Why are science standards changing in Utah?
Science, technology, and understanding of the natural world are always changing and Utah science standards have not changed for over 10 years. Moreover, students themselves are changing in both their interests and needs for college and career readiness and standards need to adapt to their needs. Information is much easier for students to access now than it ever has been and science standards that focus on what students can do with scientific information is more vital than standards that focus on content that students must remember.

Are the Utah SEEd Standards based on national research?
The Utah SEEd standards are the result of current research in teaching and learning (National Research Council’s A Framework for K-12 Science Education) that identify the best learning progressions for students in science education. This research builds on previous studies that Utah’s current science standards are based from (American Association for the Advancement of Science’s Project 2061: Benchmarks for Science Literacy and National Academy of Science’s National Science Education Standards).

Are the Utah SEEd Standards based on the Next Generation Science Standards (NGSS)?
The Utah SEEd standards use the performance expectations of the Next Generation Science Standards.

What differences are there between the Next Generation Science Standards and Utah SEEd Standards?
The Utah writing teams organized the NGSS performance expectations into cohesive learning goals for Utah grades 6-8 and grouped them into main ideas they called “Root Questions”.

Who was on the writing committee?
Practicing Utah 6th, 7th, and 8th grade science educators, district science specialists, and university scientists from regions throughout the state served on the committees. Many members of the writing teams have asked to remain anonymous so that they don’t have to field questions and concerns from the public. Each writing group we have described group by title and the region of Utah they live in.

- **6th Grade Team**
  - Science Professor (Ph.D.), Northern Utah
  - District Science Specialist, Wasatch Front
  - 5 Science Educators from Wasatch Front
  - 1 Science Educator from Central/Southern Utah

- **7th Grade Team**
  - Science Professor (Ph.D.), Northern Utah
  - Science Professor (Ph.D.), Wasatch Front
  - District Science Specialist, Northern Utah
  - 2 Science Educators from Northern Utah
  - 4 Science Educators from Wasatch Front

- **8th Grade Team**
  - Science Professor (Ph.D.), Central/Southern Utah
  - 2 District Specialists from Wasatch Front
  - 1 Educator on University Assignment from Wasatch Front
  - 4 Science Educators from Wasatch Front
How were writing committees organized?
Online applications were made available through the State Science Education Coordinating Committee (SSECC) which consists of state district science and curriculum directors and specials as well as representation from state colleges and universities. Applicants were chosen based on the grade level they teach (6th-8th grade science) and availability.

How will the standards be reviewed to assure they are what is best for Utah students?
Utah SEEd standards were reviewed by a State Standards review committee composed of ten parents selected by the legislature and seven specialist in science and education chosen by the Utah State Board of Education. Additionally, all public interested in science standards have the opportunity to provide feedback through the 90-day public review process which ends July 10, 2015. Feedback from these groups will be considered by the State Board of Education prior to the drafting of the final version of the SEEd standards and the final approval of the SEEd standards.

After the SEEd standards are finalized and adopted when will they be used throughout the state?
Following adoption by the State Board of Education the SEEd standards will be piloted by interested teachers, schools, and districts the 2016-2017 school year. The SEEd standards will be fully implemented throughout the state starting the 2017-2018 school year.

Are the SEEd standards a federally mandated?
The research behind the SEEd standards (K-12 Science Education Framework) was created by a group of states and the National Research Council and no governmental funds were used to create these standards. The Framework and Next Generation Science Standards have been developed for states to adopt as is or to adapt to their needs. There is no federal mandate to adopt nor is there federal funding attached to using the research in the K-12 Science Education Framework or the Next Generation Science Standards.

Are these Common Core standards?
The Utah SEEd Standards were developed by Utah educators and experts for Utah students using the most current research in the Framework for K-12 Science Education by the National Research Council and the Next Generation Science Standards. These are not Common Core standards.

Is this State or Local control?
The SEEd standards are developed by the Utah State Office of Education, in order to ensure that all Utah students receive a high quality science education that prepares them for college and careers. They are aligned with expectations and standards developed on a national level, using research by the National Research Council. Each district and teacher, with the support of the USOE if desired, has the responsibility to develop curricula that help students achieve these goals.

Where is the money coming from for funding?
Because standard revision is an ongoing process, districts should have in place either Title II or other budgets that they use to provide professional development on an annual basis. It will be important that LEA’s plan/budget for this implementation and use the resources they have available, including local expertise to train and support their teachers.
What is “SEEd”? What is a “standard”? What is a Performance Expectation?
SEEd stands for Science and Engineering Education standards. These are designated for each grade level, assembled as a coherent set of “performance expectations”, or PEs. These performance expectations represent the standards for that grade level, and they are stated in terms of what a student could actively do to demonstrate they have learned the disciplinary core ideas, crosscutting concepts, and science and engineering practices.

Will teachers have to change their content/pedagogy?
The SEEd standards have moved science content in grades 6 – 8 from where they are found in the current Utah science standards to offer a more cohesive and better integrated learning experience for students. The larger change to teachers comes with the added emphasis in the value of the students’ ability to do rather than simply what they know. The knowledge of science practices and methods is essential versus knowledge recalling only science content. The pedagogy needs to reflect the current research findings including the three dimensions of science teaching and learning (NRC K-12 Framework). Teachers will still be free to choose how the information will be taught to their students.

Will teachers have time to teach the SEEd standards?
The science content (disciplinary core ideas) in the SEEd standards include an integration of physical science, life science, and earth and space science in each grade level 6-8, according to learning/content progressions. Additionally, Crosscutting Concepts and Scientific and Engineering Practices are intended to emphasize critical thinking. These skills can be leveraged because each year builds upon the knowledge and skills from the previous years. In the sixth grade standards, there are four root questions, while the previous standards had five. While the content is different, the amount of content is consistent with the normal time allotted for science instruction. Districts and charter schools should start seriously considering seventh grade science as a full-year course.

Why are there more performance expectations in 7th and 8th grade than in 6th grade?
The 7th and 8th grade SEEd standards include more performance expectations in comparison to 6th grade due to the fact that 6th grade science is taught along with ELA, math, social studies, etc. as part of the elementary school model. 7th and 8th grade science is intended to be taught as a full-year course in a secondary model with a specific science content teacher.

Will there be funding for Professional Development? New equipment?
Each district will have local control over implementation strategies to best serve their populations. USOE and our local universities will support the PD by providing both concept and content PD courses that LEA’s can utilize as part of their PD process. Funding for effective professional development is a priority to ensure that teachers have sufficient support for implementation. District leaders should work to redirect existing professional development funds to support this new endeavor.

Will the state assessment match the new SEEd standards?
The state assessment will be developed to measure progress against the performance expectations in the SEEd standards. The assessment has not yet been created but it will align to the SEEd standards including the Disciplinary Core Ideas, Crosscutting Concepts, and Science and Engineering Practices. It is anticipated that the new test will be implemented in the 2017-2018 school year.

Do all 6-8 grade science teachers have to use the SEEd standards following adoption?
All 6-8 grade science teachers working at a public district or charter must teach their students according to the current standards as it is their legal and ethical obligation.
What are the informal education providers going to do to support teachers?
The research behind the framework supports what informal education has focused on for many years making them an ideal partner. For years, informal education institutions have been gearing up to help teachers in this transition toward science and engineering practices. Existing assets and resources are a great starting point for teachers as they transition to these standards and three dimensional science learning. Informal education institutions are prepared to provide professional development, teaching kits, class programming, distance learning, and citizen science.

The new standards don’t have a list of activities, how will teachers know what to teach?
It is true that the new standards do not provide a list of learning activities, as the indicators in our old standards provided. As standards, performance expectations indicate what students should be able to do with their understanding at the end of a unit of instruction. To plan for instruction, teachers will need to identify a series of lessons and activities that will bridge the expectation with the knowledge and skills that students already have in place at the beginning of a unit of instruction. As teachers begin to plan backwards from performance expectations, they will find that they have some resources that are ready to use and others that will need to be developed to create a complete learning sequence. Districts will be involved with the effort to supply resources and professional development to help teachers design instruction around performance expectations. The performance expectations give some guidance about how a teacher might approach teaching and learning. For example “construct and interpret graphical displays”, “collect data to provide evidence”, “develop and use a model”, etc. Supplementary materials will be available to districts and charters to help give clarification, connections to Utah Math and ELA standards, as well as suggested connections to crosscutting concepts and science and engineering practices.

Will I get professional development on new content/practices? Where can I find resources?
The USOE will offer online professional development courses related to the 3 dimensional science teaching and SEEd standards once they have been adopted. Each school district will also have the option to facilitate professional development according to local needs and availability. Resources will also become available through USOE, UEN, informal science education enhancement (iSEE), university groups, and district science specialists.

Why has engineering been added to the science standards?
As science is the process by which the natural world is explained engineering is the process that uses science practices and knowledge to solve problems and therefore bring relevance to science. Engineering needs to be seen as integrated into science not a separate.

Will parents be able to help their students?
There will be resources available to help parents support their children in learning the SEEd standards. The change in teaching science is to emphasize discovery and exploration and parents can support their child’s learning by helping students gather information through investigations, reason about what they observe, and communicate what they’ve learned. Using the three dimensional process and a model of gathering, reasoning, and communicating will make science learning accessible to all.

How will this help my child become college and career ready?
The SEEd standards emphasize scientific reasoning and critical thinking over memorization. With the SEEd standards students will learn to analyze problems, design solutions, and create models. These 21st century skills will help them be successful in a variety of careers and in challenging college courses. Additionally, Utah is becoming a technology hub with the aerospace industry and technology sector. Students who know how to apply, create, and evaluate using STEM skills are in demand and associated with high-paying careers. The critical thinking skills learned through the SEEd standards supports critical thinking across the board as an important life skill.
Why are evolution and climate change in the SEEd Standards?

Evolution and Climate Change are important science concepts, and are not new to the Utah science standards. Our responsibility is to provide scientific information and help students reason about that information in a logical, scientific way. Students will not be taught to “believe” science concepts but to form ideas and support arguments with evidence. The ability of a student to analyze the evidence for controversial topics (such as evolution and climate change) is a critical thinking skill that applies across all subjects and prepares them for success in challenging college courses, careers, and lifelong learning. A suggested article defining the difference between accepting or rejecting evidence and belief called “Why I don’t ‘believe’ in science and students shouldn’t either” is available at: http://blogs.plos.org/scied/2013/09/02/why-i-dont-believe-in-science-and-students-shouldnt-either/

Why is Darwinian evolution included in the SEEd standards?

Evolution as described by Charles Darwin is the basis and the fundamental principle of life science. It is has been and will continue to be taught as a crucial scientific theory in our public science classrooms. As with all science it is always subject to change based on facts and scientific understanding.

From the State Board of Education:

Science: A Way of Knowing
Science is a distinctive way of understanding the natural world. Science seeks to increase our understanding through empirical evidence. As a way of knowing, science assumes that anything that can be observed or measured is amenable to scientific investigation. By the very nature of scientific inquiry, there are infinite possibilities for further refinement of current knowledge and understanding.

Student Beliefs and Teaching Evolution
Teachers should be aware that students bring with them a set of beliefs. Teachers and students should respect and be nonjudgmental about students’ beliefs, and teachers should help students understand that science is an essential way of knowing. Teachers should encourage students to discuss any seeming conflicts with their parents or religious leaders. Science teachers should make available to interested parents their planned instruction and the context for that instruction.


Why not teach intelligent design?
Intelligent design is not a scientific explanation and does not model science’s way of knowing. Science is grounded in evidence based understandings. Intelligent design is grounded in a way of knowing based on belief and faith. While ID may refer to some specific pieces of scientific fact, it stops short on the scientific process by not addressing the natural causes of phenomena. Additionally, federal statute prohibits the teaching of ID in a science classroom because it is a religious concept.

Evolution is just a theory, why teach it?
“Theory” in science refers to a deeper explanation than a simple idea. Theories explain the most basic mechanisms of nature and how they work. For example, atomic theory is the basis for all of chemistry. If one was to say that atomic theory is “only a theory” and shouldn’t be taught, there wouldn’t be the basis for the periodic table, chemical bonds, and the construction of molecules that we readily use to understand our physical world. Evolution is the best evidence-based explanation that we have for the diversity of species on our planet, has continues to be supported by increasing amounts of evidence.
Why are we teaching climate change to 6th grade students? The scientific practice embedded in PE 6.2.4 is asking questions, specifically having students “ask questions to clarify the evidence of the factors that have led to a rise in global temperatures”. Asking meaningful questions regarding scientific topics is a skill that most students need to be explicitly taught. Teaching sixth grade students about the rise in global temperatures over the past century, or climate change, can at first seem like a daunting task. The issue is controversial, with strong opinions about how much humans have influenced the current rise in temperatures and what the impact on Earth will be. The focus of 6.2.4 is not to scare students into thinking that we have destroyed our planet, but rather to help students understand the science behind global temperature changes such that they can begin to ask their own questions about climate change. When it comes to controversial issues in science, students need to learn how to ask questions about the available evidence, so that they can make informed decisions now, and as adults.

Additionally, studying climate change offers an opportunity for students to learn how scientists use evidence to develop explanations. Many often think primarily about the content students are learning, but equally important is helping students develop an understanding of the nature of science and develop their skills with science practices. Analyzing data that demonstrates changes in global temperatures as well as scientific studies that are examining the factors causing the changes in global temperatures is an appropriate way for students to learn about scientific endeavors and how scientists approach questions and problems. Students need to gain an understanding of science early on so that they can apply this understanding in future science courses.