Winslow Township School District

Grade 7 Science

Unit 2: Sustainability and School Gardens

Overview: Students reflect on the role that humans play in maintaining the balance and sustainability of Earth's systems. By the end of the school year, students will be able to develop an action plan for change that uses evidence-based arguments. Students will be able to explain how direct and indirect changes to natural systems influence the systems and how they can be an agent for change. Students will explore school gardening and ecosystems using the middle school's outdoor classrooms (school gardens, classroom GrowLab©, pond, Bernzomatic Garden and Greenhouse). Students are responsible for setting up and maintaining the Greenhouse's aeroponics and aquaponics systems. They also learn about the physics of ground-air heat transfer, passive solar heating and other growing technologies. Throughout the semester, students in both electives also have opportunities to learn how to cook simple dishes using ingredients grown in the Greenhouse.

<table>
<tr><th>Overview</th><th>Standards for Science</th><th>Unit Focus</th><th>Essential Questions</th></tr>
<tr><td>Unit 2

Sustainability and School Gardens</td><td>• MS-LS1-6
• MS-LS1-7
• MS-ESS3-1
• MS-ESS3-2
• MS-ESS3-3
• MS-ESS3-4
• WIDA 4</td><td>• Sustainability
• Classroom Gardening</td><td rowspan="2">• What is sustainability?
• Why is sustainability important?
• How do the actions of one generation affect future generations?
• What can students learn about sustainability from classroom and traditional gardening practices?
• What can students learn about sustainability from the outdoor classrooms?
• How can we reduce waste from the Greenhouse by composting?
• How can we use the Greenhouse to maintain the plants that will be grown in the classroom and the Bernzomatic Garden©?</td></tr>
<tr><td>Unit 3: Enduring Understandings</td><td colspan="2">• Students will be able to define sustainability as the ability to meet the needs of the present without compromising the ability of future generations to meet their own needs. These actions will allow students to activate their vision of a sustainable future, and develop a plan for achieving it.
• Students will explore their current understandings of sustainability, sustainable development and examine what this definition implies about meeting human needs now and in the future.
• Students will compare and contrast container farming to traditional farming methods.
• Students will explain the botanical and geographical origin of the plants they choose to grow in the outdoor garden.
• Students will plan and design the outdoor gardens using the plants from the GrowLab© container and Greenhouse and transfer to the outside garden.
• Use composting as an opportunity to discuss decomposition and sustainable practices.</td></tr>
</table>

Winslow Township School District

Grade 7 Science

Unit 2: Sustainability and School Gardens

Curriculum Unit 2	Standards		Pacing	
			Days	Unit Days
Unit 2: **Sustainability and School Gardens**	**MS-LS1-6**	Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.	2	10
	MS-LS1-7	Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.	2	
	MS-ESS3-1	Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.	1	
	MS-ESS3-2	Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects	1	
	MS-ESS3-3	Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.	1	
	MS-ESS3-4	Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.	2	
	Assessment, Re-teach and Extension		1	

Winslow Township School District

Grade 7 Science

Unit 2: Sustainability and School Gardens

Unit 2 Grade 7		
Disciplinary Core Ideas	**Indicator #**	**Indicator**
LS1.C: Organization for Matter and Energy Flow in Organisms Plants, algae (including phytoplankton), and many microorganisms use the energy from light to make sugars (food) from carbon dioxide from the atmosphere and water through the process of photosynthesis, which also releases oxygen. These sugars can be used immediately or stored for growth or later use. (MS-LS1-6) Within individual organisms, food moves through a series of chemical reactions in which it is broken down and rearranged to form new molecules, to support growth, or to release energy. (MS-LS1-7) **ESS3.A: Natural Resources** Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes. (MS-ESS3-1)	**MS-LS1-6**	Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.
	MS-LS1-7	Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.
	MS-ESS3-1	Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.

Winslow Township School District

Grade 7 Science

Unit 2: Sustainability and School Gardens

ESS3.B: Natural Hazards Mapping the history of natural hazards in a region, combined with an understanding of related geologic forces can help forecast the locations and likelihoods of future events. (MS-ESS3-2) **ESS3.C: Human Impacts on Earth Systems** Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things. (MS-ESS3-3) Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise. (MSESS3-3),(MS-ESS3-4)	**MS-ESS3-2**	Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.
	MS-ESS3-3	Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
	MS-ESS3-4	Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

Winslow Township School District

Grade 7 Science

Unit 2: Sustainability and School Gardens

<table>
<tr><th colspan="2">Unit 2 Grade 7</th></tr>
<tr><th colspan="2">Assessment Plan</th></tr>
<tr><td>• Exploratory activities
• Warm-up activities
• Individual/Group Lab report
• Class discussions
• Student Participation
• Teacher Observations
• Teacher-created assessments
• Open-Ended Response rubric</td><td>• Presentations
• Interactive Notebook Garden Journal Observations and Reflections
• Google Suite for Education Assessment Tools (Google Docs, Google Slides)
• Vertical Garden Showcase (April)
• Google Suite for Education Assessment Tools (Google Docs, Google Slides)
• Engineer’s Design Challenges</td></tr>
<tr><th>Resources</th><th>Activities</th></tr>
<tr><td>• Chromebooks
• Textbook
• Web Quests
• Interactive notebooks
• Science World
• Compound Light and Digital microscopes
• Virtual Labs
• Edpuzzle
• BrainPOP
• Tower Garden Educator Resources
• Diversity, Equity & Inclusion Educational Resources
https://www.nj.gov/education/standards/dei/</td><td>• Create a table in the interactive notebook outlining the 3 Pillars of Sustainability.
• Create a Google Slideshow demonstrating the 3 Pillars of Sustainability.
• Use the Engineer’s Design Process to investigate the life cycle of a product and discover ways to combat waste.
• Design and build a working hydroponic vertical farm.
• Plant, label and record observations of seeds and plugs that are placed into small pots in the Tower Garden.
September-October: Harvesting
• Garden Clean-up
• New Garden Preparation
• Fall Planting
• Composting
November-December:
• Planning Spring Planting
• Choose Crops for Spring planting
• Develop planting schedule</td></tr>
</table>

	January: • Begin planting in the Tower Garden System February-March: • Continue harvesting the plants in the Tower Garden. • Plan and prepare for the Vertical Garden Showcase in April. April-May: • Transplant indoor Grow Lab© plants and Greenhouse plants to the Bernzomatic Garden • Vertical Garden Showcase (April) June • Summer maintenance Greenhouse Manager Engineer's Design Project
Instructional Best Practices and Exemplars	
1. Identifying similarities and differences 2. Summarizing and note taking 3. Reinforcing effort and providing recognition 4. Homework and practice 5. Nonlinguistic representations	6. Cooperative learning 7. Setting objectives and providing feedback 8. Generating and testing hypotheses 9. Cues, questions, and advance organizers 10. Manage response rates

Winslow Township School District

Grade 7 Science

Unit 2: Sustainability and School Gardens

9.1 Personal Financial Literacy. 9.2 Career Awareness, Exploration, Preparation and Training & 9.4 Life Literacies and Key Skills
9.1.8.CP.1: Compare prices for the same goods or services. 9.1.8.FP.1: Describe the impact of personal values on various financial scenarios. 9.1.8.FP.3: Explain how self-regulation is important to managing money (e.g., delayed gratification, impulse buying, peer pressure, etc.). 9.1.8.PB.1: Predict future expenses or opportunities that should be included in the budget planning process. The implementation of the 21st Century skills and standards for students of the Winslow Township District is infused in an interdisciplinary format in a variety of curriculum areas that include, English language Arts, Mathematics, School Guidance, Social Studies, Technology, Visual and Performing Arts, Science, Physical Education and Health, and World Language. Additional opportunities to address 9.1, 9.2 & 9.4: **Philadelphia Mint** https://www.usmint.gov/learn/kids/resources/educational-standards **Different ways to teach Financial Literacy.** https://www.makeuseof.com/tag/10-interactive-financial-websites-teach-kids-money-management-skills/

Winslow Township School District

Grade 7 Science

Unit 2: Sustainability and School Gardens

Modifications for Special Education/504
Students with special needs: The students' needs will be addressed on an individual and grade level using a variety of modalities. Accommodations will be made for those students who need extra time to complete assignment. Support staff will be available to aid students related to IEP specifications. 504 accommodations will also be attended to by all instructional leaders. Physical expectations and modifications, alternative assessments, and scaffolding strategies will be used to support this learning. The use of Universal Design for Learning (UDL) will be considered for all students as teaching strategies are considered. • Small group instruction • Audio books/ Text-to-speech platforms • Leveled texts/Vocabulary Readers • Leveled informational texts via online • Modeling and guided practice • Read directions aloud • Repeat, rephrase and clarify directions • Extended time as needed • Break down assignments into smaller units • Provide shortened assignments • Modify testing format • Repeat directions as needed • Graphic organizers • Study Guides, Study Aids and Re teaching as needed

Winslow Township School District

Grade 7 Science

Unit 2: Sustainability and School Gardens

Modifications for At-Risk Students

Formative and summative data will be used to monitor student success. At first signs of failure, student work will be reviewed to determine support. This may include parent consultation, basic skills review and differentiation strategies. With considerations to UDL, time may be a factor in overcoming developmental considerations

- Audio books and Text-to-speech platforms
- Leveled texts/Vocabulary Readers
- Leveled informational texts via online
- Extended time as needed
- Read directions aloud
- Assist with organization
- Use of computer
- Emphasize/highlight key concepts
- Recognize success
- Provide timelines for work completion
- Break down multi-step tasks into smaller chunks
- Provide copy of class notes and graphic organizer

Winslow Township School District

Grade 7 Science

Unit 2: Sustainability and School Gardens

English Language Learners	Modifications for Gifted Students
All WIDA Can Do Descriptors can be found at this link: https://wida.wisc.edu/teach/can-do/descriptors ☐ Grades 6-8 WIDA Can Do Descriptors: ☐ Listening ☐ Speaking ☐ Reading ☐ Writing ☐ Oral Language Students will be provided with accommodations and modifications that may include: • Relate to and identify commonalities in Science studies in student's home country • Assist with organization • Use of computer • Emphasize/highlight key concepts • Teacher Modeling • Peer Modeling • Label Classroom Materials - Word Walls	Students excelling in mastery of standards will be challenged with complex, high level challenges related to the topic. • Raise levels of intellectual demands • Require higher order thinking, communication, and leadership skills • Differentiate content, process, or product according to student's readiness, interests, and/or learning styles • Provide higher level texts • Expand use of open-ended, abstract questions • Critical and creative thinking activities that provide an emphasis on research and in-depth study • Enrichment Activities/Project-Based Learning/ Independent Study Additional Strategies may be located at the links: ❖ Gifted Programming Standards ❖ Webb's Depth of Knowledge Levels and/or Revised Bloom's Taxonomy ❖ REVISED Bloom's Taxonomy Action Verbs

Winslow Township School District

Grade 7 Science

Unit 2: Sustainability and School Gardens

Interdisciplinary Connections
ELA: **RST.6-8.1** Cite specific textual evidence to support analysis of science and technical texts. **RST.6-8.7** Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). **WHST.6-8.1** Write arguments focused on *discipline-specific content*. **WHST.6-8.7** Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. **WHST.6-8.8** Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation. **Math:** **7.EE.B.4** Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. **7.RP.A.2** Recognize and represent proportional relationships between quantities.
Integration of Computer Science and Design Thinking NJSLS 8
8.1.8.DA.1: Organize and transform data collected using computational tools to make it usable for a specific purpose. 8.1.8.DA.4: Transform data to remove errors and improve the accuracy of the data for analysis. 8.1.8.DA.5: Test, analyze, and refine computational models. 8.1.8.AP.6: Refine a solution that meets users' needs by incorporating feedback from team members and users 8.1.8.DA.6: Analyze climate change computational models and propose refinements.