

Louisiana Believes

Science Standards

February 2017

Schedule

- Review process
- Vision
- Draft standards
- Implementation

Louisiana State Standards

Louisiana state law RS 17:24.4 requires BESE to adopt academic content standards, which are defined in the law as statements that define what a student should know or be able to accomplish at the end of a specific time period, grade level or at the completion of a course.

The law sets forth an expectation that standards be rigorous and that they represent the knowledge and skills needed for students to successfully transition to postsecondary education and the workplace, as determined by content experts, elementary and secondary educators and school leaders, postsecondary education leaders, and business and industry leaders.

BESE Bulletin 741, §2301 states, “The Louisiana content standards shall be subject to review and revision to maintain rigor and high expectations for teaching and learning.”

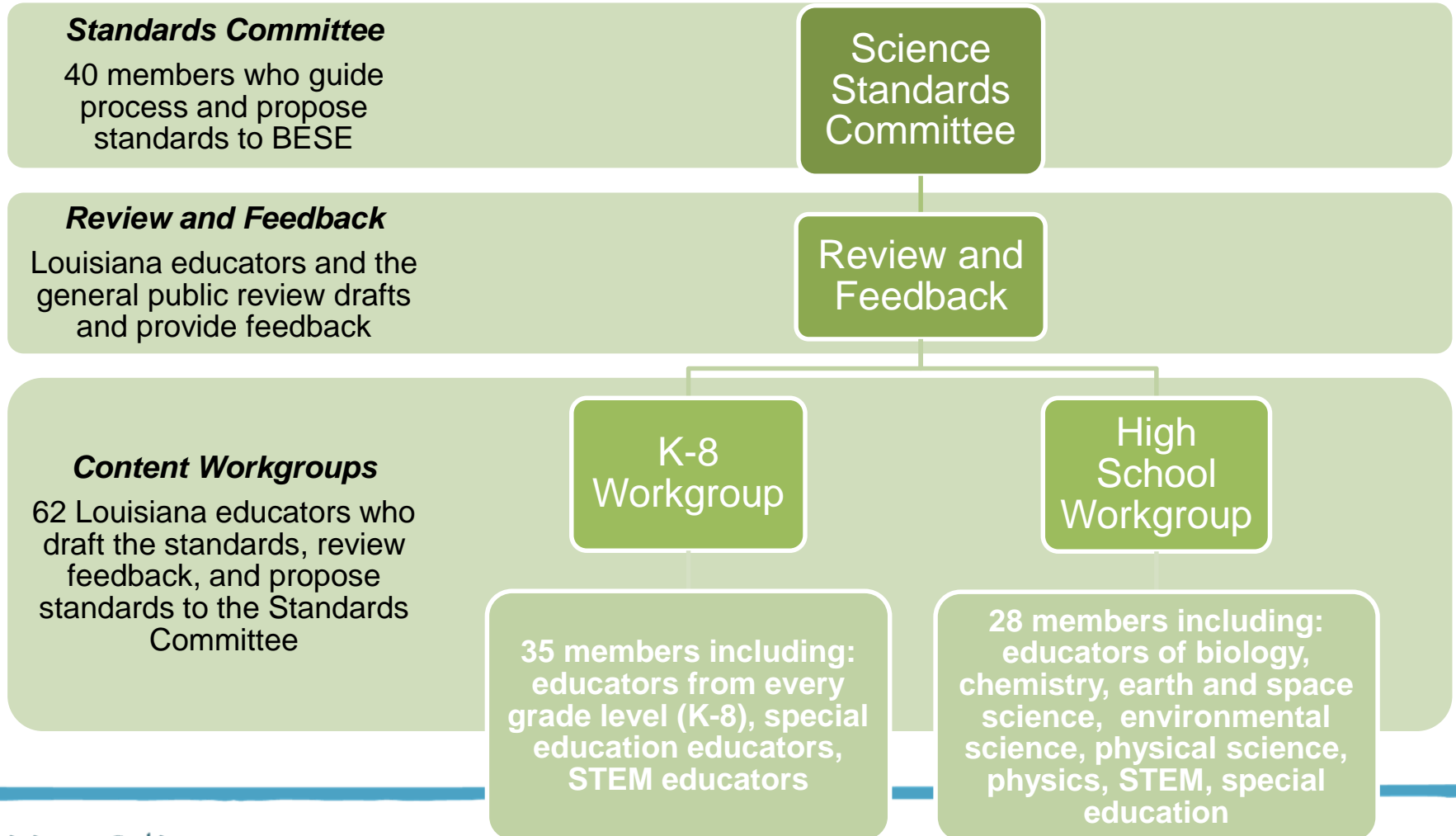
Louisiana Science Standards

In accordance with state law, the science review process is being led by content experts, elementary and secondary educators, postsecondary education leaders, and business and industry leaders. BESE has also provided for extensive participation by parents of Louisiana school children and the general public, both through the online review portal and in standards review committee meetings.

BESE solicited nominations statewide from several education associations, local school systems, and key stakeholder organizations representing parents and business and industry leaders. From these nominations, the board assembled a diverse group of 86 individuals representing every sector mentioned in the law, as well as every geographic region of the state.

These volunteers are serving on a standards review committee and two content workgroups, each led by a designated chairperson.

Standards Committee & Workgroups



Review Process: Timeline Overview

Meeting	Purpose	Date	Location
Standards Committee and Content Workgroups	Organizational meeting	Wednesday, August 31, 2016	Alexandria
Content Workgroups	Finalize framework and begin draft	Thursday, September 1, 2016	Alexandria
Content Workgroups	Draft	Monday, September 12- Tuesday, September 13, 2016	Alexandria
Content Workgroups	Draft	Wednesday, October 5-Thursday, October 6, 2016	New Orleans
Content Workgroups	Produce first draft	Sunday, November 6- Monday, November 7, 2016	Covington
Standards Committee	Review draft for public comment	Thursday, November 10, 2016	Baton Rouge
Content Workgroups	Revise first draft after public comment period	January 11-14, 2017	Lafayette
Standards Committee	Review draft and provide feedback	January 25, 2017	Bossier
Content Workgroups	Update draft (if needed)	February 1-3, 2017	Baton Rouge
Standards Committee	Final draft and vote	February 13, 2017	New Orleans

Review Process

Committee Task to Workgroup

On August 31, 2016, the committee tasked the workgroups with developing Louisiana Student Standards for Science by Tuesday, November 8, 2016, to be reviewed prior to public comment period.

These included:

- Standards for Kindergarten through 8th grade
- Standards for Biology, Chemistry, Physics, Earth and Space Science, and Environmental Science

Review Process

Thus far, educators who make up the workgroups have each spent an average of 70+ hours meeting in person as groups and 15+ more independently researching and reviewing drafts of standards to achieve this ambitious task.

- 14 total meeting dates thus far
- Over 5,500 hours combined
- 41 school districts, 5 charter schools, 20 organizations, 4 universities, and the Board of Regents directly involved

Review Process: Public Portal

Public Portal Usage

- Accessed the portal: 1404 people
- Logged into the portal: 1006 people
- Provided feedback: 180 people

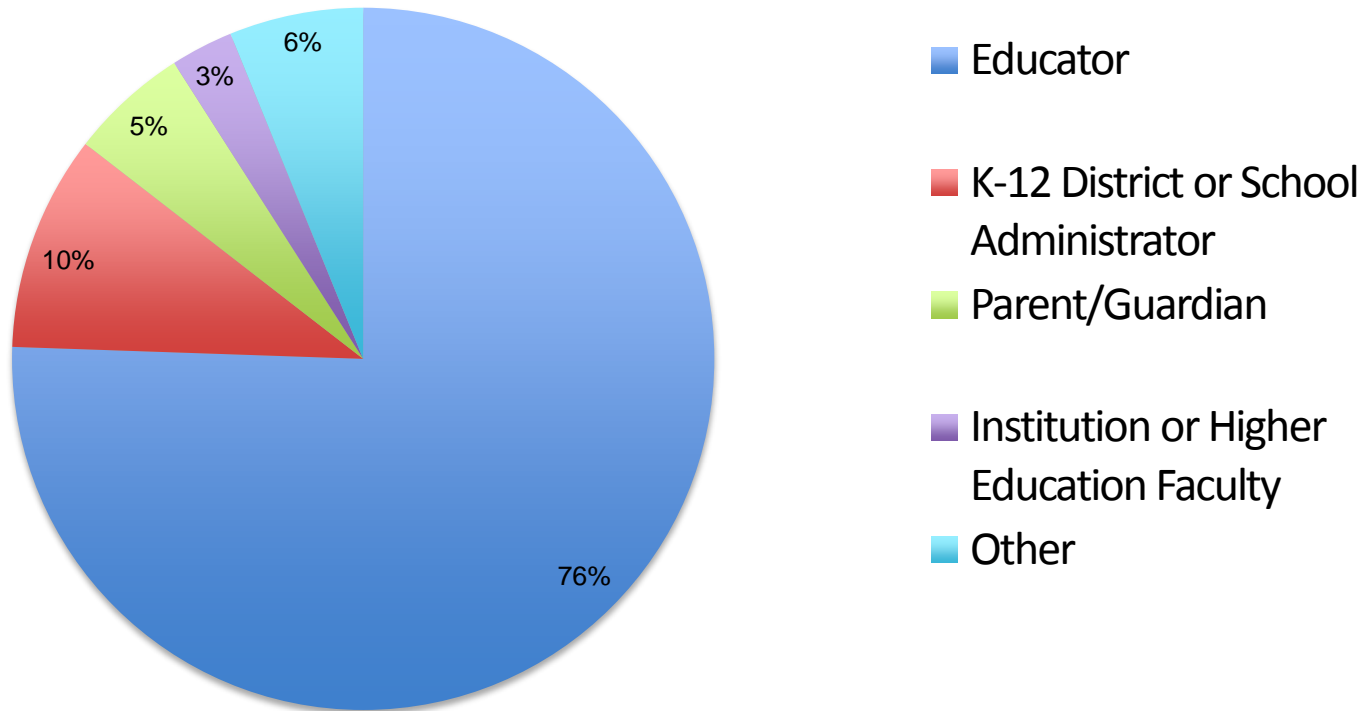
Feedback Overview

- Standards available for feedback: 920
- Standards with feedback: 883 (96%)
- Points of Feedback: 4278
- Points of Agreement: 3403 (80%)
- Suggestions to change grade level, edit, or remove: 875 (20%)
- Feedback received via email: 17

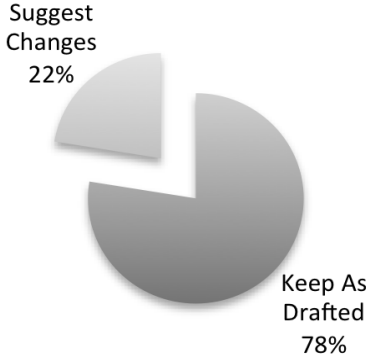
Access the full summary and raw data set [here](#).

Review Process: Public Portal

Login Statistics



Feedback Summary

Total Reviews: 10,272												
Keep Standard As Drafted	7,952	K-12 Administrator	266	 <p>Suggest Changes 22%</p> <p>Keep As Drafted 78%</p>								
		Institution or Higher Education Faculty	855									
		Other Educator (not administrator or higher education)	5,598									
		Member of Organization	159									
		Parent/Guardian	93									
		Student	1									
		Other	980									
		Suggest Changes to Standard	2,320		K-12 Administrator	179	<table border="1"> <thead> <tr> <th colspan="2">Change Suggestions</th> </tr> </thead> <tbody> <tr> <td>Remove</td> <td>385</td> </tr> <tr> <td>Move to a Different Level</td> <td>1308</td> </tr> <tr> <td>Rewrite</td> <td>627</td> </tr> </tbody> </table>	Change Suggestions		Remove	385	Move to a Different Level
Change Suggestions												
Remove	385											
Move to a Different Level	1308											
Rewrite	627											
Institution or Higher Education Faculty	90											
Other Educator (not administrator or higher education)	1,752											
Member of Organization	72											
Parent/Guardian	106											
Student												
Other	121											

Feedback Summary

Grade/Course	Count of Feedback	Count of Keep As Drafted	Percent of Keep As Drafted	Count of Suggest Changes	Percent of Suggest Changes
Kindergarten	505	420	83%	85	17%
1 st grade	350	296	85%	54	15%
2 nd grade	627	567	90%	60	10%
3 rd grade	642	535	83%	107	17%
4 th grade	930	777	84%	153	16%
5 th grade	675	604	89%	71	11%
6 th grade	1,038	702	68%	336	32%
7 th grade	1,336	713	53%	623	47%
8 th grade	1,111	725	65%	386	35%
HS Life Science	1,374	1189	87%	185	13%
HS Chemistry	625	530	85%	95	15%
HS Physics	293	190	65%	103	35%
HS Earth and Space Science	290	271	93%	19	7%
HS Environmental Science	476	433	91%	43	9%

Access the full feedback summary [here](#).

Review Process

Review Process Next Steps:

- The workgroups are currently meeting (February 1-3) to revise the standards based on the committee feedback.
- The committee will meet on February 13 to consider moving the standards to BESE for approval.
- BESE will consider the standards for adoption at their March meeting.

Schedule

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Standards Overview

As tasked, the workgroups drafted a set of standards that:

- Define what a student should know or be able to accomplish at the end of a specific time period, grade level or completion of a course.
- Represent the knowledge and skills needed for students to successfully transition to postsecondary education and the workplace.
- Build on skills learned in previous years and avoid repetition from year to year.
- Connect across grades and within grades.

Workgroup Vision

Historically, K-12 science education has emphasized factual knowledge and encouraged breadth over depth of content knowledge.

As stated by the National Research Council, “Science is not just a body of knowledge that reflects current understanding of the world; it is also a set of practices used to establish, extend, and refine that knowledge. Both elements – knowledge and practice – are essential.” (NRC 2012)

The Louisiana science standards review committee and workgroups acknowledge that K-12 science must shift to meet the demands of today’s technological society and prepare students for their future in that society.

Overview of Standards

- Quality standards provide focus on fewer topics with more opportunity for students to engage deeply.
- Quality standards identify key student knowledge and skills that students should demonstrate by the end of the year.
- Quality standards connect learning within and across grades.

Past Science Instruction	Drafted Louisiana Student Standards for Science
Focus on content acquisition	Students develop and apply knowledge in new situations
Many topics, little depth	Fewer topics, more depth
Teacher dominated discourse and instruction	Students engage in developmentally appropriate experiences using similar behaviors as a scientist

Overview of Standards

Quality standards provide focus on fewer topics with more opportunities for students to engage deeply.

Grade	Number of GLEs	Number of LSS for Science
Kindergarten	32	10
3 rd grade	62	15
6 th grade	87	18
HS Biology	58	20
HS Chemistry	63	13
HS Physics	51	12

Overview of Standards

Quality standards identify key student knowledge and skills that students should demonstrate by the end of the year.

7-MS-LS2-4 Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

CS: Emphasis is on recognizing patterns in data, making inferences about changes in populations, and on evaluating empirical evidence supporting arguments about changes in ecosystems.

SEP: 7. Engaging in argument from evidence: Construct, use, and/or present an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem.

DCI: Ecosystem Dynamics, Functioning, and Resilience
Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations.

CC: Stability and Change: Small changes in one part of a system might cause large changes in another part.

Overview of Standards

Quality standards connect learning within and across grade levels.

HS-PS3-3 Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.

CS Chemistry: Emphasis is on both qualitative and quantitative evaluations of devices. Constraints could include use of renewable energy forms and efficiency. Focus for quantitative evaluations is limited to total output for a given input. Emphasis is on devices constructed with materials provided to students. Examples of devices in chemistry could include hot/cold packs, fuels, and batteries.

CS Physics: Emphasis is on both qualitative and quantitative evaluations of devices. Constraints could include use of renewable energy forms and efficiency. Focus for quantitative evaluations is limited to total output for a given input. Emphasis is on devices constructed with materials provided to students. Examples of devices in physics could include Rube Goldberg devices, wind turbines, solar cells, solar ovens, and generators.

SEP

DCI

CC

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Louisiana Student Standards for Science

The Louisiana Student Standards for Science are in draft form. As you interact with the selected standards in the next activities, please keep that in mind.

The standards are scheduled to be considered by BESE for adoption in March.

Louisiana Student Standards for Science

Review the draft standards given.

- As a table, create a chart that shows the different components.
- Define each component.
- Describe how the multi-dimensional standards are different from previous GLEs.
- Give 2 specific examples of content that you currently teach and how the dimensions might require adjustments to that content.

Framework of LSS for Science

Coding and Descriptor

Performance Expectation: States what students should be able to do to demonstrate that they have met the standard. Performance expectations are built on the foundation of the science and engineering practices, disciplinary core ideas, and crosscutting concepts.

Clarification Statement: Provides examples or additional clarification of the performance expectation.

Science and Engineering Practices: Detail the behaviors that students should engage in that mimic those of scientists and engineers.

Disciplinary Core Ideas: Describe the most essential ideas (content) in the major science disciplines.

Crosscutting Concepts: Ideas that have applications across all areas of science.

Science and Engineering Practices

Determine which of the practices correlate to the given performance expectations.

1. Asking questions (science) and defining problems (engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (science) and designing solutions (engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

Disciplinary Core Ideas

Physical Science	PS1: Matter and its interactions PS2: Motion and stability: Forces and Motions PS3: Energy PS4: Waves and their applications in technologies for information transfer
Life Science	LS1: From molecules to organism: Structures and processes LS2: Ecosystems: Interactions, energy, and dynamics LS3: Hereditary: Inheritance and variation of traits LS4: Biological evolution: Unity and diversity
Earth and Space Science	ESS1: Earth's place in the universe ESS2: Earth's systems ESS3: Earth and Human activity
Engineering, Technology, and Applications of Science	ETS1: Engineering design ETS2: Links among engineering, technology, science, and society

Crosscutting Concepts

Determine which of the crosscutting concepts correlate to the given performance expectations.

1. Patterns
2. Cause and effect
3. Scale, proportion, and quantity
4. Systems and system models
5. Energy and matter
6. Structure and function
7. Stability and change

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Next Steps

Districts:

- Ensure a core group of science educators attend science trainings at the Teacher Leader Summit.
- Attend the March supervisor collaborations to learn about opportunities to partner with vendors for training.

Teachers:

- Review the standards once released.
- Consider applying to be a science Teacher Leader Advisor (application released in April).
- Attend the science trainings at the Teacher Leader Summit.