	List of names of attendees: Anglon Sean Athreya Jagan Ayar Bahar Bapna Shweta Batalao Anna Baura Gery Boudreau Susan Brown Christine Byrd Clyde Carter Katy Conyers Keri Cortez-Rodas Manuel Dennis Tricia Dhillon Tan Dhillon Jagdeep DiStefano Rachelle Edwards-White Donna Ellett Michelle Gordon Marc Gregorio Maria Hair Richard Harker Melissa Jackson Devin Jung Hee soon Karri Ravi Kopacz Anna Kumar Kusuma Lakshmipathy Gayathri Le Ellen LeDuc Danika Lemke Susan Lepinsky Ray Lynn Valery Ma Ningyi Melcic Lane Metcalfe Darlene Noche Abigail Oshel Erick Parker Sharon Pine Gaia Pingali Raji Preminger Linda Pugh Charlene Reynes Charles Sandoval Rosemary Sankeshi Rakesh Santillan Olivia Sharma Sandhya Srem Yvonne Tomita Jennifer Vanegas Abel Ware Karrie Warren Stewart Westover Melanie Wheaton Kyra Willkom Gerald Withers-Sparkman Donna Wright Nancy
581	Gen	Teacher	Flammer Lawrence	Please see my lists of specific suggested corrections for Ch. 1, 2, 6, 7, and 10, to be sent in separately. My primary areas of interest and expertise deal with the explicit and integrated teaching of the many elements of the nature of science and biological evolution. The only additions I would make (to the Appendix H theme that "Scientific models, laws, mechanisms and theories explain natural phenomena") are clarifications like these: 1. A scientific theory is a substantiated natural explanation; it can never include supernatural aspects, because such causes are definitively untestable. 2. A hypothesis is used by scientists as a possible explanation or relationship of certain facts about the natural world, not a prediction or expected outcome of a study. It must be testable (capable of being falsified or disproved). To the theme that "Science addresses questions about the natural and material world" I would add: 3. Science limits its explanations to ... and empirical evidence; and to natural explanations, never to supernatural explanations. 4. Not all questions can be answered by science. Questions of judgment, opinion, beliefs, and supernatural events, as such, are not appropriate for scientific investigation.
582	Gen	Teacher	Berrner Jill	It doesn't seem like child development and student motivation was taken into consideration in the development of this framework. Also, although readable, most teachers will not use this as much as you'd hope. I LOVE science, but this certainly didn't inspire me to want to teach it more.
583	Gen	Teacher	Gettman David	My only concern with the NGSS Framework is that most administrators I have talked to are in the dark about NGSS entails, and how instructional strategies and assessments will be modified to include SEP's and CCC's. Most administrators still think NGSS is about memorizing facts and doing cookbook labs.

**Please note that survey responses have been populated directly from submissions and have not been edited.*

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584	Gen	Teacher	Pringle Kenneth	I have a longer critique of the draft with some suggestions that I will send to the framework committee at the address above. Please let me know if I can clarify or help, since I am forced to do a single pass through the curricula. Moreover, I know that Earth Science is a challenging, complex science that uses ideas from the other core sciences and have no problem teaching it as a way to enhance my students understanding of chemistry, their critical thinking, and their understanding of the impact of humankind on the Earth. But I do want a chemistry program that gives students many of the skills needed for college chemistry and for their other classes including AP Bio, and AP chemistry. This is a big project and I wish you all the best. Please feel free to contact me for more information or to clarify something I might have missed.
585	Gen	Teacher	Crowell Tom	being an earth science teacher throughout my career(30 yrs. +), I find that the way districts are going to determine course mapping and sequences are going to be a disadvantage to the earth science standards. courses that place emphasis on earth science and bring in concepts of chem/physics would better serve students and the need for earth science education. with these thoughts in mind, I also understand that there are fewer earth science teachers and classes at the present, thus, for earth science to take the lead in courses being developed has big obstacles, but is correct regardless.
586	Gen	Teacher	Brandon Linda	I believe in the overall idea of science integration. I think that the documents and training provided the teacher is losing something in the translation. Give us a simple way to meet our goals and for all concerned do not shuffle the subject matter. Leave the subject matter as is so that we can piggy back using NCLB certified teachers.
587	Gen	Other	Deswal Servesh	Give students real life skills like how to do your own taxes and change your own oil.
588	Gen	Teacher	Lehnhard Joey Noelle	In the K-2 Chapter: Quite a few developmentally inappropriate conservation messages and actions. “environmental education programs for children in early childhood, from ages three to seven, should focus primarily on exploring the outdoors, building empathy for nature and living things, and fostering positive connections with nature, rather than emphasizing environmental issues or problems.” (Page 53) See this from the National Environmental Education Association of America. Little to no examples of getting kids outside to explore their own schoolyard and community and how that connects to content even though it has a strong basis in science ed research. Contextualization is incredibly powerful for all kids, but especially our ELLs. Little to no tech integration – students rarely create content themselves. Opportunities for stronger connections to CCSS here. CCSS W.K.6 “With guidance and support from adults, explore a variety of digital tools to produce and publish writing, including in collaboration with peers.” No examples

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				in vignettes of key SEPs like Developing and Using Models, Arguing from Evidence and Constructing an Explanation
589	Gen	Teacher	Lawless Andrea	The examples (vignettes) describe experience but to not appear to clearly address how to access the PE/SEP/CC was met by student(s)
590	Gen	Other	Spencer Michael	It is concerning that there is limited or no mention of School Libraries and Library programs and how they support (STEM / STEAM) education. Non-fiction informational texts that support science teaching & learning are in the Libraries! In Appendix A - Rec. Lit., the word "Library" only appears three times and two of those occurrences it is in reference to the Library of Congress - not even School Libraries.
591	Gen	Other	Glimme Aida	Please know that we are representing a high school district only. We are reading the framework through the lens of HS community and it is difficult to implement the full vision of the framework when we don't have control of our multiple partner districts and HS models are unclear and don't provide enough guidance. Additionally we are very concerned that there is no mention of 9-12 grade instructional materials. How can we select course models if we do not have a plan for supporting instructional materials. As a high school community we are excited about the emphasis on science, cross cutting concepts, change in how and what we teach but need more clarity and more guidance on how to do this. We are encouraged that there is more science for an average student however we see this framework as limiting to our students who take multiple science electives, AP courses. We want to maintain depth and rigor in each of the disciplines NGSS Framework states: "It would certainly be recommended that students, especially those considering careers in a STEM- related field, would go beyond these courses to take science, technology, engineering and mathematics courses that would enhance their preparation." - When can our kids take these classes. We want to make sure that our kids who are advanced in science have the time and place to actually take this. The Ca framework, is too lengthy to actually be read by a person implementing it, can it be streamlined as it contains a lot of important information and we are worried we are missing it.
592	Gen	Teacher	Ultican Thomas	It is not guidance for instruction when it is mandated by a political power and it leaves schools open to manipulation.
593	Gen	Teacher	Kroeger Ryan	The content of the high school physics standards is still entirely too vague for districts and teachers to begin making effective plans. Furthermore, the assessment boundaries of the NGSS within physics cover a huge breadth of topics that does not allow teachers to alter their instructional practices. There is no reduction of content at the high school level that will allow teachers to slow

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				down and spend the extra time necessary to build student knowledge using the inquiry based instructional strategies presented in the framework.
594	Gen	Teacher	Loeb Deborah	Please update tests to examine what we teach esp. in middle schools. As we transition, we try to cover everything we did and will do in order that all grades will cover all the material they need for the CST.
595	Gen	Teacher	Marrs Barbara	Overall, the CA Framework writers have done a commendable job compiling a workable framework that aligns with the CA NGSS. We, the Silverado High School (Victorville) Biology team, found the examples of how to incorporate specific EEI curriculum and the detailed “Model Snapshots” very helpful. We also consider the Instructional Strategies for CA NGSS Teaching and Learning in the 21st Century to be a very valuable tool and contribution to the Framework as well. Our major concern is that the CA NGSS Framework for high school is built upon the premise that students have studied the NGSS in middle school. The framework states: “This instructional segment also builds on the other key ideas in life science that students engaged in during middle school...Students were introduced to...in middle school... In middle school PEs, students learned... Students will have prior knowledge about... Teachers should help students remember... Students at the middle school have learned about...” (Lines 134-141, 229-231, 310-313, 420-425, 474-475, 550-552, 654-657, 766-768, 892-895, 940-941, 1003-1005, 1082-1085). However, our current reality is that we receive high school students who have never been exposed to the NGSS or 21st century learning, and have little or no middle school science knowledge and/or skills. And most school districts are very reluctant to jump into the NGSS, so, for at least another decade, we can expect high school students with the abilities described above. What we are doing at the high school level is teaching the NGSS that should have been taught in prior years and only then attempting to incorporate some of the high school NGSS. There is no possible way under these conditions to teach most of the standards, using project-based learning, and at the depth of understanding that is expected. Most of the instruction suggested by the Framework cannot be fully implemented at this time, or for a long time to come. This is a Framework for the future—so what do we do in the meantime? We would like to suggest the development of a simplified Interim Framework Instructional Document, based on a few selected Essential NGSS Learnings, to get us through this period until we actually receive students that engaged in, learned, and studied the middle school NGSS, and who do have the prior knowledge and skills necessary to learn and perform the high school NGSS.

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596	Gen	Other	Rege Dawn	<p>Additional Comments for grades 3-5: 531: “Nevertheless, modern crops and livestock were created by people” -maybe say cultivated, manipulated, or bred instead of created? 542: what is meant by “unique lifecycles?” 693, 694: For example, animals that live in snowy places grow white fur in the winter and brown fur in the summer for camouflage. This change is NOT induced by the environment, but is a genetic adaptation that evolved because it helps the animals survive. -the example could be confusing for students, maybe to clarify say some animals -also, they do this for survival rather than for camouflage -maybe use a more clear cut example 1276 (background for teachers) -since this is a completely new topic for fourth grade, it would be good to have more visuals, links to videos, etc. 1325 “students need to develop the idea that solid matter has internal structure.at the same time. They should also recognize that solid matter is not just one continuous rigid object.” -confusing, maybe it should read: Students need to develop the idea that solid matter has internal structure. At the same time, they should also recognize that solid matter is not just one continuous rigid object. 1338 “A person cannot just make energy from nothing, and that after one “uses it” it is not “used up” but that it is still around in some distributed form in the local environment.” -saying “still around” is vague, should refer directly to the transformation of energy -maybe should say “but one form of energy when it is used, is being transformed into another form of energy in the local environment.” 1358, 1362 information is contradicting, maybe the second line is incorrect 1340 “Another idea students should understand is that every machine stops operating if fuel is not continually provided because friction converts the energy of the machine’s motion to heat its motor or the surrounding environment.” -confusing example, maybe refer to a “car” rather than a “machine” because it gives a more familiar image for students, easier for them to visualize -the sentence seems to imply that there is no friction when there is fuel 2892 (photosynthesis diagram) -the beginning of the reaction formula should be $CO_2 + H_2O$ -use an improved diagram -another fourth output should be chemicals for the plant to make new cells, for example: amino acids, lipids that are part of new cells 2900 “Sugar made in the leaves of the plant is transported down to the roots.” -maybe should say it’s transported everywhere, including down to the roots 2908 “the plant does acquire some essential materials from the soil. Nitrogen, iron, and a host of other nutrients must be obtained from the soil (usually by the roots) and the plant cannot survive without these.” -maybe should say plants acquire minerals rather than materials (to say materials or nutrients is misleading because it gives the impression that it’s a big portion of the nutrition of a plant when it’s actually a very small amount) 2952 “Plants, on the other hand, are able to absorb individual metal atoms from the soil surrounding the roots.” -this is incorrect</p>
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				because plants do not absorb metal atoms, rather they absorb minerals (ions in solutions) 2966 "placing a bag around the leaves of a plant to show the condensation collected" -should specify plastic bag
597	Gen	Other	Martin Jonathan	With the integrated models it seems many chemistry concepts needed for higher level courses aren't in the concepts to be covered how would this be addressed? Also many of them look like they lend themselves to a two year integrated model as an option since state most of information is in first two courses which still leaves room for higher level courses but are higher level concepts being provided in those first two years to allow success? What will assessments look like for science? Are they going to be given the data and material and more application of concepts driven or are students going to need that base knowledge to be able to apply concepts? Seems that most of the scenarios/lessons are do concept first and explore then define concept after where giving background knowledge first might drive inquiry and exploration of concept.
598	Gen	Other	Puraci Sebastian	The pendulum of education is swinging back. When will we reach equilibrium?
599	Gen	Other	Stover Michelle	There were many contradicting requirements and limitations for teaching the courses. A few examples are: 1. establishing knowledge on physical properties such as boiling and melting point while limiting the topic on intermolecular forces 2. Focusing big on chemical reactions and law of conservation of energy without providing a background on atoms and periodic table first. 3. Putting all emphasis at the end of the course without providing hierarchy of lessons based on its simplicity or complexity. Overall, there is a problem on how topics are organized to make a point that the old order of how courses are taught may not be best. Then, emphasizing that "concepts and ideas are more concrete so should be placed earlier in the sequence, with more abstract ideas coming later in the learning process."
600	Gen	Other	Rooney Shannon	I appreciate the time that that writers have spent putting together this document. I am excited for the movement away from memorization to problem solving based education. I am concerned that the importance of a strong subject specific knowledge base is being negated in this process. The educational pendulum is again swinging too far in one direction. It is my hope that as we adopt this new program, we will incorporate both knowledge and problem solving skills so that our students are truly prepared to move forward and become successful members of society. We can't expect them to make the next great discoveries in fields if they are required to google basic knowledge. They won't know what they don't know.

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601	Gen	Other	Rooney Robert	Question: How do advanced science courses (AP, IB, Anatomy etc.) fit into any/all of these models? Concern: The Every Science Every Year model seems to be pushed by county and state people I have spoken to. If it is the preferred model (as Integrated is for Middle School), why is it the least developed model in the framework. Question: The Every Science Every Year model makes passing mention of taking two years of Integrated Science, and then taking other sciences. Is a two year sequence possible for accomplishing the goals of NGSS?
602	Gen	Other	Pitts Patricia	It is difficult with these frameworks to envision how this is going to work for all students at all levels. I believe it needs to be more specific and more detailed as far as course framework and assessments.
603	Gen	Other	Hoyt Brian	Simplify standards to be readable instead of hundreds of pages would be spectacular. Having another book or outline of sample lessons would be good as well. It is evident much work went into this process. It will be great to see what is accomplished by its end.
604	Gen	Other	Murphy-Shaw Marian	Found some direct conflicts with philosophy of NGSS (uneven attention to the 3 dimensions) but also good examples for teachers...need consistency of voice and clarity of message still. Teachers will have a lot of reading to do with this, State Rollout Admin session called out concerns about what will be expected in classrooms. If leadership uses this document it will provide a teacher with justification to teach science as it should be taught, but they need to know what it says.
605	Gen	Teacher	McCormick Jill	Please extend this public review period. It is not enough time, considering it is around the holiday breaks and schools are transitioning terms. It would be helpful if examples at all grade bands and disciplines were included (in a table perhaps) where there are snapshots and vignettes. Additionally, how differentiation could work within the examples would ensure that ALL students have access without losing the principles of the CA NGSS.
606	Gen	Teacher	Fischer Jill	Is very wordy and a TON to comb through to determine what is to be covered for each grade level / topic. I shouldn't have to print 42 pages to know what I am supposed to cover for the year. I shouldn't have to read through hundreds of pages to get an outline of information for each grade level. Summaries are nice because as a teacher, I just do not have that much time. In addition to planning, I still have 6 hours of actual teaching each day, grading/ assessing what is being done, and planning for the next day, in addition to meetings, battling for access to the copy machine and MUCH more. All of that is excluding my own personal life. The more simplified and refined/ streamlined things can be, the more useful they are to me.
607	Gen	Curriculum Specialist	Malek Ladie	Although the document is lengthy, it is articulate, specific, and well-organized, and divided into manageable chunks. Most people will only read the 3-4 chapters that are most relevant to them. I

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				also think the CA middle school integrated model is the best in the country and the vignettes will help everyone to visualize the goals that we are all striving toward.
608	Gen	Teacher	Del Razo Crystal	Please keep in mind that I only skimmed the framework as a whole. However, I did look closely at Chapter 5, which is relevant to me.
609	Gen	Other	Janzen Jennifer	Combine documents or at least provide some sections ie. Chapter 7 and all subsections. Give an option of the framework as an entire document when in review for comparing and searching versus multiple files. Since they are already paginated and numbered by lines, then it is enough to refer back and forth. To see the tabulated comments from the review session, please go to: K-5: https://drive.google.com/file/d/0B1CSvfOsa0iyZ2JoSllvMVp4MVE/view?usp=sharing 6-8: https://drive.google.com/file/d/0B1CSvfOsa0iyzy0wcFM5NF9OUDQ/view?usp=sharing CH.8: https://drive.google.com/file/d/0B1CSvfOsa0iybi12a2hzX08yZTg/view?usp=sharing CH.12: https://drive.google.com/file/d/0B1CSvfOsa0iyNGc0c2pVOVIOUmM/view?usp=sharing
610	Gen	Teacher	Just Shana	There should be more than 2 models presented as options for high school. I can think of at least two other models: 1) a fully integrated 3 year model encompassing all the NGSS content. Other advanced courses could then be available for a 4th year of science study. 2) a hybrid 3-course/4-course model with the courses as follows: 3-course model: Earth Science, Biology and Physical Science (covering both the NGSS Chemistry and Physics content) - this would be ideal for students looking to major in non-science or life science areas or to students who are undecided. The fourth year could then be open to more specific sciences like Human Anatomy, Biotech, Forensics Science, or advanced courses of Biology, Chemistry, Physics, etc... 4-course model: same as the current 4-course model. The student experience the first two years of high school would be the same. The course the students take their senior year would depend upon the needs of the student. Unfortunately, the 3-course HS model, as written, will result in two distinct tracks, the result of which will be the continued segregation of students and continuing the current practice of our best and brightest students leaving high school without receiving any instruction in the Earth Sciences.
611	Gen	Teacher	Just Shana	There should be more than 2 models presented as options for high school. I can think of at least two other models: 1) a fully integrated 3 year model encompassing all the NGSS content. Other advanced courses could then be available for a 4th year of science study. 2) a hybrid 3-course/4-course model with the courses as follows: 3-course model: Earth Science, Biology and Physical Science (covering both the NGSS Chemistry and Physics content) - this would be ideal for students looking to major in non-science or life science areas or to students who are undecided. The fourth year could then be open to more specific sciences like Human Anatomy, Biotech, Forensics Science,

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				<p>or advanced courses of Biology, Chemistry, Physics, etc... 4-course model: same as the current 4-course model. The student experience the first two years of high school would be the same. The course the students take their senior year would depend upon the needs of the student. Unfortunately, the 3-course HS model, as written, will result in two distinct tracks, the result of which will be the continued segregation of students and continuing the current practice of our best and brightest students leaving high school without receiving any instruction in the Earth Sciences.</p>
612	Gen	Teacher	Fischer Jill	<p>inconsistent / interchangeable usage of Unit and IS and Unit on Figure 1 for each grade level Figure 1 (the Integrated Storyline) for 6th and 7th grades, shows 4 "units" where as in 8th grade, they are identified as "Instructional Segment" or IS. In the other tables for each grade level, is consistently referred to as Instructional Segments. The phrase of "units" is less intimidating than "Instructional Segments" which is abbreviated as "IS" and could easily be confused with "Integrated Storyline" The work in the</p>
613	Gen	Other	Osborne Jonathan	<p>The document is really far too long. It is not that the writing is not clear but who will read it and what audience is it written for? If it is for the wider public, it needs to be simplified or a parents' version of less than 10 pages should be produced.</p>
614	Gen	Other	Brydon Barbara	<p>The length is going to make this document less useful.</p>
615	Gen	Teacher	Conn Michael	<p>This is much better than the last one. My department members are excited about the shift in teaching focus, and a little nervous about the change in course structure. Still, it looks like we are on a better road.</p>
616	Gen	Teacher	Myers Fred	<p>Standards are very vague.</p>
617	Gen	Teacher	Chen Alex	<p>Overuse of acronyms in the framework (SEP) can be shortened to Sci&Eng instead for more clarity. California frameworks are still fairly vague. Hard to implement.</p>
618	Gen	Other	Stillittano Marissa	<p>I am submitting this on behalf of 37 teachers, administrators, and community members of Torrance and Manhattan Beach. I will e-mail all the additional comments to the e-mail listed above. Thank you!</p>
619	Gen	Other	Warren Glen	<p>The framework is the best I have seen to date. It is moving us in the right direction, from teacher centered to student centered. However I do think that it is a big mistake to not references school library services when research and question formulation is a huge part of this work. The reference is important, because the value of library services comes from the specific academic areas and the student own personal inquiry needs. Library help bridge the equity challenge by making sure all students have access to valuable, accessible information.</p>

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620	Gen	Other	Hinckley Matt	It would be REALLY great to provide a summary version of this document that is easy for stakeholders to understand. As it is now, science teachers - the main critical stakeholder group in NGSS implementation - can't be expected to access such an unwieldy collection of documents. If you create a version that is accessible to teachers and then trust they will use it, NGSS implementation will be WAY better.
621	Gen	Curriculum Specialist	Henderson Kenelee	We are very concerned that there will be insufficient funding specifically targeted to science to back the tremendous amount of technology (probeware, computers for simulations, information processing, calculating, programming etc) equipment for hands-on inquiry on a regular if not daily basis, updating or incorporating safety equipment (especially PPEs), reduction of class sizes to accommodate safer science classrooms, additional lab classrooms, and the tremendous amount of professional development needed. Current wording in various recent bills simply lumps science with other core areas, which we believe dilutes the impact of funding that may be intended for science. We have concerns that the answer to our need for funding will continue to be "Look for a grant; Write a grant; Get a sponsor; etc." In view of the time teachers need to devote to science instruction (especially if they are truly trying to implement the heart of the California Science Framework, the pat answer of "Go look and find your own funding." can no longer sustain science education in California much less bring about the wide sweeping changes called for in the framework. Science teachers can no longer be expected to subsidize science education (the underlying expectation when budget allocations treat science instruction in the same way as core classes that do not need the equipment.) Science instruction should be budgeted for much more akin to CTE courses, where funds are specifically targeted and there is a fundamental acknowledgement of the very high requirement for supplies and equipment in order to provide the hands-on "real world" applications for those courses.
622	Gen	Other	Ellis Kelly	The framework was very clear. We liked the examples and we feel this will help as we revise our curriculum as information science educators. Including the EP&C and the alignment with EEI is great!
623	Gen	Other	Duong Annie	Elementary vignette format should be used as example to create secondary vignettes for their clarify and inclusive of instructional strategies, literacy strategies/connections to address the needs of ALL students.

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624	Gen	Other	Barnett Teresa	<p>I, and the educators I reviewed this with, have two overarching concerns. First, the Framework seems to be strangely disconnected from the vision of NGSS (even though we are aware that some of the writers worked closely in developing the NGSS). At the elementary level in particular, there seems to be a lack of clarity around how to shift teaching practice to engage students in meaning making, scientific discussions, using evidence to support claims with specific grade level examples or rubrics. Show what it means to start with phenomena rather than "teaching about topics"! What does good "science talk" look like in Kindergarten or first grade, and how is that different from what it should look like in 4th or 5th grade? The framework is missing these important elements, and has far too many examples of things like "this is when the teacher tells the students that (insert content fact)." Isn't that exactly what we're supposed to be moving away from? And secondly, and a MAJOR point of concern, is that the vignettes, particularly at elementary, seem to serve no cohesive purpose, and are confusing at best and poor exemplars at worst. You would be better served by removing them completely, at least from the elementary sections. They should be short, clear, and exemplify a teacher engaging students in science practice or asking questions that derive from and connect with a specific crosscutting concept. For example, it would be useful to have two short vignettes illustrating how a teacher could approach a particular lesson/topic from two different crosscutting concept lenses -- how would the questions, discussions, evidence, writing prompts differ? This is the kind of guidance teachers value; they don't need to be told the song to sing while sitting kindergarteners down on the rug for a science talk. Classroom management at that level they should have a good grip on; shifting their own science teaching practices is where short, clear examples would add value.</p>
625	Gen	Teacher	Snyder Lisa	<p>General Comment: It would be helpful to have ELD Connections boxes similar to what is available in the K-5 sections in the 6-8 sections.</p>
626	Gen	Teacher	Schmidt Karen	<p>I only had time to review Chapter 6 Grade 6-8 Integrated Model, which took 10 hours and required more space to respond than could fit in this form. I will send my chart of feedback, which followed the CSTA recommended format, to the email address above. Thank you for giving teachers a couple months to review this, and over a Winter Break.</p>

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627	Gen	Teacher	Deich Molly	<p>Rather than address the teaching of density directly, the CA Science Framework and the NGSS for middle school consider density as a defining characteristic of matter (e.g., analyzing a substance by calculating its density to determine whether a chemical reaction has occurred -- MS-PS1-2) and as a driver of Earth systems (e.g., knowing that varying levels of salinity drive ocean currents -- MS-ESS2-6). Glossing over density instruction in this way may leave the majority of middle-school students unclear on the relationship of mass to volume. Recommendations: Use words carefully and consistently when teaching mass, volume and density concepts. Avoid words such as size, amount, heavy, and light because they are vague and, at times, misleading. Teach density as an intensive quantity with many opportunities to observe, model, and predict how changing one variable at a time will affect the density of matter. Spend as much time as possible modeling, predicting, and observing the effect of different volumes on the density of matter. Give students ample opportunities to discuss thought experiments and to develop solutions together in order to refine their understandings of how to measure matter. This is particularly important with problems that have non-obvious solutions, such as finding the mass of air or finding the volume of a drop of water. When comparing the densities of materials, make sure that the volumes span a range. Comparing the densities of equal volumes of materials may encourage student conflation of mass and density. When discussing thermal expansion of matter, ensure that students keep the concepts of conservation of mass and variable volume distinct. Practice with the density formula is both useful and practical, but be sure that students have plenty of opportunities to model their answers diagrammatically as well. Further, using diagrams along with $d = m/v$ to solve for unknowns is helpful for developing deeper understanding.</p>
628	Gen	Curriculum Specialist	Velez Diana	<p>The document is so long that I couldn't review all of it. For the most part, what I read is instructive and communicates the NGSS well. Unfortunately, the grade level chapters are problematic and that is where teachers will go for guidance on instruction. The introduction states that the instructional segments are to be considered examples, yet the reality is teachers will interpret them as the way to teach the PE's. The vignettes will be taken as how they have to teach the PEs and they are missing language of practices and in depth treatment of the CCC. Limiting the vignettes to only the SEPs and CCs in the PEs gives exactly the message we don't want to communicate - that the PEs are the curriculum. I also think it's inappropriate and not useful to use the EEI curriculum as a model for 3-D learning. (Please my line by line comments via email response.)</p>

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629	Gen	Other	McGill Melody	The use of guiding questions, especially at the TK - 5 grade levels, is a good addition to the framework. It will assist teachers in focusing the content being delivered. Though I am concerned that some teachers will take that to mean the only content that needs to be addressed is the content that will answer the question. They may not develop the content in the depth desired under NGSS.
630	Gen	Teacher	Flanagan John	I'm currently a middle school science teacher, but I taught multiple subjects in many grades before this (K, 1st, 3rd, 4th & 5th). I still work closely with 3rd-5th teachers in our District's 3-8th grade STEM training & planning group. My District has been trying to implement the CA NGSS for the past two years. I have worked in both low SES, high ELL and high SES, low ELL schools, and my middle school is somewhere in the middle of the two. I love science & teaching, but I've worked with others who are far less passionate about science education than I am. Therefore, I think I have a pretty good overview of how the CA interpretation of the NGSS in the Framework will play out statewide. My key concerns are more with the current organization of topics than with the verbage and layout of the draft framework (even though I've heard constant complaints about the readability/comprehensibility of it from k-5 teachers). I think it should be revised before it is released. If a major revision of topical organization is out of the question, then I'd recommend that the committee consider reevaluating the National NGSS and considering them for adoption. The topical organization and clear evidence statements make the National version a much more compelling framework than the CA draft framework is.
631	Gen	Other	Juarez Tamara	I would like to request that the Framework have searchable subsets. The document is quite long, so when teachers use it they should be able to get to the nugget of learning they need in a teacher-friendly time frame (half-hour to one hour blocks). For example when a teacher is planning a lesson using models, it would be great to have quick links to instructional strategies and examples. As a district office support person I would like to have a good way to send out a small sampling of reading materials that dove-tail with what the teacher is working on at the moment.
632	Gen	Teacher	Brockway Eric	There is a missing technology component. The Framework for K-12 science education asserts, "Science, engineering, and technology permeate nearly every facet of modern life, and they also hold key to meeting many of humanity's most pressing current and future challenges". There is not evidence that the new state standards/ framework completely answers to these challenges. There is an interconnectedness to technology and science that is not included in any part of the middle school framework or standards. Please get back to me on why. How are we setting up science education accommodate the future findings/process/concepts/ issues that haven't come

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				up yet? We are not only short changing career and college readiness, we are not taking advantage middle school minds ability to learn coding, and computer science/ circuits by not including this as part of science. We are only given 2000 character limit for feedback for each section. I wanted to add that not all the guiding questions that were addressed in each summary, and site specific lines, but could not.
633	Gen	Teacher	Lewis Shani	The guidelines and implementations of the NGS Standards are feasible and pertinent for the growth of our students today. Good teaching can start at any point in a students academic career and the NGS Standards are guidelines to enrich student learning in the Sciences. While the state standards pointed specifics in regards to specific content a student displayed mastery in there was not much room for creativity or directives for engineering and creativity. If implemented with fidelity over three years, and modified accordingly to benefit the learning of all students, our students will, again, be able to compete worldwide in regards to the Math and the Sciences.
634	Gen	Curriculum Specialist	Aust Andrea	I think it would be valuable to include an appendix for suggested digital media resources, including video, audio, interactives, etc.
635	Gen	Teacher	Smith Mandy	General: The summary of the DCIs is different across content. Chemistry just copied and pasted DCIs, Bio, Physics summarized, and ESS GREATLY summarized (sometimes having nothing to do with the DCI). I also feel that there was a general misunderstanding on what a DCI is and what it means to be a highlighted DCI. Within a DCI area (example ESS2.D Weather and Climate) there are actually multiple statements each aligned with specific PEs. There needs to be more clarification on what part of that DCI is intended to be taught in each Instructional Segment, especially since the DCIs are never fully written out anywhere in the framework. They split the segments up very different as well 12 in Bio, 8 in ESS, 5 in Chemistry, and 4 in Physics.
636	Gen	Other	Inouye Nathan	Formatting: I love that some of the writers highlighted the focused dimension in each of the vignettes, snapshots, and narratives. I would like to see this consistently throughout the entire document. -Formatting: If this has not been done, please make
637	Gen	Other	Passmore Casey	While very interesting, the overwhelming number of pages is going to turn off many teachers. I felt like many sections were not very specific to science and could be better as appendices or some other reference text so that the Framework is more focused on science and is more manageable for teachers to read. Also, I read other sections but those comments were submitted as part of a review session.

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638	Gen	Other	Kendrick Desiree	Lastly, in my opinion the 2016 Science Framework Draft can be easily read, and comprehension is outstanding well attuned visual connection for implementing the Next Generation Standards Transitional K- Kindergarten through 12th grade.
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