

Course Title:
Build a Better World

Length:
One Quarter
Grade 4

Primary Content:
Gifted & Talented

School:
Pierrepoint

Embedded Content:
English Language Arts, Science, Math, Career Readiness, Life Literacies
and Key Skills

Initial BOE Approval Date (Born on):
June 24, 2024

**RUTHERFORD PUBLIC SCHOOLS
Rutherford, New Jersey**

GIFTED AND TALENTED DEPARTMENT

SOLUTION DESIGNERS - GRADE 4

1. Introduction/Overview/Philosophy

This 4th grade STEM Unit is a continuation of our environmental theme from the previous quarter. Students will continue to explore renewable energy, pollution, and the environment in a more hands on style. Students will design windmills, use solar for energy, design water filtration, and/or clean an oil spill. Students will then create an environmentally friendly solution that reflects their learning and solves a community problem: design a community amenity to improve the quality of life for local residents (Examples of community amenities may be public spaces like parks and community centers, transportation improvements like bike lanes, and/or public art.)

Course Outline

Driven by design thinking, there is a strong focus on engineering design concepts like researching, constructing, testing, evaluating, and redesigning, since this STEM based unit teaches students that learning is a journey — not a straight line.. Students will practice skills in many disciplines such as art, science, technology, and English as well.

The variety of enriching and thought-provoking learning experiences offered in the Gifted and Talented Program incorporates three levels of enrichment intended to promote critical thinking.

Type I—General Exploratory Activities (Content)- Exposure to disciplines, authors or events not covered in the regular curriculum. Children can be exposed to such areas long enough to be attracted to some of them for individual study.

Type II—Group Process Activities (Operations)- Students are taught skills for expanding their thinking and feeling processes. Among these activities are: brainstorming, analysis, classification, general inquiry, observation and evaluation.

Type III—Real Problem Solving (Products)- This type of enrichment involves children in thinking, feeling and doing in the manner of the practicing professional. Children are encouraged to focus on solvable problems so that they might become empowered to create products that influence outcomes and make a difference in the world.

In addition, a goal of the Gifted and Talented Program is to include activities aimed at developing the affective domain of our students, such as: valuing, responding, receiving/attending. It is through both thinking and feeling that our students will develop into thoughtful, contributing, valuable members of society.

2. Objectives

SWBAT complete hands-on STEM based challenges such as designing a windmill that moves weight; creating a water filter, determining the best way to clean up a water spill, use solar to warm/heat. If time permits, students are charged with the task of creating an environmentally sustainable redesign for a community space, such as a park, library, public square, empty lot, or community center. Students can visit the space; research the local context, needs, resources, and constraints; and investigate principles of environmentally sustainable design. They engage in critique and revision processes that involve local community members and then present their solutions to key stakeholders.

A. Curriculum Objectives for Inquiry

Students will be able to refine and broaden

1. Divergent thinking
 - a. Creative thinking
 - b. Inventive thinking
 2. Convergent thinking
 - a. Deductive thinking
 - b. Analytical thinking
 - c. Evaluative thinking
 3. Interpretive thinking
 4. Research skills
1. In the area of **divergent thinking** students will:
 - a. use **creative thinking** to:
 1. use fluent and flexible thinking to brainstorm ideas/solutions
 2. develop, produce, and dramatize
 3. adapt story versions
 4. illustrate interpretations
 5. use the five-step writing process to write original pieces
 6. create and construct original designs with a variety of manipulatives and art supplies
 - b. use **inventive thinking** to:
 1. use fluent and flexible thinking to brainstorm ideas/solutions
 2. adapt items to be used for an alternate purpose
 2. In the area of **convergent thinking** students will:
 - a. use **deductive thinking** to:
 1. formulate predictions/hypothesis
 - b. use **analytical thinking** to:
 1. analyze story elements
 2. compare and contrast story elements/manipulatives/interpretations
 3. interpret visual representations
 - c. use **evaluative thinking** to:
 1. judge character traits and motivation
 2. compare, rate, rank, revise, and eliminate information
 3. determine cause and effect
 4. make conclusions about given information
 5. self-assess using set criteria

3. In the area of **interpretive thinking** students will:
 - a. use shared inquiry to:
 1. build awareness of interpretive issues in a story
 2. analyze character motivation and development
 4. In the area of **research skills** students will:
 - a. access and select meaningful information using the Internet, books, videos, and other media
 - b. use the five-step writing process of prewriting, drafting, editing, conferencing, and publishing for a variety of audiences and purposes
 - c. use a variety of computer software to record research
 - d. synthesize knowledge of a topic into self-selected culminating activities
 - e. cite references
 - f. Present to/share research with others
- a. Skills**
- i. Improvement of reasoning ability
 - ii. Development of creativity and personal development

B. New Jersey Core Curriculum Content Standards

W.IW.4.2. Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

D. Use precise language and domain-specific vocabulary to inform about or explain the topic.

W.WR.4.5. Conduct short research projects that use multiple reference sources (print and non-print) and build knowledge through investigation of different aspects of a topic.

W.SE.4.6. Gather relevant information from multiple print and digital sources; take notes, prioritize and categorize information and provide a list of sources.

SL.PE.4.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly.

A. Explicitly draw on previously read text or material and other information known about the topic to explore ideas under discussion.

B. Follow agreed-upon rules for discussions and carry out assigned roles.

C. Pose and respond to specific questions to clarify or follow up on information, and make comments that contribute to the discussion and link to the remarks of others.

D. Review the key ideas expressed and explain their own ideas and understanding in light of the discussion.

SL.II.4.2. Paraphrase portions of a text read aloud or information presented in diverse media and formats (e.g., visually, quantitatively, and orally).

SL.ES.4.3. Identify the reasons and evidence a speaker provides to support particular points.

SL.PI.4.4. Report on a topic or text, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

SL.UM.4.5. Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes.

SL.AS.4.6. Differentiate between contexts that call for formal English (e.g., presenting ideas) and situations where informal discourse is appropriate (e.g., small-group discussion); use formal English when appropriate to task and situation.

4-PS3-2 Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.

4-PS3-4 Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.

4-ESS3-1 Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.

3-5-ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

3-5-ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

3-5-ETS1-3 Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved

By the end of **Grade 5**, students:

Curiosity and a willingness to try new ideas (intellectual risk-taking) contributes to the development of creativity and innovation skills.

9.4.5.CI.3: Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity.

The ability to solve problems effectively begins with gathering data, seeking resources, and applying critical thinking skills.

9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process.

9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global.

9.4.5.TL.5: Collaborate digitally to produce an artifact.

Career Readiness, Life Literacies, and Key Skills Practices

Career Readiness, Life Literacies, and Key Skills Practices describe the habits of the mind that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success. These practices should be taught and reinforced in all content areas with increasingly higher levels of complexity and expectation as a student advances through a program of study.

Practice	Description
Act as a responsible and contributing community members and employee.	Students understand the obligations and responsibilities of being a member of a community, and they demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them. They think about the near-term and long-term consequences of their actions and seek to act in ways that contribute to the betterment of their teams, families, community and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good.
Attend to financial well-being.	Students take regular action to contribute to their personal financial well-being, understanding that personal financial security provides the peace of mind required to contribute more fully to their own career success.
Consider the environmental, social and economic impacts of decisions.	Students understand the interrelated nature of their actions and regularly make decisions that positively impact and/or mitigate negative impact on other people, organization, and the environment. They are aware of and utilize new technologies, understandings, procedures, materials, and regulations affecting the nature of their work as it relates to the impact on the social condition, the environment and the profitability of the organization.
Demonstrate creativity and innovation.	Students regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.
Utilize critical thinking to make sense of problems and persevere in solving them.	Students readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.

Practice	Description
Model integrity, ethical leadership and effective management.	Students consistently act in ways that align personal and community-held ideals and principles while employing strategies to positively influence others in the workplace. They have a clear understanding of integrity and act on this understanding in every decision. They use a variety of means to positively impact the directions and actions of a team or organization, and they apply insights into human behavior to change others' action, attitudes and/or beliefs. They recognize the near-term and long-term effects that management's actions and attitudes can have on productivity, morals and organizational culture.
Plan education and career paths aligned to personal goals.	Students take personal ownership of their own education and career goals, and they regularly act on a plan to attain these goals. They understand their own career interests, preferences, goals, and requirements. They have perspective regarding the pathways available to them and the time, effort, experience and other requirements to pursue each, including a path of entrepreneurship. They recognize the value of each step in the education and experiential process, and they recognize that nearly all career paths require ongoing education and experience. They seek counselors, mentors, and other experts to assist in the planning and execution of career and personal goals.
Use technology to enhance productivity increase collaboration and communicate effectively.	Students find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.
Work productively in teams while using cultural/global competence.	Students positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.

3. Proficiency Levels

Students in grades four are identified as “Gifted and Talented.” Students that have received 2 points on the Gifted and Talented screening will be offered all 4 available grade level courses.

Differentiating Instruction for Students with Special Needs: Students with Disabilities, English Language Learners, and Gifted & Talented Students

Differentiating instruction is a flexible process that includes the planning and design of instruction, how that instruction is delivered, and how student progress is measured. Teachers recognize that students can learn in multiple ways as they celebrate students' prior knowledge. By providing appropriately challenging learning, teachers can maximize success for all students.

Examples of Strategies and Practices that Support Students with Disabilities and Students with 504 plans

- Use of visual and multi-sensory formats
- Use of assisted technology
- Use of prompts
- Modification of content and student products
- Testing accommodations
- Authentic assessments

Gifted & Talented Students

- Adjusting the pace of lessons
- Curriculum compacting
- Inquiry-based instruction
- Independent study
- Higher-order thinking skills
- Interest-based content
- Student-driven
- Real-world problems and scenarios

English Language Learners

- Pre-teaching of vocabulary and concepts
- Visual learning, including graphic organizers
- Use of cognates to increase comprehension
- Teacher modeling
- Pairing students with beginning English language skills with students who have more advanced English language skills
- Scaffolding
- word walls references
- sentence frames
- think-pair-share
- cooperative learning groups
- teacher think-alouds

4. Methods of Assessment

Classwork

Participation

Completed products and performance

Teacher observation
Rubrics (quality and accuracy, clarity and presentation, and concept;
Teamwork (participation, level of involvement, quality of work as a team member)
Sample collections/portfolios

5. Grouping

Small group pull-out for students identified as “Gifted and Talented” according to the Rutherford School District Gifted and Talented Policy 2464 (revised December 7, 2020) to be run as a grade 4 cycle course.

6. Articulation/Scope & Sequence

Course length is one quarter.

Major Products:

- a. Completed handouts, worksheets, journals
- b. Group discussions
- c. STEM projects such as windmills, solar houses or pizza box ovens, oil spill, water filtration
- d. PBL such as Mystery River
- e. Final Project Assessment

7. Resources

- a. References
- b. Technology
Chromebooks
Internet
- c. Supplies/Materials
a variety of art project supplies/paper
Markers/watercolor pencils/paint
Printer
Cardboard
Handouts
Worksheets
Graph paper
EiE materials for design a water filter
- d. Texts
- e. Supplemental Reading

8. Methodologies

Methods include but are not limited to:

- Cooperative learning
- Individual and group research
- Individual and group problem solving
- Inquiry

- Class discussion
- Brainstorming
- Critical Thinking
- Experimenting
- Short lecture

9. Suggested Activities

- Skill-building activities
- Exploring multiple intelligences
- Researching
- Public Speaking
- Silent sustained reading
- Shared Inquiry discussions
- Close textual analysis

10. Interdisciplinary Connections

The scope of materials for this Thomas Edison unit is broad and interdisciplinary. Students will extend their learning from the previous unit (although the unit is not dependent on previous), and make connections throughout the unit to their daily personal life. While rooted in STEM, text and discussions are constructed from real-world, local, and personal perspectives. Students are also encouraged in critical thinking as they gain understanding of resources and technologies and prepare their solutions to real-world problems. As many activities are rooted in group work, Solution Designers encourages individual responsibility and cooperation among class members.

11. Professional Development

As per the PDP/100 Hours statement: the teacher will continue to improve expertise through participation in a variety of professional development opportunities. Specialized professional development for teachers in the Gifted and Talented Department is offered through the Bergen County Consortium of Teachers of the Gifted (BCCTG) and the New Jersey Association for Gifted Children (NJAGC). Teacher will continue to read professional journals and books.

12. Curriculum Map

Unit Topic	Time Allocated	Differentiating Instruction for Students with Disabilities, Students at Risk, Students with 504 Plans, English Language Learners, & Gifted & Talented Students	Standards	Assessments
Renewable vs non-renewable resources	1-2 weeks/5 sessions per week	For Support: Computer-Based Instruction: Use of chromebooks/computers, use of YouTube, TedEd and other sites as deemed useful to enhance and modify learning Multi-media approach to accommodating various learning styles Use of visual and multi-sensory formats For Enhancement: Independent Study Interest driven Inquiry-based instruction Higher order thinking skills ELL: Visual learning, including graphic organizers Scaffolding Cooperative Learning Groups	4-ESS3-1 W.2, W.7, W.8 SL.PE.4.1 SL.II.4.2 SL.ES.4.3 SL.PI.4.4 SL.UM.4.5 SL.AS.4.6; 9.4.5.CI.3; 9.4.5.CT.1,4; 9.4.5.TL.5; CRLKSP 4; CRLKSP 5; CRLKSP 9	Formative Assessment: Oral participation in activities (class discussion) Teacher observation of student progress Classwork Self-assessment Group and individual critique Summative Assessment: Rubric to assess student created projects

<p>Wind and Solar Power Stem projects</p>	<p>Number of weeks 2 weeks/5 sessions per week</p>	<p>For Support: Computer-Based Instruction: Use of chromebooks/computers, use of YouTube, TedEd and other sites as deemed useful to enhance and modify learning Multi-media approach to accommodating various learning styles Use of visual and multi-sensory formats For Enhancement: Independent Study Interest driven Inquiry-based instruction Higher order thinking skills ELL: Visual learning, including graphic organizers Scaffolding Cooperative Learning Groups</p>	<p>4-PS3-2 4-PS3-4 4-ESS3-1 3-5-ETS1-1 3-5-ETS1-2 3-5-ETS1-3 W.2, W.7, W.8 SL.PE.4.1 SL.II.4.2 SL.ES.4.3 SL.PI.4.4 SL.UM.4.5 SL.AS.4.6; 9.4.5.CI.3; 9.4.5.CT.1,4; 9.4.5.TL.5; CRLKSP 4; CRLKSP 5; CRLKSP 9</p>	<p>Formative Assessment: Oral participation in activities (class discussion) Teacher observation of student progress Classwork Self-assessment Group and individual critique Summative Assessment: Rubric to assess student created projects</p>
<p>Oil Spill, Water filter projects</p>	<p>3 weeks/5 sessions per week</p>	<p>For Support: Computer-Based Instruction: Use of chromebooks/computers, use of YouTube, TedEd and other sites as deemed useful to enhance and modify learning Multi-media approach to accommodating various learning styles Use of visual and multi-sensory formats For Enhancement: Independent Study Interest driven Inquiry-based instruction Higher order thinking skills ELL: Visual learning, including</p>	<p>4-PS3-2 4-PS3-4 4-ESS3-1 3-5-ETS1-1 3-5-ETS1-2 3-5-ETS1-3 W.2, W.7, W.8 SL.PE.4.1 SL.II.4.2 SL.ES.4.3 SL.PI.4.4 SL.UM.4.5 SL.AS.4.6 9.4.5.CI.3; 9.4.5.CT.1,4; 9.4.5.TL.5; CRLKSP 4; CRLKSP 5; CRLKSP 9</p>	<p>Formative Assessment: Oral participation in activities (class discussion) Teacher observation of student progress Classwork Self-assessment Group and individual critique Summative Assessment: Rubric to assess student</p>

		<p>graphic organizers</p> <p>Scaffolding</p> <p>Cooperative Learning Groups</p>		<p>created projects</p>
<p>Final project (Choice based)</p>	<p>Number of weeks</p> <p>3 weeks/5 sessions per week</p>	<p>For Support:</p> <p>Computer-Based Instruction: Use of chromebooks/computers, use of YouTube, TedEd and other sites as deemed useful to enhance and modify learning</p> <p>Multi-media approach to accommodating various learning styles</p> <p>Use of visual and multi-sensory formats</p> <p>For Enhancement:</p> <p>Independent Study</p> <p>Interest driven</p> <p>Inquiry-based instruction</p> <p>Higher order thinking skills</p> <p>ELL:</p> <p>Visual learning, including graphic organizers</p> <p>Scaffolding</p> <p>Cooperative Learning Groups</p>	<p>W.4.2. D.</p> <p>W.4.4.</p> <p>W.4.6.</p> <p>W.4.7. W.4.8.</p> <p>SL.PE.4.1</p> <p>SL.II.4.2</p> <p>SL.ES.4.3</p> <p>SL.PI.4.4</p> <p>SL.UM.4.5</p> <p>SL.AS.4.6</p> <p>9.4.5.CI.3;</p> <p>9.4.5.CT.1,4</p> <p>9.4.5.TL.5;</p> <p>CRLKSP 4;</p> <p>CRLKSP 5;</p> <p>CRLKSP 9</p>	<p>Formative Assessment:</p> <p>Oral participation in activities (class discussion)</p> <p>Teacher observation of student progress</p> <p>Classwork</p> <p>Self-assessment</p> <p>Group and individual critique</p> <p>Summative Assessment:</p> <p>Rubric to assess student created projects</p>