Main Units

Architecture

Architecture	3rd Grade Gifted
Content Area: What is the core subject area?	**Timeline:** How long will this unit last?
Design Thinking, Math, Language Arts	1 Semester (16-18 weeks)
Overarching Question:	
How can we use the system of Architecture to solve real-world problems?	
Rationale/Purpose:	
A study of architecture allows students to increase their awareness of the structures in the world around them. This study uses the built environment as a window to examine the world and the ideas and principles that govern it, including "form follows function," the changing field of sustainability, as well as techniques of architectural drafting, design, and preservation. Upon completion of this unit, students will understand the significance of buildings that are in danger of demolition and take measures to preserve and protect these buildings. Students will also understand the reasoning behind and workings of environmentally friendly building practices. This unit deals with specific skills and content information, but it is most significantly concerned with the integration of academic and artistic disciplines and the interdependence of humans and our buildings. Through architecture, students primarily focus on the process of learning through visual thinking, problem-solving, creative thought, group interaction, technology, and communication. Most importantly, architecture will be taught as a system of interrelated elements that work together to produce an end product. The elements required for planning, designing, and building a structure will be examined as necessary components of a whole system. Students will look for ways to incorporate these elements as they use architecture to solve problems, whether they are repurposing endangered or vacant buildings for new uses or designing new buildings for specific functions.	
Description: What is the unit description? In other words, what will the students be doing?	
In this unit, students will complete two projects: the Designer's Challenge and the final project. • Designer's Challenge: The Designer's Challenge project is the vehicle through which students learn about the system and process of architecture. Students examine architectural terms and features, form follows function, sustainability, and architectural preservation, selection of building materials, floor plans/elevation drawings/models, and client needs/requests. They design buildings based on client specifications and use the idea that form follows function to guide their problem-solving. They begin the design process with bubble diagrams and then explore dimensions before creating their floor plans, elevation drawings, and three-dimensional models. Students also choose sustainable materials to use in their design, and they receive feedback on their project plans from experts in the field of architecture. • Final Project: In preparation for the final project, students discuss how architecture can be used to solve real-world problems. They begin by creating a list of problems, and then work individually or join groups with similar interest areas. Each student or group identifies and	

solves a problem by designing a new building or restoring an existing one. In both cases, students design buildings for functions that would benefit the surrounding community and choose whether to incorporate sustainable materials in their projects. Students articulate their plans in written project rationales/building descriptions that are sent to professional architects for feedback. Each student or group determines which visuals will best communicate their designs: floor plans, elevation drawings, or three-dimensional models.

- Students also take part in a field trip to an architecture firm or a sustainable building to experience real-world architecture at some point during the semester.

Enduring Understandings:

- EU 1.1 Decision making requires a process of gathering, analyzing, and applying information and ideas.
- EU 1.2 The decisions that we make impact others. It is important to consider the implications and consequences of personal actions.
- EU 1.3 The development of critical thinking skills and dispositions is a life-long endeavor.
- EU 1.4 There are different processes and strategies for solving problems. Being able to apply these processes and strategies may increase the probability of developing a successful outcome.
- EU 1.5 Through practice, we can grow in our ability to develop effective solutions to problems.

Essential Questions:

- EQ 1.1 How do I make and defend a well thought out and reasonable decision?
- EQ 1.2 How do I use different strategies to effectively generate solutions that solve problems?
- EQ 1.25 How do I collect and determine relevant data?
- EQ 1.3 Why is it important to be able to solve problems and explain my reasoning?
- EQ 1.4 How do my decisions impact the world?
- EQ 1.5 How can I transfer my knowledge and skills to new situations?
- EQ 1.6 How do I communicate my ideas effectively to an appropriate audience?

MOGLO:

- 3.CR.A.1: Collect and analyze data to independently identify elements of issues (Supported/Developed)
- 3.CR.B.1: Develop (a) possible solution(s) to problems (Assessed)
- 3.CR.C.2: With guidance, support ideas, decisions, and opinion statements with facts tied to evidence from multiple sources (Supported/Developed)
- 3.CR.G.1: Identify cause and effect relationships and complex connections within the system and explain trends in systems (Assessed)
- 3.CR.I.1: Effectively communicate complex ideas in a way that meets the need(s) of the intended audience (Assessed)

Unit Know, Understand, and Do:

- Students will KNOW form follows function, architecture as a system, and the impact of sustainable architecture on the field.
- Students will UNDERSTAND decision-making requires a process of gathering, analyzing, and applying information and ideas; our decisions impact others, and it is important to consider the implications and consequences of personal actions; the development of critical thinking skills and dispositions is a life-long endeavor; there are different processes and strategies for solving problems, and being able to apply these processes and strategies may

increase the probability of developing a successful outcome; and through practice we can grow in our ability to develop effective solutions to problems.
- Students will use architecture to solve a problem as they design proposals for new or reused buildings. Their proposals will include a building description, a rationale justifying their design as a solution, materials selection, visuals of their design, and feedback from a mentor in the field of architecture (See "Key Learning Activities" section for additional information about what students will be able to DO.)

Bridge Builder

Bridge Builder	Third Grade Gifted
Content Area: What is the core subject area?	Timeline: How long will this unit last?
Civil Engineering	16 weeks

Rationale/Purpose:

Working within the framework of bridge construction, students will be able to apply strategies to recognize problems, and through coordinated effort with others, develop proposed solutions to the problems to complete tasks.

Description:

In this class, students will research types of bridges and the most famous, structurally amazing bridges in the world. They will learn about the engineering design process, build their bridges using limited materials, experiment with the different forces that act on bridges, and test and improve upon their thinking in bridge-building challenges using hands-on materials and computer modeling!

Course Activities: Students will construct bridges using a variety of materials, complete bridge-building challenges, use computer modeling to design bridges, and research famous bridges around the world. They will learn about the engineering design process and use that knowledge in their bridge challenges.

Overarching Question: How can one make a bridge that successfully meets the needs of the user?

Enduring Understandings:

- EU 1.1 Decision making requires a process of gathering, analyzing, and applying information and ideas.
- EU 1.4 There are different processes and strategies for solving problems. Being able to apply these processes and strategies may increase the probability of developing a successful outcome.
- EU 1.3 The development of critical thinking skills and dispositions is a life-long endeavor.
- EU 1.5 Through practice, we can grow in our ability to develop effective solutions to problems.
- EU 1.2 The decisions that we make impact others. It is important to consider the implications and consequences of personal actions.

Essential Questions:

- EQ 1.1 How do I make and defend a well thought out and reasonable decision?
- EQ 1.2 How do I use different strategies to effectively generate solutions that solve problems?
- EQ 1.25 How do I collect and determine relevant data?
- EQ 1.3 Why is it important to be able to solve problems and explain my reasoning?
- EQ 1.4 How do my decisions impact the world?
- EQ 1.5 How can I transfer my knowledge and skills to new situations?
- EQ 1.6 How do I communicate my ideas effectively to an appropriate audience?

MOGLO:

Assessed: 3.CR. I-Communicate Ideas, Thoughts, and Messages
*3.CR.I.1-Effectively communicate complex ideas in a way that meets the needs of the intended audience.

Assessed: 3.CR.A-Analyze Problem Situations and Identify Key Elements
*3.CR.A.1-Collect and analyze data to independently identify elements of issues
-3.CR.A.2-Identify the main pattern and minor patterns in the information needed to understand issues.

Supported: 3.CR.C-Evaluate Options and Explain Reasoning
*3.CR.C.2-With guidance, support ideas, decisions, and opinion statements with facts tied to evidence from multiple sources.
-3.CR.C.1-Determine criteria for evaluating and selecting responses to issues and support selections.

Assessed: 3.CR.B-Identify Possible Solutions and Success Criteria
*3.CR.B.1-Develop possible solutions to a problem.
-3.CR.B.2-With guidance, develop success criteria for problem solutions.
-3.CR.B.3-Evaluate the possible effectiveness of proposed solutions to problems.

Supported: 3.CR.G-Systems Thinking
*3.CR.G.1-Identify cause and effect relationships and complex connections within the system and explain trends in systems.

Unit Know, Understand, and Do:

Know:
*The students will know the characteristics of the six types of bridges and the basic principles of constructing them.
*The students will know how forces (tension, compression, torsion, shear, bending) act on bridges.
*The students will know how to use the design process to build a bridge.
*The students will know how to find appropriate sources and use them to gather information about a topic.
*The students will know strategies for solving a problem that they encounter in the design

process.
*The students will know how to create a scale plan for a bridge.
*The students will know that research can be used to guide the decision-making process.
*The students will know which materials are appropriate for different types of bridges.

Understand:

- EU 1.1 Decision-making requires a process of gathering, analyzing, and applying information and ideas.
- EU 1.4 There are different processes and strategies for solving problems. Being able to apply these processes and strategies may increase the probability of developing a successful outcome.
- EU 1.3 The development of critical thinking skills and dispositions is a life-long endeavor.
- EU 1.5 Through practice, we can grow in our ability to develop effective solutions to problems.
- EU 1.2 The decisions that we make impact others. It is important to consider the implications and consequences of personal actions.

Do:
*The students will use the design process to solve bridge challenges.
*The students will learn about the types of bridges.
*The students will learn about the forces that can affect a bridge.
*The students will research information about a bridge of their choice.
*The students will create a presentation to share about a bridge of their choice.
*The students will determine what materials compose the strongest bridge beam.
*The students will set goals for their progress.
*The students will give appropriate feedback to their peers.
*The students will use the information they have learned to solve a real-world bridge problem.
*The students will create a model of their solution to a real-world problem.
*The students will communicate information they have learned to others.
*The students will build a paper and tape bridge that can hold at least one weight.
*The students will build a toothpick bridge that can hold at least one weight.

Creativity Lab

Unit Title: Creativity Lab	Course: Third Grade Gifted
Content Area: STE(A)M, Affective, All Subject Areas	Timeline: 16 Weeks
Overarching Question: How do I use creativity to solve problems or express ideas in unique and purposeful ways?	
Rationale/Purpose:	
The deliberate teaching of creativity and creative problem solving should stand as foundational	

elements in the modern educational landscape, as they are both vital for the birth of innovation. In an era defined by the imperative need for creative solutions to complex challenges, cultivating creativity equips individuals with the mindset and skills essential for generating novel solutions to multifaceted problems. Unfortunately, traditional educational settings throughout history have often inadvertently hindered the growth of this invaluable skill. One recent study displays a decrease over the past fifty years in creative thinking in elementary students, particularly in kindergarten through third grade. As there is a clear correlation between higher levels of creativity and greater academic achievement, it is essential to implement teaching strategies that foster creativity, purposefully teach students creative problem-solving strategies, while additionally providing classroom environments conducive to its development. By intentionally immersing students into the study of creativity, not only do they expand their creative aptitude, but they also simultaneously enhance their performance across diverse educational disciplines. This aligns with the stance of numerous organizations and experts who emphasize the centrality of creativity as an essential 21st-century skill. A *Future of Jobs Report for 2023* ranks creative thinking as the second most critical skill, following problem solving and preceding critical thinking. A global study surveying over 1500 IBM executives highlights creativity as the foremost competency for future successful leaders. Overall, there is a plethora of compelling studies signifying the deliberate instruction of creativity within education not only fosters personal student growth (both affectively and across numerous disciplines), which is reason enough to incorporate it, but it also holds the potential to uplift society as a whole as global innovation and progress are propelled.

Description:

In this unit, students will learn what creativity is. They'll explore what common traits creative people often share as they discover creativity covers an array of disciplines (subjects). Engaging in daily creativity mini-challenges and skill strengtheners, they will also be introduced to Howard Gardner's Theory of Multiple Intelligences. This exploration aims not only to identify their intelligence(s) but also to foster empathy for others of diverse strengths. While focusing on each of the intelligences, they will solve presented challenges by incorporating creative problem-solving strategies. Students will additionally learn strategies for problem-finding. After learning creativity traits, skills, and strategies, students will choose from a list or generate their own idea of a real-world problem to solve using an appropriate learned creative problem-solving strategy. They'll give evidence to justify the reason their idea and solution is a good one. They will present their solution at the unit's end.

Enduring Understandings:

- EU 1.4 There are different processes and strategies for solving problems. Being able to apply these processes and strategies may increase the probability of developing a successful outcome.
- EU 1.5 Through practice, we can grow in our ability to develop and communicate effective solutions to problems.

Essential Questions:

- EQ 1.2 How do I use different strategies to effectively generate solutions that solve problems?
- EQ 1.3 Why is it important to be able to solve problems and explain my reasoning?

- EQ 1.5 How can I transfer my knowledge and skills to new situations?
- EQ 1.6 How do I communicate my ideas effectively to an appropriate audience?

MOGLO:

Assessed:
MO GLO: Identify Possible Solutions and Success Criteria
*Indicator: Develop (a) possible solution(s) to problems
MO GLO: Communicate Ideas, Thoughts, and Messages
*Indicator: Effectively communicate complex ideas in a way that meets the need(s) of the intended audience

Supported:
MO GLO: Systems Thinking
MO GLO: Evaluate Options and Explain Reasoning
MO GLO: Analyze Problem Situations and Identify Key Elements

Unit Know, Understand, and Do:

Know:
What Howard Gardner's Theory of Multiple Intelligences is.
Numerous specific strategies are used to solve problems.
Creativity is not universally defined.
A basic working definition of creativity.
The difference between creativity and innovation.
Understand their multiple intelligence(s) according to Gardner's Theory of Multiple Intelligences.
FFOE is considered an important foundation of creativity to generate innovative solutions.
Creativity is not only a component of Art but is utilized in all intellectual disciplines.
How problem-solving solutions to real-world challenges tie in with innovation.
Creative people can share some similar traits or characteristics.
How to know if an idea is a good idea or not

Understand:
There are different "intelligences," or areas of strength, all people have while they can learn and use different processes to creatively innovate new solutions to problems in diverse disciplines/subjects.
Critical thinking is needed to evaluate sources and ideas while innovating.

Do:
Participate in mini creativity lessons/activities.
Create solutions to problems.
Explore various multiple intelligences.
Research a famous creative person.
Brainstorm ideas.
Learn critical thinking strategies to evaluate sources for credibility.

Solve problems by engaging in a design process.
Use creative problem-solving strategies to solve challenges.
Choose and use a creative problem-solving strategy to solve a real-world problem and/or communicate a complex idea.
Give evidence to support the use of a component in the problem's solution. (Why did they include what they did in the solution?)
Present an effective solution to a problem.