

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

2. Early Elementary²

a. Is an educational practice examination required for licensure?	Yes
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 Education²

a. Is an educational practice examination required for licensure?	Yes
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

4. Licensure Renewal

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

b. Can in-service teachers receive certification credit for professional development courses/programs in Earth and Space Sciences?	Yes	X ⁴	For license renewal
	No		
	Local issue		
	Unknown		

B. Elementary School Curriculum Support

1. Guidelines for Curriculum Development⁵

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 Standards⁴

a. Does that state provide resources to school systems to effectively implement the standards as they change?	Yes	X	The local districts provide resources to implement the standards and curriculum. The state provides the professional development. The state has online resources tied to each standard in math and science. Some professional development is offered through the Math and Science Partnership, which is funded through the Department of Education.
	No		
	Local issue		
	Unknown		

4. Professional Development⁴

a. Does the SEA provide professional development that is, at least in part, specific to the geosciences?	Yes, provided by SEA		GLOBE is dominant in many schools but operates independently of the state. WILD and WET is offered through the Department of Natural Resources. Middle school and high school teachers receive professional development s yearly. Recently, professional development was conducted by the SEA for GIS mapping.
	Yes, but independent of SEA	X	
	No		
	Local issue		
	Unknown		

II. Curriculum

A. Elementary School State Science Standards

1. Organization⁵

a. What is the name of the state's elementary school science standards?	Minnesota K-12 Academic Standards in Science
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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?	Standards
	Sub-standard statements that provide more detail to the overarching standards (level two)	X		Benchmarks

2. Content⁵

a. Are the science standards subdivided according to scientific discipline (Physical Science, Life Science, and Earth and Space Science)?	Yes	The Minnesota Academic Standards in Science are organized by grade level into four content strands: 1) The Nature of Science and Engineering 2) Physical Science 3) Earth and Space Science 4) Life Science
b. Are the Earth and Space Science standards identified by core ideas in the geosciences?	Yes	Each strand has three or four substrands. The substrands are the core ideas of the strands. Strand 3: Earth and Space Science Substrand 1. Earth Structure and Processes Substrand 2. Interdependence within the Earth System Substrand 3. The Universe Substrand 4. Human Interactions with Earth Systems
c. Do the state's standards include current issues in the geosciences? Current issues in the geosciences can be described as Earth science processes altered by human activities or Earth science processes that affect human well-being.	Yes	Grade 4 students examine water supply and quality. Grade 5 students examine renewable and non-renewable energy and material resources found in MN and how they are used. Grade 8 Recognize that land and water use practices can affect natural processes and that natural processes interfere and interact with human systems. High School: Explain how human activity and natural processes are altering the hydrosphere, biosphere, lithosphere and atmosphere, including pollution, topography and climate.
d. Do the state's standards include	Yes	Grade 3:

<p>career exploration in the geosciences?</p>	<p>Strand: The Nature of Science and Engineering Substrand: Interactions among science, technology, engineering, mathematics, and society Standard: Men and women throughout the history of all cultures, including Minnesota American Indian tribes and communities, have been involved in engineering design and scientific inquiry. Benchmark: Recognize that the practice of science and/or engineering involves many different kinds of work and engages men and women of all ages and backgrounds.</p>
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3. Development⁵

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

<p>b. Does the state have plans to review/revise its science standards?</p>	<p>Currently under review</p>		<p>The Minnesota K-12 Academic Standards in Science were revised in 2009 and implemented by all schools beginning with the 2011-2012 school year. The 2009 standards are scheduled to be revised again in 2017-2018 (Minnesota Statutes, section 120B.023, subdivision 2).</p>
	<p>Within the next 5 years (2015-2020)</p>	<p>X</p>	
	<p>Between 5 and 10 years from now (2020-2025)</p>		
	<p>No plan or timeline exists</p>		
	<p>Unknown</p>		

B. Middle School State Science Standards

1. Content⁵

<p>a. What is the name of the state's middle school science standards?</p>	<p>Minnesota K-12 Academic Standards in Science</p>
<p>b. Are Earth and Space Science topics included in the standards?</p>	<p>Yes</p>
<p>c. Is Life Science and Physical Science content included in the standards?</p>	<p>Yes</p>

C. High School State Science Standards

1. Content⁵

a. What is the name of the state's high school science standards?	Minnesota K-12 Academic Standards in Science
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 Graduation

a. What is the total number of credits required for graduation?	Unknown
b. What is the number of science credits required for graduation?	3

2. Course Content

a. Is Life Science required?	Yes	
b. Is Physical Science required?	Yes	1 credit in physics or chemistry is required
c. Is Earth Science required?	No	Earth Science standards are required, but not a specific Earth Science course
d. Is Environmental Science required?	No	
e. Is Earth Science accepted?	Yes	
f. Does Earth Science have to be lab-based?	Not stated	

III. Instruction

A. Elementary School Approaches to Instruction

1. State Science Standards

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?	Scientific inquiry and investigation

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?	"The standards and benchmarks describe a connected body of science and engineering knowledge acquired through active participation in science experiences."
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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. Technology

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?	Most schools have computers available, including laptop carts. Many schools have interactive whiteboards. There is a 1 to 1 iPad program many districts participate in and schools have mobile labs. There is good connectivity throughout the state and technology is embedded in the instructional practices. Some districts also use probe ware.

IV. Learning Contexts

A. Elementary School Classrooms

1. Class Size

a. What is the average number of students in an elementary classroom?	Unknown
b. What is the maximum allowable number of students in an elementary classroom?	Unknown (there are no state guidelines)

2. Instructional Time

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		A best practice indicates that 3 hours per week is typical at high performing schools. Metro schools often receive science instruction via science specialists. There are many different models/schedules for science instruction that are used.
	Local decision	X	
	Teachers must spend a certain amount of time teaching science.		
	Unknown		

B. Elementary School Support Services

1. Specialized Support

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	Some students receive special assistance from another adult during science. Most of the assistance is push in. Sometimes students are pulled out for other remediation but this is not a standard practice.
	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 Education

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>Examples of extra- curricular programs include: Robotics clubs, tutoring and mentoring programs, after school programs, science fairs, science Olympics, and SciMathMN (STEM Network). Some tutoring is also available from 3M and other industries.</p> <p>The state partners with museums to provide opportunities for girls and students of color. PBS also has a program for girls, called SciGirls.</p>
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2. Remedial Education

a. What remedial supports are in place for geosciences topics with which students are struggling?	Local level decision	X	Some tutoring is also available from 3M and other industries.
	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?			Minnesota Comprehensive Assessments or MCAs
b. At what grade(s) is the assessment implemented?			5
c. Does the statewide science assessment measure achievement of the state's standards, i.e. is the assessment aligned with state standards?			Yes
d. Is the content of the statewide science assessment sub-divided by discipline, namely Physical Science, Life Science, Earth and Space Science?			Yes
e. Are there any plans for revising or changing the current elementary level science assessment?	No plans for revision		The assessment is online and uses enhanced technology. The assessment will change with the standards. Revisions take place when standards are revised.
	Revision is planned, but timeline is unknown		
	Revision is planned with implementation date set	X	
	Unknown		

2. Results

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

3. District Level Reporting

a. At the district level, are the percentages of students performing at each PLD reported to the public?	Yes	District results on the statewide assessment are available to the public on the SEA website. The Minnesota Department of Education Data Center allows users to access results on a school, district, and state level.
b. At the district level, is student achievement reported according to scientific discipline (Life Sciences, Physical Sciences, Earth and Space Sciences)?	Yes	The Minnesota Department of Education Data Center website allows users to examine district level subscores on the state science assessment. Subscores match the strands from the Minnesota Academic Standards in Science. The four strands are:
c. If yes, is this data available to the public?	Yes	1) The Nature of Science and Engineering 2) Physical Science 3) Earth and Space Science 4) Life Science

4. State Level Reporting

a. At the state level, are the percentages of	Yes	The Minnesota Department of Education Data
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students performing at each PLD reported to the public?		Center website allows users to examine state level sub scores on the state science assessment. Sub scores match the strands from the Minnesota Academic Standards in Science. The four strands are: 1) The Nature of Science and Engineering 2) Physical Science 3) Earth and Space Science 4) Life Science
b. At the state level, is student achievement reported according to scientific discipline (Life Sciences, Physical Sciences, Earth and Space Sciences)?	Yes	
c. If yes, is this data available to the public?	Yes	

B. Elementary School International Assessments in Science

1. TIMSS

a. Has the state participated in the Trends in International Mathematics and Science Study (TIMSS)?	Yes
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b. If yes, in which years did the state participate?	1995	X
	2003	
	2007	X
	2011	X

C. Middle School Statewide Science Assessment

1. Structure and Content

a. What is the name of the statewide standardized test in science at the middle school level?	Minnesota Comprehensive Assessments-Series III (MCA-III)
b. At what grade(s) is the assessment implemented?	8
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

C. High School Statewide Science Assessment(s)

1. Structure and Content

a. What is the name of the state's standardized science assessment(s)?	High School Minnesota Comprehensive Assessments-Series III (MCA-III)
b. At what grade level is the assessment implemented?	9-12
c. Does the assessment address Life Science concepts?	Yes
d. Does the assessment address Physical Science concepts?	No
e. Does the assessment address Earth Science concepts?	No

VII. Accountability

A. School Level

1. Individual Student

a. Does the state produce an Individual Student Report (ISR) that describes a student's performance on the state's science assessment?	Yes	Schools send home an Individual Student Report (ISR) with the student or mail to the student's parent/guardian. The ISR describes an individual student's performance in terms of scale score, achievement level, and Minnesota Academic Standards for each subject. The ISR for a grade 5 student includes the student's performance on the science assessment.
b. Is the ISR made available to a student's parents or guardians?	Yes	<p>The ISR report for science provides sub-scores which indicate an individual student's performance on the strands from the Minnesota Academic Standards. The four strands are:</p> <ol style="list-style-type: none"> 1) The Nature of Science and Engineering 2) Physical Science 3) Earth and Space Science 4) Life Science <p>teachers receive the Individual Student Report, which reports a student's performance on the statewide assessment and subdivides the student's score according to the four strands of the Minnesota Academic Standards:</p> <ol style="list-style-type: none"> 1) The Nature of Science and Engineering 2) Physical Science 3) Earth and Space Science 4) Life Science <p>In addition, teachers can access student result files and summary files through the SEA secured website. These reports allow teachers to compare student's subscores with average school and district subscores.</p>
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 Appraisal

a. Are students' results on the statewide science assessment a component of teacher evaluation?	They can be
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B. District Level

1. District Accreditation

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

C. State Level

1. Statewide Monitoring

a. Are student outcomes in statewide science assessments at the elementary level used in monitoring the adequacy of state educational systems?	Yes	Science assessment used for monitoring informally.
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2. Trends in Student Outcomes

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	(2008-14)
	11 or more years (before 2004-2005)		

c. Are the results also subdivided by science discipline (Life Sciences, Physical Sciences, Earth and Space Sciences)?	Yes
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¹ State of Minnesota, The Office of the Revisor of Statutes, Minnesota Administrative Rules, 8710.3200 Teachers of Elementary Education: <https://www.revisor.mn.gov/rules/?id=8710.3200>

² Minnesota Teacher Licensure Examinations, Preparation Materials, Study Guides: http://www.mtle.nesinc.com/PageView.aspx?f=HTML_FRAG/GENRB_PrepStudyGuide.html

³ Minnesota Department of Education, Educator Excellence, Licensing, Renew a License, License Renewal Instructions and Registration Guide, PDF: <http://education.state.mn.us/MDE/EdExc/Licen/index.html>

⁴ Minnesota Department of Education (personal communication)

⁵ Minnesota Department of Education, Educator Excellence, Standards, Curriculum and Instruction, K-12 Academic Standards, Science: <http://www.education.state.mn.us/MDE/EdExc/StanCurri/K-12AcademicStandards/Science/index.htm>

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