

Instructions for Using the Oregon Grades K-3 Engineering Design Notebook Template Draft, 12/8/2011

These instructions are for the Oregon Grades K-3 Engineering Design Notebook template that can be found on the web at <http://www.ode.state.or.us/search/page/?=32>. The template includes a graphic of the Engineering Design Process that aligns with the 3rd grade Oregon Science Content Standards. If you are using it for earlier grades (even though work samples are not required before 3rd grade), please see the list of suggested changes at the end of this document.

Pages of the Template

First let's consider what's on each page and what the students will add to these pages.

Cover: The student should fill in the blanks. You can give specific guidance about things like semester/trimester and class section.

Inside front cover: A graphic summarizes the engineering designs assumed by the 3rd grade engineering design section of the Oregon Science Content standards. You can use the glossary of terms at the end of this document to explain the steps to your students.

Table of Contents: This page lists the sections of the engineering design notebook. In most cases you will want to allow your students to decide how many pages each section should have. You may want to tell them the minimum and maximum number of pages for each section. The students should number each page and put the starting page number of each section on this page.

The Problem: You may want to assign a specific problem or you might want to assign a category of problems to be solved. An example of the former would be design a container that can be used carry 50 crayons or 30 colored pencils. An example of the latter would be design something that would be useful for students going to and from school. In most cases the problem should be described in terms of a human need or some other need. Once your students have had some experience with specific problems you may want to give them more latitude about the types of problems than can tackle.

Potential Solution: Students should use this section to describe a potential solution to the problem. They can both draw their idea and describe it using words. Labeling the drawing to describe its parts and their function is a good idea.

The Prototype: The students should build something that represents their potential solution. They should then use this section to draw and describe their prototype. The difference between the drawing in this section and the previous one is that before they were describing what they were planning on building. In this section they are describing what they actually built which may be smaller or use less expensive materials than their original idea.

Ways of Using the Template

The template can be used in several ways.

- (1) **“Loose-leaf” individually bound notebooks:** Provide each student with copies all the pages of the template. They can use the graph paper and lined paper at the end of the template to make additional sheets to insert in the various sections or you can provide supplies of these two sheets for students who need extra pages. Notebooks may be “bound” according to your or the students’ preferences using staples, report covers, three-ring binders, or some other method.
- (2) **“Glue-stick” customization for pre-bound composition notebooks:** Provide each student with copies of all the pages of the template except the blank lined page at the end of the template. Students should glue pages onto pages in the composition book as they are completed. When students need additional pages in a section they can use the notebook pages without gluing on pages or they can glue copies of the graph paper onto composition pages. The Table of Contents Page should be updated as new sections in the notebook are started.

Alternatively, the students can use the template as guidelines for what they handwrite on the pages of the composition books.

- (3) **“Pre-bound” individual notebooks:** Provide each student with either a full-size or half-size copy of this template, choosing the number of pages you think is appropriate for each step. Here is one possible solution that assumes half-size pages:

- 1 each – Cover
- 1 each – Inside front cover – Engineering Design Process graphic
- 1 each – Table of Contents
- 1 each – Introduction
- 1 each – The Problem
- 2 each – Potential Solution
- 3 each – The Prototype
- 1 each – Inside back cover
- 1 each – Back cover

If you use this format you can pre-number all the pages and fill in the Table of Contents with the page numbers of the first page of each section.

Suggestions for Design Notebooks for K-2nd Grades

Kindergarten

The Oregon Administrative Rules do not require Kindergarten students to produce a work sample. Instead you might want to have students use worksheets to draw their ideas and then use simple tools like scissors and materials like construction paper, glue and tape to build structures. You can also have students disassemble and reassemble things to learn how they work. One example would be an inexpensive flashlight.

1st Grade

The Oregon Administrative Rules do not require 1st grade students to produce a work sample. Nevertheless you may want to introduce you students to the idea of keeping a workbook. The 1st grade standard uses the word “structure” rather than “prototype” so your template should probably do so as well. It also emphasizes the relationship of the parts of a structure to the function of the structure. While this may sound complicated it can be as simple as a roof keeping the rain out and a window letting light in. There is a reference to using tools in the 1st grade standard. Such tools would probably be simple things like scissors to cut construction paper or a bread knife to spread modeling clay.

Even if you decide against using notebooks, you should still have your students use the steps described in the standard:

- Identify tools that can be used to build things.
- Demonstrate how parts of a structure relate to its function
- Show how tools are used.

2nd Grade

The Oregon Administrative Rules do not require 2nd grade students to produce a work sample. Nevertheless you may want to introduce you students to the idea of keeping a workbook. The 2nd grade standard uses the word “structure” rather than “prototype” so your template should probably do so as well. The 2nd grade standard also refers to working with a team, so you may want to have each student complete a notebook a notebook about the project that they are sharing with other students on their team. Or, you could have the members of each team share a notebook.

Even if you decide against using notebooks, you should still have your students use the steps described in the standard:

- Use tools to construct a simple designed stricter out of common objects and materials.
- Work with a team to complete a designed structure that can be shared with others.
- Describe an engineering design that is used to solve a problem or address a need.

Glossary

Need: *The reason why we want to solve a problem. Most engineering problems are based on needs of people, society or the world around us.*

Problem: *The goal of an engineering design project. Most engineering projects relate to a practical problem that provides a benefit to people or improve upon an existing solution.*

Prototype: *A first version of a solution that may not have all the refinements of the final solution.*

Solution: *A possible way of solving a practical problem.*

Structure: *Similar to prototype in this context except that it more likely that the structure will be a model of something that would be larger in real life.*