A national exam revealed fewer than one-third of elementary and high school students have a solid grasp of science…The U.S. Secretary of Education Arne Duncan indicated that the "next generation will not be ready to be world-class inventors, doctors and engineers" if results don't improve (Banchero, 2011).

ND STEM NETWORK

SCIENCE • TECHNOLOGY • ENGINEERING • MATHEMATICS

ND STEM FAQ's

What is the STEM Network?

The North Dakota STEM Network is a partnership of change-making individuals from K-12 education, higher education, ND state government, industry, economic development and non-profit organizations who believe that outstanding STEM education is the key to North Dakota's future in order to prepare our children and maintain a strong economy. The Network also has partnerships with national organizations focused on education and workforce issues. This state-wide network is comprised of four regional communities, defined geographically – Northeast, Northwest, Southeast, Southwest- and a 5th representing North Dakota's Native American community.

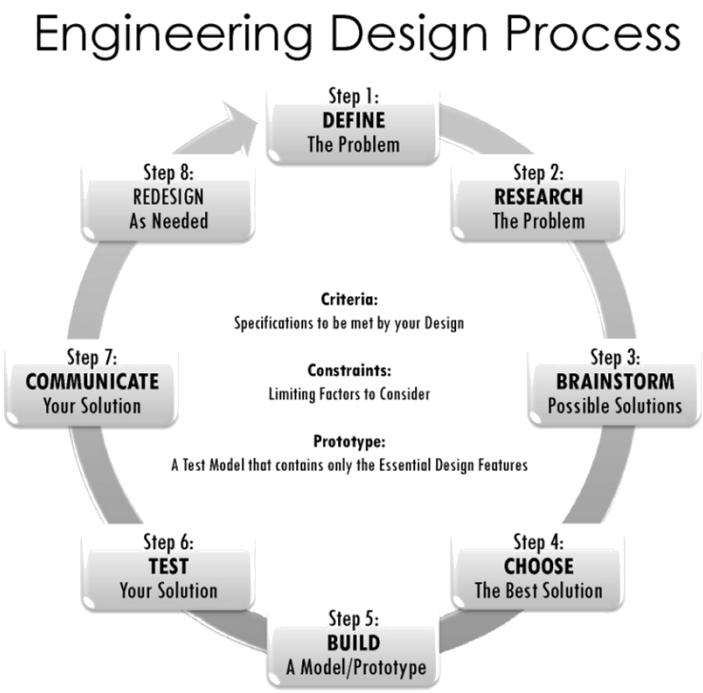
What is STEM Education?

Many people like to describe STEM (science, technology, engineering and mathematics) as an effort to increase the number of students going into STEM career fields, therefore creating more engineers or scientists. However, STEM education goes beyond that. It is a paradigm shift, a completely new philosophy for teaching and learning – one that allows students to engage in dynamic learning communities focusing on projects and using the engineering design process. That process integrates several subjects making each subject more relevant to the working world. It allows students to be more creative and innovative, to work as teams, to communicate and problem solve which more closely replicates what happens in the 21st century workplace.

STEM education gives kids an opportunity to build 21st century skills like creativity, critical thinking, collaboration, and communication. STEM gets students engaged and actively involved in the learning process. STEM excites and inspires kids by employing their newfound knowledge in authentic experiences that are awe-inspiring and cemented into their memory.

STEM is the tie that binds our current curriculum. It focuses on the same N.D. standards but uses the engineering design process as a method for problem solving and seeing the overlap in our curriculum.

What is the Engineering Design Process?



The engineering design process is a method for solving problems in a way that results in the optimal outcome. It teaches students that real-world problems can have multiple solutions, and therefore it is important to think about how we can choose the best possible solution. The engineering design process uses an organized system of thinking. It also teaches students that problem solving is an iterative process with many cycles of thought.

This type of process improves a student's ability to solve problems in any discipline.

Why is STEM Education Important for Education?

STEM is a necessity and not a luxury. STEM education is vital for our national security and global competiveness. Corporations and multinational companies have made the paradigm shift to the 21st century. Education, except in pockets, hasn't turned the corner yet. Corporations are increasing their recruitment of innovators and technological experts from other countries because our education system is not providing them with the workforce they need. The majority of U.S. workers in the future will need to have some education past high school and in many cases will need to continue the learning process throughout their lives.

Further, the amount of information in the world is increasing exponentially. We need to produce people who are proficient at navigating these large volumes of information and capable of producing the next innovations. Increasingly, those innovations will occur between disciplines, hence our focus on interdisciplinary problem solving.

Technology complements workers with higher education and higher skill levels. Yet it displaces workers who perform routine tasks. It will be critical to produce technologically literate people who can use technology as a tool and can quickly learn and adapt new interfaces to solve problems.

Why Not Stick with the Old Way?

Traditional education does not provide an opportunity for deep and enriching experiences in curriculum. Traditional education lacks the ability to broadly excite inquiring minds or invite success by giving students a chance to practice 21st century skills which include communication, teamwork, creativity and innovation.

High Tech High, a STEM high school located in California, describes the three axioms of public education as it currently exists:

- We separate head from body
- We separate children by ability
- We separate school from the real world

What does a STEM Classroom Look Like?

STEM classrooms look like cooperative problem solving stations. The following ideas and images describe a STEM school: tools, experiments, labs, tinkering, technology rich, outside resources enriching curriculum, building, experiencing, empathy, student voice, student participation, student engagement, teacher teaming, teacher internships, staff collaboration, differentiation, learning for all.

Is there Proof that it's Working?

Ask any STEM education teacher and they will tell you -- You are darn right it's working. For example, the first year West Fargo STEM School started, their students placed second in a state middle/high school robotics competition called Bison Best; they later went to nationals and placed well. Additionally, several students at the West Fargo STEM Center won the national competition for NASA and made a trip to present their ideas and watch the space shuttle. When given the freedom to learn as a school and not from a school, the students produce results time and again.

Currently test scores at the West Fargo STEM Center are the same as traditional schools (slightly higher in science). The school is working to find a balance between teaching to the test (which occurs in many traditional schools), creating a new test that measures 21st century skills and problem solving, and giving our students authentic opportunities to perform for audiences bigger than their team of teachers.

Incubator STEM platform schools are out-performing their district schools in math and science in more than 90 percent of the cases. The schools have also increased their graduation rates to more than 90 percent.

One STEM teacher said: "Put it this way: Put me in a complex problem solving situation, I would take one STEM student over ten traditional students any day. These students know how to collaborate, how to be resourceful, how to apply action to concepts, and how to solve problems. These additional skills are taught with the curriculum and supplement student success and 21st century preparedness.

What is the Mission of the Network?

The North Dakota STEM Network aims to connect and increase collaboration across the state in order to provide greater opportunities in regards to STEM education and workforce development. The Network will strengthen the education system in North Dakota, while further aligning education with economic development and workforce needs, providing skills and opportunities for all students to be globally competitive.

What are the Overall Goals of the Network?

The Network plans to change the face of education. The statewide effort will connect education to industry in order to create environments in which students can develop skills to prepare them for the 21st century workplace. It will eliminate demographic and geographical barriers; STEM education will make education accessible and relevant to all students.

The Network will align education with economic development and workforce needs, providing skills and opportunities for all students to become globally competitive.

Why is a STEM Network Valuable to North Dakota?

The North Dakota Department of Commerce affirms that the state's business climate has gained a reputation for supporting emerging businesses, entrepreneurs and expansions. "The state's growing manufacturing, technology-based businesses, agricultural and energy industries are drawing some of the world's most recognized companies into the state." These industries all demand well-prepared employees with the problem-solving and analytical skills that are developed and refined through STEM education. The North Dakota University System's strategic plan recognizes the importance of STEM education with a special focus on agriculture, energy, life sciences, health care and advanced technology.

If we can create an environment that allows students to access more and higher levels of mathematics and science along with all the other subjects, we will create a pipeline of talent that can respond to future workforce needs. They will become globally competitive, entrepreneurial, competent graduates who are college and work ready. When they stay in North Dakota, they will create a pipeline of talent that will attract more investments and new businesses and jobs, therefore strengthening and evolving the state's economy.

Who are the Stakeholders in the ND STEM Network?

The simple answer is that everyone in North Dakota has a stake in this.

Since November 2010 a group of like-minded individuals from K-12 education, higher education, state government, industry, economic development and non-profit organizations have started to collaborate and design a network. These STEM champions believe that outstanding STEM education is the key to our children's and the state's future. This grass roots effort is a collaboration of community members throughout the state who support increased excellence in STEM education for ALL North Dakota students. The list of supporters is long and keeps growing.

Join us!

Works Cited: Banchero, S. (2011). Wall Street Journal. *Students Score Poorly on Science Test.* Retrieved January 29, 2011, from http://online.wsj.com/article/SB10001424052748704698004576103940087329966.html