New York State Middle-Level Career and Technical Education
THEME MODULE TITLE: Sustainability

MODULE DESCRIPTION

This module introduces students to ways in which the environment is impacted by humans and their activities. Humans will always need resources to live. Sustainability refers to the rate of use of resources such that consumption can continue without damaging the environment. Students will examine the resources they use, how they use them, and ways to conserve and preserve resources for future generations. Current issues related to natural resource management, renewable energies, and sustainable practices will be examined. Students will have the opportunity to explore the wide variety of career options related to sustainability and identify the knowledge, skills, education, and training necessary for success within these fields.

GUIDING QUESTION

What knowledge and skills are necessary to evaluate the long-term effects of personal practices on the environment and to demonstrate introductory understanding of how to use and conserve resources to meet human needs while minimizing harm to the environment?

MODULE CONTENT

Sustainability
1. Resources
   Students will
   a) Define "sustainability" as it applies to resource use
   b) Explain how sustainability can be a factor in decision making
   c) Define and give example of renewable and non-renewable resources
   d) Explain factors to consider when evaluating environmental implications of decisions
   e) Investigate practices that promote stewardship of environmental resources
   f) Research the personal, environmental, and financial costs and benefits of sustainability-conscious decisions to individuals, families, schools, workplaces and communities
   g) Practice making decisions that show consideration for sustainability of resources in a variety of classroom applications

2.Environmental Management
   Students will
   a) Explain the concept of "carbon footprint"
   b) Explain how individual choices impact the availability and quality of natural resources in the community
   c) Describe ways individuals can adjust behaviors to minimize the impact of their choices on the environment
   d) Describe ways values affect one's evaluation of the need for change ofpersonalbehaviors that impact the environment
   e) Explain factors to consider when assessing the environmental impact of purchasing

decisions for everyday goods
    f) Explain factors to consider when assessing the environmental impact of housing decisions
    g) Explain factors to consider when assessing the environmental impact of transportation decisions
    h) Explain factors to consider when assessing the environmental impact of food choices
    i) Describe the impacts of pollution on the availability and quality of natural resources
    j) Examine the impacts of landfills, including toxins, leachate, and greenhouse gases, on the global community
    k) Describe the impacts of climate change on the availability and quality of natural resources
    l) Research local, state, national, and global governmental regulations that were enacted to protect natural resources

3. Energy Conservation
    Students will
    a) List and describe energy sources used to power homes, school, workplaces, and communities
    b) Categorize energy sources as renewable or nonrenewable
    c) Understand and explain how individuals can limit the use of nonrenewable resources by reducing, reusing, and recycling
    d) Define "conservation" as it applies to energy
    e) List and describe methods for energy conservation in the home, workplace, and community
    f) Describe how energy conservation strategies are multifaceted and continually changing
    g) Research the effects of energy shortages on the community
    h) Practice energy conservation through a variety of classroom applications

4. Careers Related to Sustainability
    Students will
    a) Investigate knowledge, skills, and practices needed for careers related to sustainability or for employment in settings that utilize sustainable practices
    b) Analyze career paths within the natural resources, environmental management, and energy conservation fields
    c) Evaluate personal skills, abilities, and interests for employment in the natural resources, environmental management, and energy conservation fields

ILLUSTRATIVE ACTIVITIES by CTE Content Area

Agricultural Education
Composting School Food Waste
    Students will conduct action research in the school cafeteria to determine the amount of food waste generated by students during lunch periods. Students will research methods for reducing food waste and for utilizing food waste through composting. Students can investigate the use of the compost in a school garden to grow vegetables to serve in the cafeteria.
Business and Marketing Education
Sustainable Business Practices

Students will conduct research and prepare virtual brochures on sustainable business practices and how these practices attract new employees. Brochures can include profiles of local or national businesses that promote sustainability and show how these businesses infuse sustainability into daily work activities, training programs, reward systems, and operational practices and objectives. Students can share their brochures through the school intranet.

Family and Consumer Sciences Education
Product Lifecycles

Students will identify a commonly used household item and investigate the full product lifecycle. They will include the source of the materials used to make the product, the useable life of the product, and ways the product can be safely recycled or repurposed for a new use. Students will discuss the impacts on community resources from initial creation to disposal and apply this learning to a recycle/upcycle/repurposing project, such as recycling t-shirts into reusable shopping bags.

Health Science Education
Environmental Healthcare Workers

Students prepare questions in preparation for a guest speaker on resource management and energy conservation in healthcare facilities. Invite an environmental healthcare worker to speak with students about the ways healthcare facilities utilize sustainable practices, such as through lighting options; selection and care of textiles; and selection, cleaning, and disposal of tools and implements. Discuss ways the need for patient safety and disease control affect the environmental management decisions in a healthcare facility.

Technology Education
Renewable Energy Technologies

Students will research technologies that promote renewable energy. Students design and build examples such as windmills, solar ovens, and photovoltaic models to demonstrate and test how renewable energy can be collected and used to produce power. Discuss the benefits and challenges of implementing these renewable energy technologies on a large scale to provide power to the community.

Trade and Technical Education
Sustainable Garden Plans

Small teams of students will practice the conversion of feet to paces. They will use this skill to form a calculation of bearing in square, triangular, and irregular land plots. Students will research average growth rates, harvest yield, and footprint of native plants. Each team will design and present a sustainable garden to use in a given plot.

STANDARDS ADDRESSED

New York State Career Development and Occupational Studies (CDOS) Standards
Intermediate Level
http://www.p12.nysed.gov/cte/

Standard 1: Career Development

Students will be knowledgeable about the world of work, explore career options, and

relate personal skills, aptitudes, and abilities to future career decisions

Standard 2: Integrated Learning

Students will demonstrate how academic knowledge and skills are applied in the workplace and other settings

Standard 3a: Universal Foundation Skills

Students will demonstrate mastery of the foundation skills and competencies essential for success in the workplace

Common Career Technical Core Standards

https://www.careertech.org/career-ready-practices

Career Ready Practices

1. Act as a responsible and contributing citizen and employee
2. Apply appropriate and academic and technical skills
3. Attend to personal health and financial well-being
5. Consider environmental, social, and economic impacts of decisions
6. Demonstrate creativity and innovation
8. Utilize critical thinking to make sense of problems and persevere in solving them
9. Model integrity, ethical leadership, and effective management
11. Use technology to enhance productivity
12. Work productively in teams while using cultural global competence

National Agricultural Education Standards

https://www.ffa.org/the council/afnr

CS.03.	Examine and summarize the importance of health, safety andenvironmental management systems in AFNR workplaces
CS.04.	Demonstrate stewardship of natural resources in AFNR activities
CS.06.	Analyze the interaction among AFNR systems in the production, processing and management of food, fiber and fuel and the sustainable use of natural resources
AS.08.	Analyze environmental factors associated with animal production
ESS.02.	Evaluate the impact of public policies and regulations on environmental service system operations
ESS.03.	Develop proposed solutions to environmental issues, problems andapplications using scientific principles of meteorology, soil science, hydrology,microbiology, chemistry and ecology.
ESS.04.	Demonstrate the operation of environmental service systems (e.g.,pollution control, water treatment, wastewater treatment, solid wastemanagement and energy conservation)
NRS.01.	Plan and conduct natural resource management activities that apply logical, reasoned and scientifically based solutions to natural resource issues and goals
NRS.02.01.	Analyze the interrelationships between natural resources and humans
NRS.03.	Develop plans to ensure sustainable production and processing of natural resources
NRS.04.	Demonstrate responsible management procedures and techniques to protect, maintain, enhance, and improve natural resources
PS.01.	Develop and implement a crop management plan for a given production goal that accounts for environmental factors
CRP.05.	Consider the environmental, social and economic impacts of decisions

Note: National Agricultural Education Standards CRP .01-.12 coincide with Common Core Technical Core Standards

National Business Education Standards

Economics

I. Allocation of Resources Achievement Standard

Assess opportunity costs and trade-offs involved in making choices about how to use scarce economic resources

VI. Productivity Achievement Standard

Explain the importance of productivity and analyze how specialization, division of labor, investment in physical and human capital, and technological change affect productivity and global trade

International Business

II. The Global Business Environment Achievement Standard

Describe the interrelatedness of the social, cultural, political, legal, and economic factors that shape and impact the global business environment

IV. Global Business Ethics and Social Responsibility Achievement Standard

Describe the factors that define what is considered ethical and socially responsible business behavior in a global business environment

Management

V. Ethics Achievement Standard

Examine the roleof ethics and social responsibility in decision making

National Family and Consumer Sciences Standards

3.0 Consumer Services

Integrate knowledge, skills, and practices needed for a career in consumer services

3.4Analyze resource consumption for conservation and waste management practices

3.4.1 Investigate sources and types of residential and commercial energy, water policy and usage, waste disposal, and pollution issues

3.4.2 Evaluate local, state, and national consumer programs and services, both private and government, to recycle and conserve energy and environmental resources

3.4.3 Explore a variety of strategies and practices to conserve energy and reduce waste

3.4.4 Examine waste management issues and local, national, international, and global issues

3.4.5 Examine roles of government, culture, industry, and family in energy consumption

National Consortium for Health Science Education

3.1 Healthcare Delivery Systems

3.13 Assess the impact of emerging issues on healthcare delivery systems

7.3Environmental Safety

7.31Apply safety techniques in the work environment

International Technology and Engineering Educators Association

Standards for Technological Literacy

Technology and Society
4. Students will develop an understanding of the cultural, social, economic, and political effects of technology
   D. The use of technology affects humans in various ways, including their safety, comfort, choices, and attitudes about technology's development and use
   E. Technology, by itself, is neither good nor bad, but decisions about the use of products and systems can result in desirable or undesirable consequences
   G. Economic, political, and cultural issues are influence by the development and use of technology
5. Students will develop an understanding of the effects of technology on the environment
   D. The management of waste produced by technological systems is an important social issue
   F. Decisions to develop and use technologies often put environmental and economic concerns in direct competition with one another

USDOE Employability Skills
http://cte.ed.gov/employability skills/
Applied Knowledge: Applied Academic Skills, Critical Thinking Skills
The thoughtful integration of academic knowledge and technical skills put to practical use
Effective Relationships: Interpersonal Skills, Personal Qualities
The skills that enable individuals to interact effectively with clients, coworkers, and supervisors
Workplace Skills: Resource Management, Information Use, Communication Skills, Systems Thinking, Technology Use
The skills employees need to successfully perform work tasks

RESOURCES

Cornell Cooperative Extension
Agriculture and Food Systems
http://cce.cornell.edu/programs
Cornell Cooperative Extension links the research and extension efforts at Cornell University, the Cornell University Agricultural Experiment Station and the New York State Agricultural Experiment Station, providing the knowledge to maximize New York State's agricultural and natural resources. CCE's regional agriculture teams provide research-based information, programs, and technical assistance all around the state.

New York State Energy Research and Development Authority (NYSERDA)
https://www.nyserda.ny.gov/
NYSERDA offers objective information and analysis, innovative programs, technical expertise and support to help increase energy efficiency, save money, use renewable energy, and reduce reliance on fossil fuels.

United States Department of Agriculture

Office of the Chief Economist
https://www.usda.gov/oce/sustainable/
USDA seeks to balance the goals of satisfying human needs; enhancing environmental quality, the resource base, and ecosystem services; sustaining the economic viability of agriculture; enhancing the quality of life for farmers, ranchers, forest managers, workers, and society as a whole. USDA also supports the principles of "reduce, reuse, and recycle" in relation to efficient product handling, processing, transportation, packaging, trade, consumption and waste management.

Office of Community Food Systems
https://www.fns.usda.gov/farmtoschool/farm-school
The Food and Nutrition Service has seven regional offices around the country; in each is a Farm to School Regional Lead available to provide farm to school related support.

University of Colorado, Boulder
https://phet.colorado.edu/en/simulations/category/new
PhET provides fun, free, interactive, research-based simulations. PhET tests and evaluates each simulation to ensure educational effectiveness.The simulations are written in Java, Flash, or HTML5, and can be run online or downloaded to a computer. All simulations are open source resources that are free to all students and teachers.

United States Environmental Protection Agency (EPA)
Environmental Education
https://www.epa.gov/education/environmental-education-ee-publications#resources
The Environmental Protection Agency provides environmental science research, education, and assessment information. The mission of the EPA is to protect human health and the environment. EPA has 10 regional offices across the country; New York is in Region 2. The Regional Environmental Education Coordinator in each area can provide information and resources about local environmental issues and EPA programs.

United States Composting Council (USCC)
Composting for Teachers and Students
https://compostingcouncil.org/composting-for-teachers-and-students/
The US Composting Council is involved in research, training, and public education on composting and compost standards. The USCC provides free resources and educational materials.

Career and Technical Education Technical Assistance Center of New York (CTE TAC)
http://nyctecenter.org/
The Career and Technical Education Technical Assistance Center (CTE TAC) operates under a state contract to assist the New York State Education Department (NYSED) in carrying out its mission of improving the quality, access, and delivery of career and technical education through research-based methods and strategies resulting in broader CTE opportunities for all students.