UNIT 1 – STEM BASICS

OVERVIEW

STEM stands for science, technology, engineering, and mathematics. Sometimes this includes Art and becomes STEAM but for this curriculum, we will focus on STEM. STEM is important because it pervades every part of our lives:

Science is the study of the physical world around us.
Technology is the application of scientific knowledge for practical purposes. We use it to expand every aspect of our lives – through computers, cell phones, video cameras, almost anything.
Engineering is the branch of science concerned with the design, building, and use of engines, machines and structures. It focuses on things like the designs of roads and bridges, but also tackles the challenges of changing global weather and environmentally friendly changes to our home.
Mathematics is the science of numbers, quantity, and space. It is in every occupation, every activity we do in our lives.

INTEGRATION: STEM education is an integrated, interdisciplinary approach to learning that provides hands-on and relevant learning experiences for students. *In other words, teachers from different subject areas or expertise connect lessons.* English classes may review vocabulary concepts for engineering or sciences, which are then applied in science classes with hands on or integrated learning experiences.

WHOLLY CONNECTION: STEM teaching and learning goes beyond simple instruction. *It engages students and teaches them with critical thinking, problem solving, creative and collaborative skills.* Ultimately STEM teaching helps students see connections between the school, work place, community and the global economy.

OBJECTIVES:

- To introduce students to STEM concept.
- To start students' exploration of STEM related fields and develop ideas about what a career in a STEM field might look like.
- To see how STEM is a large part of our everyday lives.

KEY VOCABULARY

- Visit Link for List.

ADDITIONAL RESOURCES

- Visit Link for List.

LESSON PLANS

Lesson 1: What is STEM?
Lesson 2: Are Sports part of STEM?
Lesson 3: Deaf people in STEM, yes!
Lesson 4: Is Cooking part of STEM?
Lesson 5: STEM part of our everyday lives?

LESSON PLAN 1: WHAT IS STEM?

LESSON OBJECTIVES

- To introduce students to STEM concept.
- To see how STEM is a large part of our everyday lives.

ACTIVITY TIME

- Three to five 50 minute class periods.

TARGET GRADE

- Adaptable for 6th through 12th grade.

MATERIAL LIST

- DeafTEC Video.
- Computers.
- Notepads and pencils.
- Poster board, magazines, drawing and painting supplies.

KEY VOCABULARY

- Visit Link for List.

ONLINE RESOURCES

- Visit Link for List.

CORE STANDARDS

- Visit Link for List.

ACTIVITY

As a class, discuss what STEM stand for?

1. Go to Kids Science Facts and pick a science fact. Click on that word and read the information. Develop a short 5-minute vlog, presentation, or PowerPoint for your class.

2. Watch Deaf and Hard of Hearing college students talk about their experience in STEM Programs:

Deaf TEC Video: In Their Own Words: Deaf College Students in STEM Programs: Introduction to STEM Video

LESSON 2: ARE SPORTS PART OF STEM?

OVERVIEW

When we think of sports we often think of what happens on the playing field, swimming pool, or in the gymnasium. In fact, sports - professional sports in particular - incorporate a great deal of preparation, planning, and investment from many people, not just the athlete. There are many STEM professionals involved in sports that do not actually play, but contribute to the success of the players. Careers in the sports sciences involve everything from building stadiums, to coaching, videography, video analysis, to clothing and equipment engineering. So if you enjoy sports, you might enjoy a career in the STEM fields that serve sports. (https://www.chevronstemzone.com/)

Learning via sports is inspiring especially when STEM topics are introduced at an early age. 3D printing of sport equipment, designing new materials for the fastest uniforms in speed skating, understanding aerodynamics, or figuring out how to curve the ball while playing baseball are just a few examples of the STEM/sports connection. Sport scientists can research the best recovery for a professional athlete or how to train in order to achieve optimal results.

Notable Deaf Athletes And Accomplishments

- Derrick Coleman, a Super Bowl winning fullback of the Seattle Seahawks
- Tamika Catchings, a 10-time WNBA all-star who once posted a quadruple-double
- Carl Morris, an 8-ball pool world champion
- Luther Hayden Taylor, a winning pitcher for the New York Giants, whose entire team learned sign language to communicate with him
- James Kyte, an NHL hockey player
- Carlo Orlandi, an Olympic, gold winning boxer
- Ashley Fiolek, the youngest female American National Motocross champion
- Brad Minns, tennis player, coach, and fitness trainer
- William Hoy, the first Deaf baseball player who helped pioneer umpire hand signals to “hear” calls

LESSON PLAN 2: ARE SPORTS PART OF STEM?

LESSON OBJECTIVES

- To introduce students to how sports are related to STEM.
- To learn what kind of STEM is included in specific sports.

ACTIVITY TIME

- One 50 minute class period.

TARGET GRADE

- Adaptable for 6th through 12th grade.

MATERIAL LIST

- Computers.
- Notepads and pencils.
- Poster board, magazines, drawing and painting supplies.

KEY VOCABULARY

- Visit Link for List.

ONLINE RESOURCES

- Visit Link for List.

CORE STANDARDS

- Visit Link for List.

ACTIVITY

Students will view

- Learning Physics – Skateboarding engages kids in science

1. Individual students will pick a favorite sport.

2. Search Internet for videos, articles, sciences journals that explain that sport and then prepare a presentation considering 1 or more of the following questions:

a) What kinds of science is involved in this sport?

b) What kind of technology is used in this sport to help the athletes that play?

c) How does engineering help us understand the mechanics of the body or improve equipment used in the sport?

d) How does mathematics help us connect all of these concepts? Notice that math formulas and concepts are present in all areas. **Example video**: Science of Gymnastics (short)

e) How can you engineer better equipment for the sport you picked?

f) What other question can you hypothesize or develop?

Collect your information and then decide how you will present it to the class. Make a video of your own. Do an artistic collage. Write an essay. Create a PowerPoint.

LESSON PLAN 3: DEAF PEOPLE IN STEM, YES!

LESSON OBJECTIVES

- To encourage Deaf and Hard of Hearing students to imagine themselves in STEM fields.
- To learn how STEM fields can be accessible for Deaf and Hard of Hearing students.

ACTIVITY TIME

- One 50 minute class period.

TARGET GRADE

- Adaptable for 6th through 12th grade.

MATERIAL LIST

- Computers.
- Notepads and pencils.
- Poster board, magazines, drawing and painting supplies.

KEY VOCABULARY

- Visit Link for List.

ONLINE RESOURCES

- Visit Link for List.

CORE STANDARDS

- Visit Link for List.

ACTIVITY

Students will view

- Deaf welders: https://dcmp.org/media/12299-deaf-and-hard-of-hearing-stem-professionals-let-s-meet-deaf-welders (requires membership by teacher)
- Famous Deaf scientists: http://deaftec.org/resources/careers/lst
- How hearing people can learn: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6234809/

1. Search Internet for videos, articles, sciences journals identify Deaf people in different STEM fields and then prepare a presentation considering 1 or more of the following questions:

a) Who did you pick as your Deaf person to research?

b) What kind of field is this person in?

c) What inspired this person to study in this field?

d) What kinds of technology helped this person interact with hearing people or helped hearing people interact with this person?

2. Collect your information and then decide how you will present it to the class. Make a video of your own. Do an artistic collage. Write an essay. Create a PowerPoint.

LESSON 4: IS COOKING PART OF STEM?

OVERVIEW

Cooking, in particular, is a key area where we are using scientific methods without realizing it. Every time you prepare food, you are using math and science concepts. This makes food an exceptional tool for teaching math and science to virtually all ages.

ADDITIONAL RESOURCES

- Additional Lessons for Middle School **http://www.foodmaster.org/grade6-8.html#.WW_j_hg-IUE** - Welcome to the FoodMASTER Middle School program! This curriculum was developed by FoodMASTER with funding from the National Institutes of Health: Science Education Partnership Award to present middle school grade students with twelve basic topics in foods. Each topic area includes hands-on math and science lessons to take your students on an exciting and innovative exploration of food, math and science.
- Additional Lessons for Higher Education: **http://www.foodmaster.org/higher-ed.html#.WW_khhg-IUE-**
- http://cen.acs.org/articles/90/i36/Kitchen-Chemistry-Classes-Take-Off.html
- **http://blog.typsy.com/food-of-the-future-how-molecular-gastronomy-revolutionized-the-dining-experience**

LESSON PLAN 4: IS COOKING PART OF STEM?

LESSON OBJECTIVES

- To learn how cooking involves STEM concepts.
- To apply specific STEM techniques to cooking.

ACTIVITY TIME

- Three 50 minute lessons.

TARGET GRADE

- Adaptable for 6th through 12th grade.

MATERIAL LIST

- Videos on computer.
- Pencils / paper or computer for essay.
- Computers
- If teachers chose to use secondary curriculum, additional materials listed in FoodMASTER curriculum will be needed.

KEY VOCABULARY

- Visit Link for List.

ONLINE RESOURCES

- Visit Link for List.

CORE STANDARDS

- Visit Link for List.

ACTIVITY

Watch two of the following videos to answer the questions:

- What is Molecular Gastronomy?
- The Best of Molecular Gastronomy
- Molecular Gastronomy changes the hamburger!
- Alton Brown Makes Apple Pie

  The Science of adding salt to food: why do we salt food while cooking?
- The Science of Good Cooking
- How to Make a Perfect Pot of Rice Every Time
- Alton Brown Makes Meatloaf
- Alton Brown Makes French Toast

Questions to ponder:

a) How do we use math and science in cooking?

b) How is STEM changing the way we cook?

c) Is molecular gastronomy taking cooking to a new level of cooking?

LESSON PLAN 5: STEM AS PART OF OUR EVERYDAY LIVES

LESSON OBJECTIVES

- Explore ways in which STEM is a part of our everyday lives.
- Learn more about different STEM careers.

ACTIVITY TIME

- Three 50 minute class periods.

TARGET GRADE

- Adaptable for 6th through 12th grade.

MATERIAL LIST

- Videos on computer.
- Internet access.
- Pencils / paper or computer for essay.

KEY VOCABULARY

- Visit Link for List.

ONLINE RESOURCES

- Visit Link for List.

CORE STANDARDS

- Visit Link for List.

ACTIVITY

Using the iON Future – STEM Career Exploration Game students will explore the different ways that STEM is in our lives. Try the game "STEM is everywhere" and discover the STEM careers in your everyday life! See which students can get the highest score finding the list of STEM words.

1. Prepare a presentation considering the following 1 or more of the following questions:

    a) What everyday activity / item surprised you by its involvement with a STEM job?

    b) What items in your classroom were probably designed, made and distributed by STEM professionals?

    c) What is your favorite STEM creation?

    d) What other question can you hypothesize or develop?