

I. Teacher Preparation

A. Elementary School Licensure Requirements

1. Licensure Grade Levels¹

a. Does the state offer an Early Elementary Education credential (Preschool/Kindergarten to Grade 2/3)?	Yes	Early Childhood Education
b. Does the state offer an Elementary Education credential (Kindergarten/Grade 1 to Grade 5/6)?	Yes	Elementary Education (K-6)

2. Early Elementary^{2,3}

a. Is an educational practice examination required for licensure?	No
b. Is an examination in reading and writing or language arts required for licensure?	Yes
c. Is a mathematics examination required for licensure?	Yes
d. Is a science examination required for licensure?	No

3. Elementary Education^{2,3}

a. Is an educational practice examination required for licensure?	No
b. Is an examination in reading and writing or language arts required for licensure?	Yes
c. Is a mathematics examination required for licensure?	Yes
d. Is a science examination required for licensure?	Yes

4. Licensure Renewal

a. What is the period of validity for an educator's license?	Less than 5 years	X (3 years) ⁴
	5 years	
	Greater than 5 years	

b. Can in-service teachers receive certification credit for professional development courses/programs in Earth and Space Sciences?	Yes	X	Process was just changed for elementary teachers. ⁵
	No		
	Local issue		
	Unknown		

B. Elementary School Curriculum Support

1. Guidelines for Curriculum Development

a. Does the SEA provide guidelines for curriculum development, beyond the state's science standards?	No
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b. If yes, which of the following does the state provide?	1. Science frameworks		
	2. Curriculum maps		
	3. Learning progressions		
	4. Benchmark maps		
	5. Templates for unit design		
	6. Curriculum development guides		
	7. Model units		
	8. Lesson plan templates/guides		
	9. Web-based lesson plan portals		
	10. Model lesson plans		
	11. Assessment guidelines		

2. Instructional Materials⁶

a. At what level does adoption of instructional materials occur?	State level	
	Local level	X

b. If the state is an adoption state, do adopted materials in science include those that address topics specific to the geosciences?	N/A	
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3. Support for New Standards⁵

a. Does that state provide resources to school systems to effectively implement the standards as they change?	Yes	X	Professional Learning Teams (PLT) have been formed that develop resources for teachers and provide regional professional development opportunities on how to implement NGSS. In addition, the PLT members are expected to complete local trainings. Vermont is a local control state. It is up to the districts how they allocate their funds. Summer programs are also offered.
	No		
	Local issue		
	Unknown		

4. Professional Development⁵

a. Does the SEA provide professional development that is, at least in part, specific to the geosciences?	Yes, provided by SEA		Teachers do participate in GLOBE, WET, WILD but the state does not keep records on participation.
	Yes, but independent of SEA	X	
	No		
	Local issue		
	Unknown		

II. Curriculum

A. Elementary School State Science Standards

1. Organization⁷

a. What is the name of the state's elementary school science standards?	Next Generation Science Standards
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b. What is the grade-level arrangement of the standards?	Grade specific	X
	Grade-level bands	
	Benchmark grade levels	

c. How are the standards outlined?	Overarching standard statements (level one)	X	d. What terms are used to identify each level?	Performance Expectations
	Sub-standard statements that provide more detail to the overarching standards (level two)			

2. Content⁷

a. Are the science standards subdivided according to scientific discipline (Physical Science, Life Science, and Earth and Space Science)?	Yes	The standards are grouped into four major domains: 1) Physical Sciences 2) Life Sciences 3) Earth and Space Sciences 4) Engineering, Technology, and Applications of Science
b. Are the Earth and Space Science standards identified by core ideas in the geosciences?	Yes	The standards can be organized according to Disciplinary Core Idea (DCI). The DCIs for Earth and Space Sciences are: <u>ESS1 Earth's Place in the Universe</u> -ESS1A: The Universe and its Stars -ESS1B: Earth and the Solar System -ESS1C: The History of Planet Earth <u>ESS2 Earth's Systems</u> -ESS2A: Earth Materials and Systems -ESS2B: Plate Tectonics and Large-Scale Systems -ESS2C: The Role of Water in Earth's Surface Processes -ESS2D: Weather and Climate -ESS2E: Biogeology <u>ESS3 Earth and Human Activity</u> -ESS3A: Natural Resources -ESS3B: Natural Hazards -ESS3C: Human Impacts on Earth Systems -ESS3D: Global Climate Change
c. Do the state's standards include current issues in the geosciences? Current issues in the geosciences	Yes	K: Students look the impact of humans on the local environment and consider ways to reduce that impact. 1: Students look at design solutions that reduce the impacts of weather-related hazards.

can be described as Earth science processes altered by human activities or Earth science processes that affect human well-being.		4: Students examine renewable and non-renewable energy resources and how their uses affect the environment 5: Students consider the impact of human activities on the environment and ways that these impacts can be reduced and resources and the environment can be protected.
d. Do the state's standards include career exploration in the geosciences?	No	

3. Development

a. When were the standards adopted or last revised?	Within the last two years (2014-2015)		June, 2013 ⁸
	Between 3-6 years ago (2010-2013)	X	
	Between 7-10 years ago (2006-2009)		
	More than 10 years ago (before 2006)		

b. Does the state have plans to review/revise its science standards?	Currently under review		There is no state mandate to review standards. We adopted NGSS in June 2013. VT will have these standards for many years. ⁵
	Within the next 5 years (2015-2020)		
	Between 5 and 10 years from now (2020-2025)		
	No plan or timeline exists	X	
	Unknown		

B. Middle School State Science Standards

1. Content⁷

a. What is the name of the state's middle school science standards?	Next Generation Science Standards (NGSS)
b. Are Earth and Space Science topics included in the standards?	Yes
c. Is Life Science and Physical Science content included in the standards?	Yes

C. High School State Science Standards

1. Content⁷

a. What is the name of the state's high school science standards?	Next Generation Science Standards (NGSS)
b. Are Earth and Space Science topics included in the standards?	Yes
c. Is Life Science and Physical Science content included in the standards?	Yes

D. High School Course Requirements

1. Credits Required for Graduation⁹

a. What is the total number of credits required for graduation?	Local level
b. What is the number of science credits required for graduation?	Local level

2. Course Content⁹

a. Is Life Science required?	No
b. Is Physical Science required?	No
c. Is Earth Science required?	No
d. Is Environmental Science required?	No
e. Is Earth Science accepted?	Not Stated
f. Does Earth Science have to be lab-based?	Not Stated

III. Instruction

A. Elementary School Approaches to Instruction

1. State Science Standards⁷

a. Do the state's science standards provide guidelines regarding any specific approach to be used for science teaching?	Yes
b. If so, what is the term used to identify this approach?	NGSS Science and Engineering Practices

c. Do the state's science standards provide a rationale for this approach?	Yes
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d. If so, what is the rationale?	Engaging in the practices of science helps students understand how scientific knowledge develops; such direct involvement gives them an appreciation of the wide range of approaches that are used to investigate, model, and explain the world. Engaging in the practices of engineering likewise helps students understand the work of engineers, as well as the links between engineering and science. Participation in these practices also helps students form an understanding of the crosscutting concepts and disciplinary ideas of science and engineering; moreover, it makes students' knowledge more meaningful and embeds it more deeply into their worldview.
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2. Guidelines for Curriculum Planning

a. If the state offers guidelines for curriculum planning, do these advocate more specific strategies for science instruction?	No
b. If so, what are the strategies?	N/A

3. Technology⁵

a. Are decisions regarding the use of technology in elementary science classrooms made at the state level or local level?	Local level
b. What kinds of technology are being used by elementary school science teachers in the state?	VT is a local control state. Technology varies widely. Some districts use Google Chrome books and ipads.

IV. Learning Contexts

A. Elementary School Classrooms

1. Class Size⁵

a. What is the average number of students in an elementary classroom?	Approximately 22
b. What is the maximum allowable number of students in an elementary classroom?	Unknown

2. Instructional Time⁵

a. At the elementary level, are teachers recommended or required to dedicate a certain amount of instructional time to science?	There is no time requirement	X	
	Local decision		
	Teachers must spend a certain amount of time teaching science.		
	Unknown		

B. Elementary School Support Services

1. Specialized Support⁵

a. Are there specific policies in place regarding English as a Second Language (ESL) and Special Education services that could impact science instruction (e.g. pull-out or push-in models)?	Local level decision	X	Portfolio assessments are used for those severely disabled. Other modifications would be local decisions.
	Depends on the specifications of a student's IEP or ILP		
	Teachers must follow specific practices regarding science		
	Unknown		

V. Extra-Curricular Programs

A. Elementary School Geosciences Enrichment Opportunities

1. After-School and Informal Education⁵

a. Are opportunities to engage in geoscience-related topics outside of school (e.g. after-school programs and informal education programs) being offered to students in the state?	Yes
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b. If so, what are they?	<p>Unaware of clubs or programs at the elementary level. Some districts do have Century 21 grants that may include science activities.</p> <p>The state is beginning to build partnerships with museums to introduce them to the NGSS and the Common Core Curriculum. Local districts most likely have partnerships. Also, the VT State Teachers Association includes other agencies when they meet.</p>
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2. Remedial Education⁵

a. What remedial supports are in place for geosciences topics with which students are struggling?	Local level decision	X	
	Remediation services are being provided to students in science		
	No remediation support in science		
	Unknown		

VI. Monitoring Systems

A. Elementary School Statewide Science Assessment

1. Structure and Content

a. What is the name of the statewide standardized test in science at the elementary level?	New England Common Assessment Program (NECAP) ¹⁰
b. At what grade(s) is the assessment implemented?	4 ¹⁰
c. Does the statewide science assessment measure achievement of the state's standards, i.e. is the assessment aligned with state standards?	Yes ¹¹
d. Is the content of the statewide science assessment sub-divided by discipline, namely Physical Science, Life Science, Earth and Space Science?	Yes ¹²

e. Are there any plans for revising or changing the current elementary level science assessment?	No plans for revision		It will not change this year. In June 2013 the State adopted the Next Generation Science Standards (NGSS) as the State's science standards. These replaced standards that had been in place since 2000. ⁵
	Revision is planned, but timeline is unknown	X	
	Revision is planned with implementation date set		
	Unknown		

2. Results¹⁰

a. Is student achievement measured by Performance Level Descriptors?	Yes
b. If yes, how many performance levels are there?	4

3. District Level Reporting¹³

a. At the district level, are the percentages of students performing at each PLD reported to the public?	Yes	The SEA has created an on-line portal which allows the public to view results on the NECAP statewide science assessment at the district level. Results provided to the public are aggregated and not subdivide by discipline.
b. At the district level, is student achievement reported according to scientific discipline (Life Sciences, Physical Sciences, Earth and Space Sciences)?	No	
c. If yes, is this data available to the public?	No	

4. State Level Reporting¹³

a. At the state level, are the percentages of students performing at each PLD reported to the public?	Yes	The SEA has created an on-line portal which allows the public to view results on the NECAP statewide science assessment. Results are aggregated and not subdivided by discipline.
b. At the state level, is student achievement reported according to scientific discipline (Life Sciences, Physical Sciences, Earth and Space Sciences)?	No	
c. If yes, is this data available to the public?	No	

B. Elementary School International Assessments in Science

1. TIMSS¹⁴

a. Has the state participated in the Trends in International Mathematics and Science Study (TIMSS)?	No
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b. If yes, in which years did the state participate?	1995	
	2003	
	2007	
	2011	

C. Middle School Statewide Science Assessment

1. Structure and Content¹⁵

a. What is the name of the statewide standardized test in science at the middle school level?	New England Common Assessment Program, Science Assessment (NECAP Science Assessment)
b. At what grade(s) is the assessment implemented?	8
c. Does the assessment address Life Science concepts?	Yes
d. Does the assessment address Life Science concepts?	Yes
e. Does the assessment address Earth Science concepts?	Yes

C. High School Statewide Science Assessment(s)

1. Structure and Content¹⁵

a. What is the name of the state's standardized science assessment(s)?	New England Common Assessment Program, Science Assessment (NECAP Science Assessment)
b. At what grade level is the assessment implemented?	11
c. Does the assessment address Life Science concepts?	Yes
d. Does the assessment address Physical Science concepts?	Yes
e. Does the assessment address Earth Science concepts?	Yes

VII. Accountability

A. School Level

1. Individual Student¹⁶

a. Does the state produce an Individual Student Report (ISR) that describes a student's performance on the state's science assessment?	Yes	
b. Is the ISR made available to a student's parents or guardians?	Yes	
c. Is the ISR made available to a student's teacher?	Yes	
d. Does the ISR report student's performance in terms of scale score and achievement level?	Yes	
e. Does the ISR subdivide results by science discipline (Physical Science, Life Science, Earth and Space Science)?	Yes	

2. Teacher Appraisal⁵

a. Are students' results on the statewide science assessment a component of teacher evaluation?	No
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B. District Level

1. District Accreditation⁵

a. Are student outcomes in statewide science assessments at the elementary level part of accreditation of public schools at the district level?	Yes	
	No	X
	At a future point	
	Local decision	
	Unknown	

C. State Level

1. Statewide Monitoring⁵

a. Are student outcomes in statewide science assessments at the elementary level used in monitoring the adequacy of state educational systems?	No
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2. Trends in Student Outcomes¹³

a. Does the SEA report to the public performance results on the state science assessment over time?	Yes
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b. If yes, how many years of achievement data are available?	3 years (2011-2012 to 2013-2014)	
	4-7 years (2007-2008 to 2013-2014)	
	8 to 10 years (2004-2005 to 2013-2014)	X
	11 or more years (before 2004-2005)	

c. Are the results also subdivided by science discipline (Life Sciences, Physical Sciences, Earth and Space Sciences)?	No
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¹ Vermont Agency of Education, Initial Licensure, Traditional Route:

<http://education.vermont.gov/licensing/application/initial>

² Vermont Agency of Education, Initial Licensure, Vermont's Testing Requirements for Licensure: Praxis I & II Testing Brochure: <http://education.vermont.gov/licensing/application/initial>

³ Educational Testing Service, Praxis, Vermont, Test Requirements, Vermont Test Requirements:

<http://www.ets.org/praxis/vt/requirements/>

⁴ Vermont Agency of Education, Renewing a Level I License:

<http://education.vermont.gov/licensing/application/renewal/level-1>

⁵ Vermont Agency of Education (personal communication).

⁶ Education Commission of the States, State Textbook Adoption: <https://www.ecs.org/clearinghouse/57/75/5775.htm>

⁷ Next Generation Science Standards: <http://www.nextgenscience.org/search-standards>

⁸ Vermont Agency of Education, Science, Overview: <http://education.vermont.gov/science>

⁹ Vermont Agency of Education, Vermont State Board of Education, Education Quality Standards:

http://education.vermont.gov/documents/EDU_EQS_01_23_14_Proposed_Final_Rule.pdf

¹⁰ Vermont Agency of Education, New England Common Assessment Program (NECAP):

<http://education.vermont.gov/assessment/necap>

¹¹ Vermont Agency of Education, State and National Data, Vermont's Framework of Standards and Learning Opportunities: <http://education.vermont.gov/assessment/data#state>

¹² Vermont Agency of Education, Other Resources, Science, Science Target Document:

<http://education.vermont.gov/assessment/necap/resources/other#science>

¹³ Vermont Agency of Education, Report Viewer:

<http://edw.vermont.gov/REPORTSERVER/Pages/ReportViewer.aspx?%2fPublic%2fAssessment+Report+by+Grade>

¹⁴ U.S. Dept. of Education, Institute of Education Sciences, National Center for Education Statistics, Trends in International Mathematics and Science Study (TIMSS), State and District Participation in TIMSS:

<https://nces.ed.gov/TIMSS/benchmark.asp>

¹⁵ Vermont Agency of Education, State and National Data: <http://education.vt.gov/assessment/data>

¹⁶ Vermont Agency of Education, State and National Data, Data and Results, 2014 Guide to Using the NECAP Science Reports: <http://education.vermont.gov/assessment/data>