ANALYSIS AND CONCEPT - SKILL SYNTHESIS OF THE NEXT GENERATION SCIENCE STANDARDS (NGSS, 2013)

This analysis and synthesis have been carried out using a concept-based or concept-transfer model of learning and teaching. Such models are specifically designed to foster higher-order thinking such as described by Part III of the NGSS publication.

Each NGSS standard was first analyzed for its underlying transferable concept or skill. This analysis matched each standard with a transferable concept taken from a comprehensive taxonomy of transferable concepts and another for transferable scientific skills or processes. These structures, closely aligned with the NGSS cross-cutting concepts, delineate transferable concepts and skills at a scale intended to facilitate classroom unit design and implementation.

This taxonomy was organized according to three characteristics of all transferable concepts: generality (pervasive/obvious → rare/subtle), complexity (simple → complex), and abstractness (abstract → concrete).

There are two documents for each of the three grade levels used by the NGSS included in this zip file:

a) Analysis: The allocation of standards within the master structures of transferable concepts and skills. This document shows where each NGSS standard was allocated within the master structures, thus providing the context and "big picture" within which each standard would be taught and learned.

b) Synthesis: A one-page summary of the concepts and skills required by the standards.

Elementary Level Grades K - 5	a) Analysis and allocation of NGSS standards by concept & skill b) Synthesis of concepts and skills underlying the NGSS standards
Middle School Level Grades 5 - 8	a) Analysis and allocation of NGSS standards by concept & skill b) Synthesis of concepts and skills underlying the NGSS standards
High School Level Grades 9 - 11	a) Analysis and allocation of NGSS standards by concept & skill b) Synthesis of concepts and skills underlying the NGSS standards

Both of these documents greatly facilitate vertical (grade-to-grade, course-to-course) planning and design of curriculum at and between each grade level. In general, curricula over the years of schooling as well as within each course should follow three patterns of cognitive development: students learn from the pervasive to the rare, from the simple to the complex, and from the concrete to the abstract.

The following documents have also been included in order to facilitate vertical as well as course curriculum design and planning that follow a concept-based model of teaching and learning. The above analyses of the NGSS standards cover the first several steps and thus can be used to accelerate the planning process. However, most teachers benefit greatly from the process of studying and categorizing each standard, even if they were to arrive at a similar analysis to the one provided here.

a) The Process of Designing a Concept-Based Curriculum Plan: A Brief Description

b) Course Curriculum Design in a Nutshell