Unit 3: Design & Alternate Solutions

Content Area: **Applied Technology**
Course(s):
Time Period: **Marking Period 1**
Length: **3 weeks**
Status: **Published**

Summary

Introduction:

Design skills and techniques will be introduced. A brief program or design brief will list the requirements for a two-story house. The teacher will demonstrate methods for finding alternate solutions. Students will choose one solution and complete the project-exploring schematic drawings, design development, and making final drawings. The house will require a two-story solution and stair systems will be introduced. Students will modify previous work to complete the project and revise the section to meet new requirements. Students will consider how environmental concerns relate to design.

Revision: July 2024

Essential Questions/Enduring Understandings

Essential Questions:

How do architects solve problems or find alternate solutions?

What is the architectural design loop and how is it utilized?

What factors are considered when stair systems are created in house design?

Enduring Understandings:

Finding alternate solutions provides the designer with an opportunity to choose a better solution

the design loop, while iterative has a direction toward completion.

The decisions made early on, at the alternate solutions step of design, have a great impact on the final design.

Learning Plan

Preview the essential questions and connect to learning throughout the unit.

Teacher will provide formative and summative assessments of skills attainment.

Project-based learning: teacher will use an apprenticeship model to demonstrate how to brainstorm a house.

Students will choose a favorite sketch and complete the project. The sketch will be on the board and require students to complete the project by finding alternate solutions on their own. Students will sketch on paper possible solutions and when they find a best one, revise a CAD drawing.

Suggested activity: teacher will use an apprenticeship model to demonstrate how to brainstorm a two-story house. Modeling a procedure, students will finish the house. The house also incorporates a stair system.

Problem-oriented learning and suggested activity: students design a residence using their own program. Students will maintain copies of work to demonstrate the application of the design loop.

Textbook for reference: Architecture, residential drawing and design by Kicklighter.

Assessment

Formative

demonstrate knowledge and understanding of vocabulary through correct usage.

teacher check in

sketchbook solutions

exit tickets

participation in class discussions on design look and alternate

develop a solution from an upstairs sketch for a two-story house.

provide evidence of finding alternate ideas, schematic drawings, design development, and presentation drawings.

complete writing prompts: Example: Explain the relationship between each step of the design loop and programming. Beyond sizes and dimensions, what type of information is in a program, and why is it important?

Summative assessment:

answer the essential questions.

develop a solution from a sketch for a single-story house.

Benchmark assessment:

Final exam.

Alternative Assessment:

Create a virtual walk through presentation on house design with all components of a single story house

Materials

core book list

Whiteboard and markers

Smartboard

Tracing paper

Paper

AutoCAD and the CAD Lab

Pencils, pens, markers.

Standards

ELA.K-12.1	Developing Responsibility for Learning: Cultivating independence, self-reflection, and responsibility for one's own learning.
ELA.K-12.2	Adapting Communication: Adapting communication in response to the varying demands of audience, task, purpose, and discipline.
ELA.K-12.3	Valuing Evidence in Argumentation: Constructing viable claims and evaluating, defending, challenging, and qualifying the arguments of others.
ELA.K-12.4	Building Knowledge: Building strong content knowledge and connecting ideas across disciplines using a variety of text resources and media.
ELA.K-12.5	Leveraging Technology: Employing technology and digital media thoughtfully, strategically and capably to enhance reading, writing, speaking, listening, and language use.
TECH.K-12.1.3	Knowledge Constructor Students critically curate a variety of resources using digital tools to construct knowledge, produce creative artifacts and make meaningful learning experiences for themselves and others.
TECH.K-12.1.3.a	plan and employ effective research strategies to locate information and other resources for their intellectual or creative pursuits.
TECH.K-12.1.3.b	evaluate the accuracy, perspective, credibility and relevance of information, media, data or other resources.
TECH.K-12.1.3.c	curate information from digital resources using a variety of tools and methods to create collections of artifacts that demonstrate meaningful connections or conclusions.
TECH.K-12.1.3.d	build knowledge by actively exploring real-world issues and problems, developing ideas

	and theories and pursuing answers and solutions.
TECH.K-12.1.4	Innovative Designer
	Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions.
TECH.K-12.1.4.a	know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.
TECH.K-12.1.4.b	select and use digital tools to plan and manage a design process that considers design constraints and calculated risks.
TECH.K-12.1.4.c	develop, test and refine prototypes as part of a cyclical design process.
TECH.K-12.1.4.d	exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems.
	Integration of Knowledge and Ideas
TECH.K-12.1.6	Creative Communicator
	Students communicate clearly and express themselves creatively for a variety of purposes using the platforms, tools, styles, formats and digital media appropriate to their goals.
TECH.K-12.1.6.a	choose the appropriate platforms and tools for meeting the desired objectives of their creation or communication.
TECH.K-12.1.6.b	create original works or responsibly repurpose or remix digital resources into new creations.
TECH.K-12.1.6.c	communicate complex ideas clearly and effectively by creating or using a variety of digital objects such as visualizations, models or simulations.
TECH.K-12.1.6.d	publish or present content that customizes the message and medium for their intended audiences.
SCI.HS-ESS3	Earth and Human Activity
SCI.HS-ESS3-5	Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.
SCI.HS.ESS3.D	Global Climate Change
SCI.HS-ETS1	Engineering Design
SCI.HS-ETS1-4	Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.
SCI.HS.ETS1.B	Developing Possible Solutions
	Both physical models and computers can be used in various ways to aid in the engineering design process. Computers are useful for a variety of purposes, such as running simulations to test different ways of solving a problem or to see which one is most efficient or economical; and in making a persuasive presentation to a client about how a given design will meet his or her needs.
CS.9-12.EC	Ethics & Culture
CS.9-12.ED	Engineering Design
WRK.9.2.12.CAP	Career Awareness and Planning
TECH.9.4.12.CI	Creativity and Innovation
TECH.9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
TECH.9.4.12.CI.2	Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).

TECH.9.4.12.CI.3	Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).
TECH.9.4.12.CT	Critical Thinking and Problem-solving
	Career planning requires purposeful planning based on research, self-knowledge, and informed choices.
	With a growth mindset, failure is an important part of success.
	Engineering design is a complex process in which creativity, content knowledge, research, and analysis are used to address local and global problems. Decisions on trade-offs involve systematic comparisons of all costs and benefits, and final steps that may involve redesigning for optimization.
	Innovative ideas or innovation can lead to career opportunities.
	Engineering design evaluation, a process for determining how well a solution meets requirements, involves systematic comparisons between requirements, specifications, and constraints.