Innovators in STEM
Grade 7
Unit 2 Plan

acher(s)	
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Unit Overview

Unit Title	
Unit Length	30 days; 15 periods; 42-minute periods
Performance Task	***The Innovator's School*** Students work together to reimagine a specific physical space in their actual school environment. In their designs, students work to address a question and meet a need such as how to design a space that provides access to physical activities all students enjoy, a place to utilize innovative technologies, or a space to study efficiently. Students survey the school community and utilize the data to justify their designs. Students will work within a budget and demonstrate their understanding of how to manage the budget. ***Learning Process:*** *Design Thinking Process*
Essential Questions	How can we peacefully and effectively advocate for change while addressing realistic constraints and being inclusive of all?
Enduring Understandings	Using problem-solving processes, we can develop a solution, supported by data, to present our solution so it meets the needs of varying stakeholders.
Pacing Guide	Link to unit pacing guide.

Goals

STEM Program Goals *By the end of the 7th grade…*		**Unit Goal** *By the end of this unit…*
Communication	Students will be able to **analyze the**	Students will be able to ask and listen to

	main idea of a piece of work(s) and determine how the point of view(s) **impacts their solutions**.	students' perspectives on what they need from their school and determine the extent to which the points of view impact their school solutions.
Collaboration	Students will be able to work together to **build consensus** on an approach or solution by determining a goal and considering design constraints and possibilities.	Through the Design Thinking Process, students will be able to build consensus on what will be incorporated into their design based on the challenge, goal, and design constraints.
Creativity	Students will be able to **provide a new or different perspective** on how to solve a problem by rethinking the constraints, materials, approach, or desired outcome.	Students will be able to rethink the use of resources, space, and time to meet the desired outcome in their design of a school.
Critical Thinking	Students will be able to **use data to analyze** the **cause and effect** of a problem to determine **ways in which the problem can be addressed** or solved.	Students will be able to collect and analyze data to determine what the best use of school space is and how to allocate resources to achieve their design.

Connections

Discipline	Connected Standards
Science (2020 NJSLS)	**Biological Evolution: Unity and Diversity MS-LS4.1** Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.
	Biological Evolution: Unity and Diversity MS-LS4.5 Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.
	Biological Evolution: Unity and Diversity MS-LS4.6 Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.
Computer Science and Design Thinking (2020 NJSLS)	**Data & Analysis 8.1.8.DA.1** Organize and transform data collected using computational tools to make it usable for a specific purpose.
	Engineering Design 8.2.8.ED.7 Design a product to address a real-world problem and document the iterative design process, including decisions made as a result of specific constraints and trade-offs

	(e.g., annotated sketches).
English Language Arts (2020 NJSLSA)	**Writing Anchor W9** Draw evidence from literary or informational texts to support analysis, reflection, and research.
	Speaking and Listening Anchor SL4 Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.
	Language Anchor L3 Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.
Technology (ISTE Standards for Students)	**Innovative Designer 1.4.c** Students develop, test and refine prototypes as part of a cyclical design process.
	Computational Thinker 1.5.b Students collect data or identify relevant data sets, use digital tools to analyze them, and represent data in various ways to facilitate problem-solving and decision-making.
	Global Collaborator 1.7.c Students contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.
UN Sustainable Development Goals	**Goal 4: Quality Education** ● Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.
	Goal 5: Gender Equality ● Achieve gender equality and empower all women and girls.
	Goal 8: Decent Work and Economic Growth ● Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.
	Goal 16: Peace, Justice, and Strong Institutions ● Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.

Learning Process and Check Points

Assessment Type	Learning Phase	Student Product	Description	Goal Assessed
Formative	Empathize	A data collection tool that they administer.	Survey students and staff to learn more about how a physical space in the school can be more conducive to learning.	Communication
Formative	Define	A reflection and explanation of data analysis and findings.	Analyze the data collected to define what the challenge might be in the design of that physical space.	Communication Critical Thinking
Formative	Ideate	A list of brainstormed solutions.	Brainstorm solutions to create an innovative learning space in your school.	Collaboration Creativity
Formative	Prototype	A 3D model of the redesigned school space.	Build a 3D model of your redesigned school space.	Creativity Critical Thinking
Formative	Test and Iterate	Presentation and captured feedback and takeaways from the audience.	Present your solution to a small group of students and staff and solicit feedback.	Communication Collaboration
Summative	Implement and Share	Performance Task	Create a recording of your final presentation that can be shared with decision-makers in the school.	Communication Collaboration Creativity Critical Thinking
Summative	Reflect	Unit reflection journal.	Reflect on your problem-based learning experience.	Communication Collaboration Creativity Critical Thinking

Unit Resources

Type	Purpose/Description	Access the Resource
3D Modeling Software	To digitally create the school design	*Recommended:* CoSpaces
3D Printer	To print and present the school design	*Recommended:* Robo 3D
UN Sustainable Development Goals	Students draw connections between their designs and real-world problems/goals	https://sdgs.un.org/goals
***Optional:* Student Design Log**	Students record their learning and reflection as part of the design process	Create a digital or physical resource for students.

Vocabulary

Academic Vocabulary *(Tier 2 Words)*	Subject-Specific Vocabulary *(Tier 3 Words)*
• Design Thinking process • Critical • Empower • Advocate • Prototype • Justify • Data analysis • Survey	• 3D Model • 3D Print

Differentiation

Type *The type of differentiation strategy.*	**Strategy** *The specific differentiation strategy.*	**Implementation** *When, how, or why the strategy is implemented.*
Modification *A change to the learning objective.*	Set individualized and relevant learning goals based on the performance task rubric.	For students who are working on developing their skills but below grade level expectations, use the performance task rubric to identify which criteria levels the students will meet. (ie. some students will have a goal of achieving level 4 whereas others might have a goal of achieving level 2.
Scaffold *A support to aid access, learning, and mastery of an objective. May*	Identify how students will gather data.	Provide structured choice and/or guidelines for how students should approach data collection (ie. questions to ask, tools to use, etc.)

result in a change in the time, input, output, or size of learning experiences.	Group roles - some roles might include: *interviewer, data analyst, 3D modeler, project manager*	Utilize intentional group roles to support student collaboration. *Note - group roles do not mean that students only complete that part of the work but rather lead the group through it.*
	Provide a learning process checklist.	Provide the steps of the Design Thinking learning process to remind students of the process and move autonomously through it.
	Provide or co-create sample or exemplar 3D models.	Sample 3D designs to support student learning and modeling.
Enrichment *A way to provide students personalized, in depth learning.*	Student choice of topics.	Students can have as little as or as much choice in the topic of their solution. Some students benefit from a concrete list of structured choice whereas others may benefit from open ended choice and can work through the abstract.
Extension *A way of extending the learning of a unit, objective, or lesson.*	Students enter their solutions into the New Jersey STEAM Tank competition.	Students, with the support of an educator, can enter their design solutions into the STEAM Tank competition to share publicly and iterate their ideas with the support of mentors from the field.

Unit Preparation

Technology Set Up	1. **Complete the next section, "Unit Considerations," and reflect on student strengths, areas of anticipated challenges, and appreciate differentiation strategies.** 2. **Review the sample Pacing Guide and modify it to accommodate your learning schedule.** 3. Ensure all students have an account to access the 3D modeling software. 4. Ensure 3D printers have the filament to print enough models. 5. Prepare the school community to be surveyed by students to encourage their authentic support and participation in the project.
Unit Considerations *Teacher Reflection*	*Think about students' current skills and knowledge, what they may struggle with, where differentiation might be appropriate, and how this unit can be customized for your classroom. Write your reflections below:*

Pacing Guide

The learning phases and project checkpoints are outlined below. Complete, revise, and/or expand upon the pacing guide for your classroom.

Day/Class Period	**Phase**	**Aim / Activity** *What is the learning objective? What will students do?*	**Assessment** *How will you assess learning?*
Day 1	Empathize		
Day 2			
Day 3			
Day 4		Students will be able to survey students and staff to learn more about how a physical space in the school can be more conducive to learning.	Students will use a tool to collect data, administered, and data collected.
Day 5	Define		
Day 6		Students will be able to analyze the data collected to define what the challenge might be in the design of that physical space.	Students will be able to engage in reflection and explanation of data analysis and findings.
Day 7	Ideate		
Day 8		Students will brainstorm solutions to create an innovative learning space in your school.	Students will generate a list of brainstormed solutions.
Day 9	Prototype		
Day 10			
Day 11		Students will build a 3D model of the redesigned school space.	Students will create a 3D model of their school space.
Day 12	Test and Iterate		
Day 13		Students will present their solution to a small group of students and staff and solicit feedback.	Students will present and captur feedback and takeaways from the audience.
Day 14	Implement	Students will create a recording of	Students create a video of their

	and Share	your final presentation that can be shared with decision-makers in the school.	final ideas and presentation.
Day 15	Reflect	Students will be able to reflect on their problem-based learning experience.	Students will journal a reflection of the learning experience.