6th Grade: Energy Transformation

The Energy Transformation curriculum aligns with 6th grade Essential Standards—Energy Conservation and Transfer. The curriculum was developed in partnership with Progress Energy and North Carolina State University. Each lesson is grade-level appropriate and has been correlated with U.S. National Science Education Standards.

National Science Standards objective include:

- The order of Scientific Inquiry
- Physical Science (motion and forces)
- Science and Technology (abilities of technological design)
- Science in Personal and Social Perspectives

The Energy Transformation curriculum includes a support lessons and activities that allow teachers (volunteers) and students to explore energy sources and heat transfer, historical aspects of energy sources, and energy's economic and environmental implications for the future.

Energy Transformation challenges students by guiding them in conducting investigations and examining models to build an understanding of the characteristics of energy transfer through the process of engineering design.

Students work in teams to build, improve, and test the efficiency of a small model "home" developed by the curriculum designers. Students learn about stack effect, air pressures, temperature differentials, heat flow, and insulation values. The purpose of the exercise is for students to understand the relationship between various behaviors and building practices and how those behaviors and practices affect energy efficiency as it relates to heat flow and energy transfer.

Life skills help a person live a productive, and satisfying

ESSENTIAL STANDARDS

Energy Conservation and Transfer

Clarifying Objectives:

6.P.3 Understand characteristics of energy transfer and interactions of matter and energy.

6.P.3.1 Illustrate the transfer of heat energy from warmer objects to cooler ones using examples of conduction, radiation and convection and the effects that may result.

- Control the Flow
- The Heat is On
- It Just Makes Cents

6.P.3.2 Explain the effects of electromagnetic waves on various materials to include absorption, scattering, and change in temperature.

6.P.3.3 Explain the suitability of materials for use in technological design based on wa response to heat (to include conduction, expansion, and contraction) and electrical energy (conductors and insulators)

- Don't Lose Your Cool Don't Blow Your Stack
- It's a Wrap

The Experiments in Poultry Science curriculum aligns with 7th grade Essential Standards—Structures and Functions of Living Organisms and Evolution and Genetics. The Experiments in Poultry Science curriculum was developed in partnership with a number of land-grant universities and Discovery Place. Each lesson is grade-level appropriate and has been correlated with U.S. National Science Education standards.

National Science Standards objectives include:

- The order of Scientific Inquiry
- Reproduction and Heredity
- Structure and Function in Living Systems
- Regulation and Behavior

Also included in the Experiments in Poultry Science curriculum are support lesson plans that allow teachers (volunteers) and students to explore the ethics of scientific research, hierarchal order, and careers in science.

Children have a natural sense of curiosity about living things in the world around them. Building on this curiosity, students can develop an understanding of biology through direct experience with living things, their life cycles and their habitats. Many believe students learn best by interacting with the world – listening, observing, experimenting and applying their knowledge to real-world situations. Each activity within this curriculum follows these steps in the experiential learning model.

Life skills help a person live a productive, and satisfying life. Within this curriculum students will have the opportunity to develop life skills related to science processes, teamwork, keeping records, and planning and organizing.

The Experiments in Poultry Science curriculum is supported through 4-H and the North Carolina Department of Public Health. See the publication Guidelines for Animals in North Carolina Schools when considering using poultry as a lab experiment, available online at http://epi.publichealth.nc.gov/cd/vph/AnimalsinNorthCarolinaSchools.pdf.

Structures and Functions of Living Organisms

Essential Standards

7.L.1 Understand the processes, structures and functions of living organisms that enable them to survive, reproduce, and carry out the basic functions of life.

Clarifying Objectives:

7.L.1.1 Compare the structures and life functions of single-celled organisms that carry out all the basic functions of life including:
• Euglena • Amoeba • Paramecium • Volvox

7.L.1.2 Compare the structures and functions of plant and animal cells, including major organelles (cell membrane, cell wall, nucleus, chloroplasts, mitochondria, and vacuoles).
• Give Eggs a Break

7.L.1.3 Summarize the hierarchial organization of multi-cellular organisms from cells to tissues to organs to systems to organisms.
• Daily Embryonic Development
• Life is Not Always What it Seems

7.L.1.4 Summarize the general fucntions of the major systems of the human body (digestion, respiration, reproduction, circulation, and excretion) and ways that these systems interact with each other to sustain life.
• Warming Up With Eggs • Life is Not Always What it Seems

Evolution and Genetics

Essential Standards

7.L.2 Understand the relationship of the mechanisms of cellular reproduction, patterns of inheritance and external factors to potential variation among offspring.

Clarifying Objectives:

7.L.2.1 Explain why offspring that result from sexual reproduction (fertilization and meiosis) have greater variation than offspring from asexual reproduction (budding and mitosis)
• The Reproductive System and Fertilization

7.L.2.2 Infer patterns of heredity using information from Punnett squares and pedigree analysis.

7th Grade: The Power of Wind

The Power of Wind curriculum aligns with 7th grade Essential Standards—Energy Conservation and Transfer. The curriculum was developed in partnership National 4-H, the University of Illinois, the Noyce Foundation, and 3M Foundation. Each lesson is grade-level appropriate and provides a continuous build upon the Essential Standard: Forces and Motion. In addition, the Power of Wind curriculum has been correlated with U.S. National Science Education Standards.

National Science Standards objective include:

- The order of Scientific Inquiry
- Physical Science (Motion and Forces)
- Science and Technology (Abilities of Technological Design)
- Science in Personal and Social Perspectives

The Power of Wind also includes support lesson plans that allow teachers (volunteers) and students to explore thinking like an engineer, innovative design, and concepts of engineering, the relevance of math to the energy we use, and community influence.

Lessons module themes include challenge, investigation, and exploration that allow the student to achieve a metacognitive understanding of mechanical systems through the science of wind power. Many believe students learn best by interacting with the world – listening, observing, experimenting, and applying their knowledge to real-world situations. Each activity within this curriculum follows these steps in the experiential learning model.

Life skills help a person live a productive, and satisfying life. Within this curriculum students will have the opportunity to develop life skills related to critical thinking, problem solving, teamwork, communication, and acquiring and evaluating information.

Contact your local Cooperative Extension and ask the 4-H agent about the Power of Wind.

Energy Conservation and Transfer

Essential Standards:

7.P.2 Understand forms of energy, energy transfer and transformation and conservation in mechanical systems.

7.P.2.1 Explain how kinetic and potential energy contribute to the mechanical energy of an object.

- Chapter 1: How Can We Think LIke An Engineer

7.P.2.2 Explain how energy can be transformed from one form to another (specifically potential energy and kinetic energy) using a model or diagram of a moving object (roller coaster, pendulum, or cars on ramps as examples)

- Chapter 2: How Do We Study The Wind?
- Chapter 3: How Do We Use The Wind?

7.P.2.3 Recognize that energy can be transferred from one system to another when two objects push or pull on each other over a distance (work) and that electrical circuits require a complete loop through which an electrical current can pass.

- Chapter 4: How Do Geography and Community Influence Wind Power Projects?

7.P.2.4 Explain how simple machines such as inclined planes, pulleys, levers, and wheels and axles are used to create mechanical advantage and increase efficiency.

- Chapter 5: How Does Wind Insprie Creativity and Design?

COOPERATIVE EXTENSION'S YOUTH DEVELOPMENT PROGRAM

NC State University A&T State University COOPERATIVE EXTENSION
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6th Grade: Shoot for the Stars

The Shoot for the Stars Curriculum aligns with 6th grade Essential Standards—Earth in the Universe. The curriculum was developed in collaboration with North Carolina 4-H and the North Carolina Science House at North Carolina State University, with funds from the National Science Foundation (NSF). Each lesson is grade-level appropriate and has been correlated with U.S. National Science Education standards.

National Science Standards objective include:

- The Order of Scientific Inquiry
- Structure of the Earth's System
- Earth's History
- Earth's in the Solar System

Shoot for the Stars allows educators to easily add hands-on activities that can be conducted both in the classroom and at home. It provides support review lessons from third grade Essential Standards so that learning is scaffolded. Constellation and Star Art modules allows for creative collaboration between science and language arts. These support lessons let teachers connect with colleagues by accessing material from the language arts common core by linking to subject matter content in the areas of reading standards for literature and writing standards.

Life skills help a person live a productive, and satisfying life. Within this curriculum, students will have the opportunity to develop life skills related to communication, teamwork, and critical thinking.

Contact your local Cooperative Extension and ask the 4-H agent for Shoot for the Stars.

Earth in the Universe

Essential Standards:

6.E.1 Understand the Earth/moon/sun system, and the properties, structures, and predictable motions of celestial bodies in the universe.

6.E.1.1 Explain how the relative motion and relative position of the sun, Earth, and moon affect the seasons, tides, phases of the moon, and eclipses.

- Time Keeps Running
- Sun Keeps Shining
- Moon Keeps Turning
- Day and Night Keep Switching
- Seasons Keep Changing

6.E.1.2 Explain why Earth sustains life while other planets do not based on their properties (including types of surface, atmosphere and gravitational force) and location relative to the Sun.

- Space Keeps Going

6.E.1.3 Summarize space exploration and understandings gained from it.

- Space Travel Keep Dreaming

COOPERATIVE EXTENSION'S YOUTH DEVELOPMENT PROGRAM

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The Health Rocks!® is a three-part evidence and research-based leader's curriculum for a healthy living program, designed to bringing youth, families, and communities across the United States together to reduce use of tobacco, alcohol, and drugs among youth. Health Rocks! Aims to help youth resist risky behaviors by guiding them in development of life skills in the areas of critical thinking, decision-making, communication, managing feelings, stress management, and goal setting to help them resist risky behaviors. It also provides accurate health information on the consequences of youth usage of tobacco, alcohol, and drugs. Health Rocks! aligns with National Health Standards and North Carolina Essential Standards (Healthful Living-Health Education) targeting ages 8 through 14.

The program aims to:

- Reduce youth smoking and tobacco use.
- Help youth build life skills that lead to healthy lifestyle choices with special emphasis on youth smoking and tobacco use prevention.
- Help youth understand influences and health consequences related to use of tobacco, drug, and alcohol use to make healthy choices.
- Engage youth and adults in partnership to develop and implement community strategies that promote healthy lifestyle choices.
- Build positive, enduring relationships with youth involved as full partners through widely varying "communities of interest" to address youth risk behaviors.
- Health Rocks!® also provides health information regarding norms and consequences of youth tobacco, alcohol, and drug usage. The curriculum is designed for teen/adult facilitation, with teaching tips and key health messages embedded in the hand-on activities.

The 46 activities use hands-on experiences to facilitate youth learning, including concept review and learning assessment at the end of each chapter. A Retrospective Impact Evaluation is included along with appendices with additional resources, a drugs glossary, and a facilitator-training outline.

For information about Health Rocks! in your area, contact your local Cooperative Extension Office and ask 4-H agent for the Health Rocks curriculum.

ESSENTIAL STANDARDS
6th Grade

Clarifying Objectives:

Alcohol, Tobacco, and Other Drugs.

- Take a deep breath
- Running free
- Did you know?

Mental and Emotional Health.

- Should I or Shouldn't I
- The chains that bind
- Be a stress buster
- Making informed decisions

Personal and Consumer Health

- The choices that matter
- Lights! Camera! Action!

ESSENTIAL STANDARDS
7th Grade

Clarifying Objectives:

Alcohol, Tobacco, and Other Drugs.

- Take a deep breath
- Running free
- Did you know?

Mental and Emotional Health.

- Should I or Shouldn't I
- The chains that bind
- Be a stress buster
- Making informed decisions

ESSENTIAL STANDARDS
8th Grade

Clarifying Objectives:

Alcohol, Tobacco, and Other Drugs.

- Did you know?
- Lights! Camera! Action!

Mental and Emotional Health.

- Should I or Shouldn't I
- The chains that bind
- Be a stress buster
- Making informed decisions

COOPERATIVE EXTENSION'S YOUTH DEVELOPMENT PROGRAM

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2nd Grade: Bug Out

Bug Out aligns with 2nd grade Essential Standard-Structures and Functions of Living Organisms. The goal of Bug Out is to increase understanding and appreciation of insects and to reduce fear of insects through experiential learning activities. Bug Out stimulates thinking, develops communication skills, and promotes positive social interactions. Bug Out is best used during the summer or fall when insects are most common and active.

Materials and pre-class preparations are laid out, along with a suggested script. Where appropriate, vocabulary lists, worksheets, and activity sheets are included. An educational kit containing most of the non-consumables needed for implementing these lessons is available through your local 4-H agent. Contact your local Cooperative Extension and ask for the 4-H agent to learn more about the 4-H School Enrichment Curriculum.

ESSENTIAL STANDARDS

Structures and Functions of Living Organisms (2nd)
Understanding Animal Life Cycles

Clarifying Objectives:

2.L.1.1 Summarize the life cycle of animals:

- Birth
- Developing into an adult
- Reproducing
- Aging and death

✓ **Bug Out** – Mystery Bug
✓ **Bug Out** – How Do They Grow
✓ **Bug Out** – Let's Look at More Insects

2.L.1.2 Compare life cycles of different animals such as, but not limited to, mealworms, ladybugs, crickets, guppies or frogs.

✓ **Bug Out** – Bugs in a Bottle
✓ **Bug Out** – It's a Bug's Life
✓ **Bug Out** – Bug Parts Bingo

Hatching Classroom Projects aligns with 2nd grade Essential Standard-Structures and Functions of Living Organisms. Developers of the Hatching Curriculum designed each lesson to be grade-level appropriate and have been correlated with U.S. National Science Education Standards.

Children have a natural sense of curiosity about living things in the world around them. Building on this curiosity, students can develop an understanding of biology through direct experience with living things, their life cycles and their habitats. Many believe students learn best by interacting with the world — by listening, observing, experimenting and applying their knowledge to real-world situations.

An additional goal of this curriculum is to help students develop life skills. Life skills help an individual live a productive and satisfying life. Within this curriculum students will have the opportunity to develop life skills related to science processes, managing, thinking, working, relating and living a healthy lifestyle.

This curriculum meets the "Guidelines for Animals in North Carolina Public Schools" (2008) set forth by the North Carolina Public Health Department. Contact your local Cooperative Extension and ask for the 4-H agent to learn more about Hatching Classroom Projects.

ESSENTIAL STANDARDS

Structures and Functions of Living Organisms (2nd Grade)
Understanding Animal Life Cycles

Clarifying Objectives:

2.L.1.1 Summarize the life cycle of animals:

- Birth

✓ **Embryology** – Warming up with Eggs
✓ **Embryology** – Building an Eggs-ray Viewer
✓ **Embryology** – Playing Peek-a-boo with Embryos
✓ **Embryology** – Daily Embryonic Development

- Developing into an adult

✓ **Embryology** – Pick a Chick
✓ **Embryology** – Backyard Flock

- Reproducing

✓ **Embryology** –
The Reproductive System and Fertilization

- Aging and death

Not Covered

3rd Grade: Soil Solutions

Soil Solutions brims with hands-on science lessons that utilize the local school landscape to connect students to the world of soils and plants in an inviting and relevant way. Activities are structured to foster wonder and curiosity and encourage ways to turn student questions into investigations. The teacher's role becomes that one of a collaborator and a partner in inquiry with their students. Aligned to meet North Carolina's Essential Science Standards third grade science ecosystems, the curriculum draws from current research and knowledge in crops, horticulture and soil sciences.

Using the 4-H Experiential Learning Model as a framework, Soil Solutions seeks to further life skills including communication, teamwork, critical thinking, and more, by engaging students to learn by doing, sharing their experience with each other, reflecting on their results and generalizing and applying what they know to new situations.

Materials and pre-class preparations are laid out, along with a suggested script. Where appropriate, vocabulary lists, worksheets and activity sheets are included. An educational kit containing most of the non-consumables needed for implementing these lessons is also available through your local 4-H agent. Contact your local Cooperative Extension and ask for the 4-H agent to learn more about the 4-H School Enrichment Curriculum.

ESSENTIAL STANDARDS

Ecosystems (2nd Grade)

Understand How Plants Survive in their Environments

Clarifying Objectives:

3.L.2.1 Remember the functions of the following structures as they relate to the survival of plants in their environments:

- Roots – absorb nutrients
- Stems – provide support
- Leaves – synthesize food
- Flowers – attract pollinators and produce seeds for reproduction

✓ **Soil Solutions** – Pollination Partners

✓ **Soil Solutions** – Seeds up Close

3.L.2.2 Explain how environmental conditions determine how well plants survive and grow.

✓ **Soil Solutions** – Happy Homes for Plants

✓ **Soil Solutions** – A Balancing Act

3.L.2.3 Summarize the distinct stages of the life cycle of seed plants.

✓ **Soil Solutions** –
Plant Growth Experiment: A Nutrient Study

3.L.2.4 Explain how the basic properties (texture and capacity to hold water) and components (sand, clay and humus) of soil determine its ability to support the growth and survival of many plants.

✓ **Soil Solutions** – Is It Soil Yet?

✓ **Soil Solutions** – Living Off the Land

✓ **Soil Solutions** – A Balancing Act

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Shoot for the Stars aligns with 3rd grade Essential Standard-Earth in the Universe. This curriculum is a unique blend that can be used in many settings both inside and outside the classroom. Lessons work well in the classroom and also provide activities for learning at home.

Using the 4-H Experiential Learning Model as a framework, Shoot For The Stars seeks to further life skills through communication, teamwork, critical thinking and more, by engaging students to learn by doing, sharing their experience with each other and reflecting on their results.

Contact your local Cooperative Extension and ask for the 4-H agent to learn more about the 4-H School Enrichment Curriculum.

3rd Grade: Astronomy (Shoot For The Stars)

ESSENTIAL STANDARDS

Earth in the Universe (3rd Grade)

Clarifying Objectives:

Recognize the major components and patterns observed in the earth/moon/sun system.

3.E.1.1 Recognize that the earth is part of a solar system that includes the sun (a star), planets and many moons, and the earth is the third planet from the sun in our solar system.

- ✓ **Shooting For The Stars** – Space Keeps Going
- ✓ **Shooting For The Stars** – Sun Keeps Shining
- ✓ **Shooting For The Stars** – Moon Keeps Turning

3.E.1.2 Recognize that changes in the length and direction of an object's shadow indicate the changing position of the sun during the day, although the patterns of the stars in the sky stay the same.

- ✓ **Shooting For The Stars** – Time Keeps Running

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Have you wondered why just some of the lights go out, why certain things insulate us from electricity better than others, or the effect of magnetism on various substances? Electricity is everywhere. Learn how to build a flashlight, a compass, an electromagnet and an electric motor.

Magic of Electricity aligns with 4th grade Essential Standard-Energy: Conservation and Transfer. Developers of the Magic of Electricity curriculum designed each lesson to be grade-level appropriate and have correlated lessons to meet U.S. National Science Education Standards.

The skills emphasized in Magic of Electricity are problem solving, examination and analysis and evaluating information.

Materials lists and pre-class preparations are laid out, along with a suggested script. Where appropriate, vocabulary lists, worksheets and activity sheets are included. An educational kit containing non-consumables needed for implementing most lessons are also available through your local Cooperative Extension. Ask for your 4-H agent.

ESSENTIAL STANDARDS

Energy: Conservation and Transfer (4th Grade)

Clarifying Objectives:

Remember that energy takes various forms that may be grouped based on their interaction with matter.

4.P.3.1 Recognize the basic forms of energy (light, sound, heat, electrical, and magnetic) as the ability to cause motion or create change.

- ✓ **Electricity I** – May the Force Be With You
- ✓ **Electricity I** – Attract or Repel
- ✓ **Electricity I** – A Passing Force
- ✓ **Electricity I** – Electric Attractions
- ✓ **Electricity I** – Sense the Current
- ✓ **Electricity I** – Control the Flow

4.P.3.2 Recognize that light travels in a straight line until it strikes an object or travels from one medium to another and that light can be reflected, refracted and absorbed.

- ✓ **Electricity I** – Bright Lights
- ✓ **Electricity I** – Control the Flow
- ✓ **Electricity I** – A Passing Force
- ✓ **Electricity I** – Conducting Things
- ✓ **Electricity I** – Circuit Sense
- ✓ **Electricity I** – Is There a Fork in the Road

The Vermicomposting curriculum aligns with fifth-grade Essential Standard-Ecosystems. Students explore the life of an earthworm through a micro-community that contains producers, consumers and decomposers (as all communities do).

Vermicomposting stimulates both lower and upper level critical thinking skill development as students acquire and evaluate information.

Few supplies are needed, thereby making this a popular curriculum. Contact your local Cooperative Extension and ask for the 4-H agent to learn more about the Vermicomposting curriculum.

ESSENTIAL STANDARDS

Ecosystems (5th Grade)

Clarifying Objectives:

Understand the interdependence of plants and animals within their ecosystems.

5.L.2.1 Compare the characteristics of several common ecosystems, including estuaries and salt marshes; oceans; lakes and ponds; forests; and grasslands.

- ✓ **Vermicomposting** – Setting Up a Worm Bin
- ✓ **Vermicomposting** – To Harvest Castings

5.L.2.2 Classify the organisms within an ecosystem according to the function they serve: producers, consumers, or decomposers (biotic factors).

- ✓ **Vermicomposting** – Earthworm Anatomy
- ✓ **Vermicomposting** – Other Critters in a Worm's Neighborhood
- ✓ **Vermicomposting** – To Harvest Castings

5.L.2.3 Infer the effects that may result from the interconnected relationship of plants and animals to their ecosystem.

- ✓ **Vermicomposting** – Other Critters in a Worm's Neighborhood
- ✓ **Vermicomposting** – Recycle, Reuse, Re-Imagine!