



# FOSS Publisher's Response

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The Next Generation Science Standards are a set of expectations directed toward a goal: helping students make sense of scientific phenomena and solve problems. For three decades, FOSS curriculum designers at UC Berkeley's Lawrence Hall of Science have been advancing science instruction to the same goal. As a result, FOSS is America's most adopted science program, taught by 100,000 teachers and engaging over 3.5 million students each year across all 50 states. Evolved to embody the specifics of NGSS, FOSS materials are research-based and classroom-tested to promote equity for all learners.



## Winner in district evaluations

The EdReports' review of FOSS prioritized a very narrow interpretation of NGSS objectives. Matters of implementation and data related to crucial classroom results were not addressed. Other review processes, including many by states and districts, have considered a broader range of criteria, such as these specified by Oakland Unified School District:

**In the Oakland Unified School District, we evaluated middle school science instructional materials based on six criteria: (1) NGSS Alignment, (2) Supports for Language, Literacy, and Common Core Connections, (3) Equity and Access, (4) Assessment, (5) Teacher Usability, (6) Quality of Student Materials. Our teachers and students rated Next Generation FOSS highest in every single category. We are proud to provide teachers and students with instructional materials that promote both teacher and student learning.**

Brenda Tuohy, STEM Director, Oakland Unified School District  
California

Like many districts, Oakland has implemented FOSS materials, examined the evidence, and reached its own conclusion: FOSS works in the classroom, successfully involving learners of all backgrounds, cultures, languages, and abilities.

## Wide-ranging materials viewed through a narrow lens

The providers of FOSS do agree with EdReports that instructional materials should be judged according to NGSS expectations. However, EdReports' review of the FOSS Middle School program reveals that the rubric and evidence guide alone are unable to evaluate a curriculum's compliance with the expectations of *A Framework for K-12 Science Education* and NGSS to deliver positive classroom outcomes.

While EdReports raises noteworthy questions, it provides an insufficient evaluation of FOSS Middle School's alignment with NGSS. High-quality science curriculum materials are too complex for assessment through such a narrow lens. We encourage districts and schools to weigh EdReports' review against district, regional, and other nationally recognized tools, incorporating pilot feedback from teachers and students, for a more complete and useful picture.





# 1. NGSS celebrates the need for flexibility and variety, yet EdReports’ protocol is narrow and rigid.

## A. FOSS embodies three-dimensional instruction

NGSS and FOSS strive to provide three-dimensional instruction. EdReports found numerous instances across 73 investigations in FOSS “where the **[FOSS] instructional materials include all three dimensions** and integrate SEPs, CCCs, and DCIs in student learning opportunities” (page 2). It criticized only one example in one course, an introductory lesson that allegedly left out a DCI. The authors of NGSS never intended that every single moment in a science classroom should be three-dimensional. Yet that is what the EdReports tool promotes.

## B. Phenomena: employed as the NGSS authors intended

The centrality of “phenomenon” in NGSS does **not** imply that an external anchor experience must begin every investigation. At times, carrying sense-making of a particular event or example through multiple investigations may be appropriate, at other times contrived and unsuitable. What is critical is a logical developmental learning sequence focused on phenomena, which **FOSS specifies** in each investigation’s concept map. Also critical are opportunities for teachers to make connections to local phenomena by connecting to everyday phenomena throughout each course—as found in FOSS. EdReports’ review reveals a prescriptive interpretation of the role of phenomena in instructional materials that differs from the approach described by NGSS.

From Achieve/NGSS (emphases ours):

*Not all phenomena need to be used for the same amount of instructional time. Teachers could use an **anchoring phenomenon** or two as the overall focus for a unit, along with other **investigative phenomena** along the way as the focus of an instructional sequence or lesson. They may also highlight **everyday phenomena** that relate investigative or anchoring phenomena to personally-experienced situations. A single phenomenon doesn’t have to cover an entire unit, and different phenomena will take different amounts of time to figure out.<sup>1</sup>*

## C. Sense-making: foundational to student learning

EdReports’ review states, “Only twelve investigations in the series engage students in sensemaking of phenomena or solving design problems” (page 36). In fact, the published FOSS chapters Sense-Making Discussions for Three-Dimensional Learning for each grade level cite a total of **59 formal sense-making opportunities** in grades 6-8, each of which is clearly indicated with accompanying DCI, SEP, and CC as in the example below.<sup>2</sup>

	Instructional opportunity	Disciplinary Core Idea	Science and Engineering Practices	Crosscutting Concepts
<b>Heredity and Adaptation</b>	Inv. 1, Part 2, Step 26	LS4.A: Evidence of common ancestry and diversity	Analyzing and interpreting data; engaging in argument from evidence	Patterns; stability and change

In addition, FOSS grades 6–8 includes **eight explicit engineering problems** for which students design solutions. Due to this discrepancy in the count of student opportunities (EdReports: 12; FOSS: 67), it appears the EdReports’ tool either inadvertently missed dozens of sense-making opportunities, or defines them differently than the FOSS developers.



## D. Three-dimensional assessment: honoring NGSS's letter and spirit

In assessment design, the EdReports review again exposes its rigidity. The reviewers criticized FOSS for not actively using all the three-dimensional strands in every summative assessment item. However, NGSS does not expect this of every item. Quoting NGSS's *Criteria for Statewide Summative Assessment*:

*... any given task or task component may connect to substantial parts of one or more standards, but will likely not fully assess a given standard.*

*... Each task contributes evidence for particular claims and subclaims. Tasks, taken together, provide the evidence needed to support the assessment purpose, claims and subclaims, assessment design, and reporting categories.*

*All multi-component tasks require students to explicitly apply at least two dimensions at appropriate levels of sophistication to successfully complete the task.*

*The vast majority of assessment prompts (individual questions; these can be stand-alone tasks or parts of multicomponent tasks) explicitly require students to explicitly apply at least two dimensions at grade-appropriate levels of sophistication to successfully complete.<sup>3</sup>*

NGSS does not call for every item to assess each of the three strands. Taken as a whole, each FOSS benchmark assessment provides evidence for student learning of specified performance expectations, meeting the actual expectations of NGSS.

**The richness and opportunity for science learning in FOSS is in harmony with both the intent and content of the NGSS. Even with the complexity resulting from the 3-D nature of the standards, the writers of The Framework and the NGSS still envisioned that “the NGSS... not dictate or limit curriculum and instructional choices” (Introduction to the NGSS, p. xiv). FOSS has chosen a scope and sequence that respects that vision, while still providing the resources necessary for effective student learning, including assessments that measure all three dimensions.**

Craig Gabler, Ph.D., Member, NGSS Writing Team



## 2. EdReports’ review process fails to collect data on a curriculum’s classroom experience and impact.

**A.** EdReports’ reviewers never observe the program in practice with its most crucial stakeholders: students. Evaluating a program’s design via rubric alone is incomplete without also observing how that program translates to actual student learning. This is exactly why most districts include classroom pilots by teachers as part of the review process.

**B.** Classroom implementation analysis should also include another critical component: whether **teachers** find the program materials educative, supportive, and usable day-to-day. This is essential, especially because NGSS represents a dramatic shift from normative curricula, instruction, and assessment for both teachers and students.

## 3. EdReports’ “gateway” blocks critical information.

EdReports Gateway 3 could provide some insight on the likelihood of implementation success. However, the restrictive structure of EdReports’ “gateway” approach gives educators **no information** about later gateways if the first gateway is deemed too low. This system leaves out evidence of materials’ comprehensive strengths and weakness. This winnowing process ultimately renders an incomplete and misleading verdict. Districts seeking to prioritize classroom impact and teacher support cannot use EdReports’ science rubric to compare programs because the Gateway 3 information on most programs is **unavailable**. Compared to the EdReports’ process, any of the multiple NGSS-curriculum evaluation tools recognized by Achieve provide a more comprehensive view.

### Conclusion

The FOSS Program was built and continuously evolves based on evidence—from research, evaluation, ongoing teacher-student experience in actual classrooms, and feedback and insights from educational agencies. Our experience in designing, implementing, and evaluating standards-aligned curricular materials and track record of success leads us to stand behind the successful implementation of FOSS Middle School across the country. Real-world experiences and evidence from diverse classroom settings continue to validate FOSS’s ability to enable teachers and students to meet NGSS expectations. States, districts, schools, teachers, and students can remain confident that FOSS Middle School is a fully realized 21st century science program, embracing NGSS and proven effective in the classroom.

### References

<sup>1</sup> Using Phenomena in NGSS-Designed Lessons and Units. Published September 2016. View Creative Commons Attribution 3.0 Unported License at <http://creativecommons.org/licenses/by/3.0/>.  
<https://www.nextgenscience.org/sites/default/files/Using%20Phenomena%20in%20NGSS.pdf>

<sup>2</sup> *Sense-Making Discussions for Three-Dimensional Learning—Grade 8*, Full Option Science System, UC Berkeley, 2018

<sup>3</sup> [https://www.nextgenscience.org/sites/default/files/resource/files/CriteriaforStatewidesummativescienceassessments\\_03192018.pdf](https://www.nextgenscience.org/sites/default/files/resource/files/CriteriaforStatewidesummativescienceassessments_03192018.pdf)

