NORTH DAKOTA SCIENCE CONTENT STANDARDS

Draft – April 2014 – Draft

Performance Expectations by Grade: Grades K–2
Engineering Design Standards

Released for Public Comment

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North Dakota Science Content Standards, Draft: April 2014, Released for Public Comment is based on the Next Generation Science Standards.[1]

[1] NGSS Lead States. 2013. **Next Generation Science Standards: For States, By States**. Washington, DC: The National Academies Press.

North Dakota Science Content Standards

Performance Expectations by Grade

This document, released for public review, presents the North Dakota Science Content Standards in tables, which include individual Performance Expectations. Refer to the North Dakota *Introduction* for more information related to the layout of the document. A separate document presents the North Dakota Science Content Standards arranged in tables, which include groups of Performance Expectations arranged by Disciplinary Core Idea. Readers are invited to review both documents and provide feedback regarding preference for organizational format in the associated questionnaire.

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Performance Expectations by Grade: Grades K-2
Engineering Design

K-2-ETS1-1 Engineering Design

Students who demonstrate understanding can:

K-2-ETS1-1. **Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.**

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Asking Questions and Defining Problems
Asking questions and defining problems in K–2 builds on prior experiences and progresses to simple descriptive questions.

- Ask questions based on observations to find more information about the natural and/or designed world(s).
- Define a simple problem that can be solved through the development of a new or improved object or tool.

Disciplinary Core Ideas

ETS1.A: Defining and Delimiting Engineering Problems

- A situation that people want to change or create can be approached as a problem to be solved through engineering.
- Asking questions, making observations, and gathering information are helpful in thinking about problems.
- Before beginning to design a solution, it is important to clearly understand the problem.

Crosscutting Concepts

Connections to K-2-ETS1.A: Defining and Delimiting Engineering Problems include:
Kindergarten: K-PS2-2, K-ESS3-2

Articulation of DCIs across grade-levels:
3-5.ETS1.A ; **3-5.ETS1.C**

Common Core State Standards Connections:

ELA/Literacy —

RI.2.1	Ask and answer such questions as *who, what, where, when, why,* and *how* to demonstrate understanding of key details in a text. (K-2-ETS1-1)
W.2.6	With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. *(K-2-ETS1-1)*
W.2.8	Recall information from experiences or gather information from provided sources to answer a question. (K-2-ETS1-1)

Mathematics —

MP.2	Reason abstractly and quantitatively. *(K-2-ETS1-1)*
MP.4	Model with mathematics. *(K-2-ETS1-1)*
MP.5	Use appropriate tools strategically. *(K-2-ETS1-1)*
2.MD.D.10	Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. (K-2-ETS1-1)

K-2-ETS1-2 Engineering Design

Students who demonstrate understanding can:

K-2-ETS1-2. **Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.**

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Developing and Using Models

Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.

- Develop a simple model based on evidence to represent a proposed object or tool.

Disciplinary Core Ideas

ETS1.B: Developing Possible Solutions

- Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.

Crosscutting Concepts

Structure and Function

- The shape and stability of structures of natural and designed objects are related to their function(s).

Connections to K-2-ETS1.B: Developing Possible Solutions to Problems include:

Kindergarten:K-ESS3-3, **First Grade:** 1-PS4-4, **Second Grade:** 2-LS2-2

Articulation of DCIs across grade-levels:

3-5.ETS1.A ; **3-5.ETS1.B** ; **3-5.ETS1.C**

Common Core State Standards Connections:

ELA/Literacy —

SL.2.5 Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. *(K-2-ETS1-2)*

K-2-ETS1-3 Engineering Design

Students who demonstrate understanding can:

K-2-ETS1-3. Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Analyzing and Interpreting Data
Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.

- Analyze data from tests of an object or tool to determine if it works as intended.

Disciplinary Core Ideas

ETS1.C: Optimizing the Design Solution

- Because there is always more than one possible solution to a problem, it is useful to compare and test designs.

Crosscutting Concepts

Connections to K-2-ETS1.C: Optimizing the Design Solution include:
Second Grade:2-ESS2-1

Articulation of DCIs across grade-levels:
3-5.ETS1.A ; **3-5.ETS1.C**

Common Core State Standards Connections:

ELA/Literacy —

W.2.6	With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. *(K-2-ETS1-3)*
W.2.8	Recall information from experiences or gather information from provided sources to answer a question. *(K-2-ETS1-3)*

Mathematics —

MP.2	Reason abstractly and quantitatively. *(K-2-ETS1-3)*
MP.4	Model with mathematics. *(K-2-ETS1-3)*
MP.5	Use appropriate tools strategically. *(K-2-ETS1-3)*
2.MD.D.10	Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. (K-2-ETS1-3)