Unit 01: The Design Loop and CADD

Content Area: **Applied Technology**
Course(s):
Time Period: **Marking Period 1**
Length: **5 Weeks**
Status: **Published**

Brief Summary of Unit

Unit 1 is designed to address AutoCAD skill gaps and provide students with fundamental problem solving skills using the design loop. Students will design a house to meet this goal. This unit is a formative assessment of student skills, and addresses the different prerequisites and time lapses students will have.

Revision Date: July 2026

Essential Questions/Enduring Understandings

Essential Questions:

What is the architectural design loop, and what are its components?

How do architects develop and communicate building designs?

What skills are necessary to successfully complete CADD work?

Enduring Understandings:

The architectural design loop consists of five steps that provide a structured process for solving design problems.

Architects use the design loop to efficiently develop and complete projects.

Computer-Aided Design and Drafting (CADD) skills are essential for producing accurate and efficient architectural work.

Students Will Know/Students Will Be Skilled At

Students Will Know:

that the design loop is a procedure to develop a solution to a problem.

the design loop has 5 steps and what they are: programming, brainstorming/pick-one, schematics, design development, and final documents. that the design loop moves forward, but is iterative.

Students Will Be Skilled At:

how to create, open, rename, save-as, and save files in different formats for AutoCAD. These formats include: .dwg, pdf, .bak.

how to use commands to efficiently draw, including: line, linetype, polygon, polyline, lineweight, mirror, scale, extend, trim, erase, offset, rectangle, ellipse, arc, and others.

how to use the design loop to develop a design.

strategies and procedures for the development of a set of drawings, including using plans to generate sections and elevations.

Learning Plan

- CADD Skills Assessment: Students will be provided with a technical drawing to replicate, demonstrating their proficiency in Computer-Aided Design and Drafting (CADD) skills, including accuracy, precision, and attention to detail.

- Reading Assignment: The teacher will guide students through selected excerpts from Towards a New Architecture by Le Corbusier, with class discussion focused on architectural principles, design philosophy, and their influence on modern architecture.

- Design Project Activity: Students will design a residential house that responds to a specific architectural program and set of design criteria. Each student will work from a virtually flat site provided by the instructor. Using the design loop process, students will create and refine architectural drawings while receiving ongoing critique and support from the teacher. Final project materials will include floor plans, sections, and elevations compiled into a professional digital portfolio.

- Instructional Support and Feedback: The teacher will provide continuous guidance, individualized feedback, and technical assistance throughout the duration of the project. Targeted demonstrations and mini-lessons will be delivered to address learning gaps, reinforce foundational concepts, and introduce advanced drafting and architectural design techniques as needed.

- Personalized Evaluation and Remediation: The teacher will conduct individualized evaluations designed to identify and address specific skill deficits. Instruction and support will be differentiated to target students' personal learning goals and improve overall performance in architectural design and drafting competencies.

- Project Presentation and Assessment: Upon completion, students will formally present their projects using their digital portfolios. Projects will be evaluated using a detailed rubric that assesses creativity,

technical accuracy, application of the design process, presentation quality, and adherence to project requirements.

- Written Reflection Prompt: Students will complete a written response to the following prompt: "What is the design loop, and how did you apply it throughout the development of this project?"

Assessment

Formative assessment:
Students will be provided with a drawing to replicate in order to demonstrate their Computer-Aided Design and Drafting (CADD) skills.
Exit Tickets
Class Discussion and Feedback

Summative assessment:
Students will present their completed project from the digital portfolio. The project will be evaluated using a rubric.

Possible word prompts:
"What is the design loop and how did you use it in this project?"
"What is meant by form follows function?"

Personalized evaluations:
The teacher will target specific learning goals in order to remediate identified skill deficits.

Benchmark Assessment:
Final Exam

Alternative Assessment:
Design loop project/presentation

Materials

The CADD LAB-computers equipped with up-to-date AutoCAD and/or other design and drafting software, presentation software, productivity software, a scanner and printers/plotters.

Traditional drafting equipment and supplies-vellum, colored and graphite pencils, pen and ink, drawing boards, tape, scissors, t-squares, triangles etc.

Chip-board, X-acto knives and other model making supplies.

A computer with INTERNET based presentation software (i.e. Prezi and Google Slides) and Microsoft

Powerpoint.

Smartboard for demonstrations by the teacher and presentations by students.

3D Printers, PLA, and other supplies.

Standards

9.2.12.CAP	Career Awareness and Planning
9.4.12.CI	Creativity and Innovation
1	Make sense of problems and persevere in solving them
TECH.K-12.1.1	Empowered Learner
	There are strategies to improve one’s professional value and marketability.
	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
2	Reason abstractly and quantitatively
TECH.K-12.1.1.a	articulate and set personal learning goals, develop strategies leveraging technology to achieve them and reflect on the learning process itself to improve learning outcomes.
	Innovative ideas or innovation can lead to career opportunities.
9.2.12.CAP.2	Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs.
9.2.12.CAP.3	Investigate how continuing education contributes to one's career and personal growth.
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.K-12.1.1.c	use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways.
9.4.12.CI.3	Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).
	Career planning requires purposeful planning based on research, self-knowledge, and informed choices.
9.4.12.CT	Critical Thinking and Problem-solving

TECH.K-12.1.2	Digital Citizen
	Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.
9.2.12.CAP.5	Assess and modify a personal plan to support current interests and post-secondary plans.
9.4.12.CT.1	Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).
9.2.12.CAP.7	Use online resources to examine licensing, certification, and credentialing requirements at the local, state, and national levels to maintain compliance with industry requirements in areas of career interest.
9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
TECH.K-12.1.2.c	demonstrate an understanding of and respect for the rights and obligations of using and sharing intellectual property.
TECH.K-12.1.2.d	manage their personal data to maintain digital privacy and security and are aware of data-collection technology used to track their navigation online.
TECH.K-12.1.3	Knowledge Constructor
TECH.K-12.1.3.a	plan and employ effective research strategies to locate information and other resources for their intellectual or creative pursuits.
LA.RST.9-10	Reading Science and Technical Subjects
	Key Ideas and Details
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.
LA.RST.9-10.1	Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.
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.
LA.RST.9-10.2	Determine the central ideas, themes, or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
TECH.K-12.1.4	Innovative Designer
LA.RST.9-10.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
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.
LA.RST.9-10.5	Analyze the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
TECH.K-12.1.4.c	develop, test and refine prototypes as part of a cyclical design process.
9.4.12.GCA	Global and Cultural Awareness
9.4.12.GCA.1	Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political. economic, cultural) may work better than others (e.g., SL.11-12.1., HS-ETS1-1, HS-ETS1-2, HS-ETS1-4, 6.3.12.GeoGI.1, 7.1.IH.IPERS.6, 7.1.IL.IPERS.7, 8.2.12.ETW.3).
TECH.K-12.1.6	Creative Communicator

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.
9.4.12.TL	Technology Literacy
	Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.
9.4.12.TL.1	Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).
	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.
8.2.12.ED.1	Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.
	Collaborative digital tools can be used to access, record and share different viewpoints and to collect and tabulate the views of groups of people.
8.2.12.ED.2	Create scaled engineering drawings for a new product or system and make modification to increase optimization based on feedback.
8.2.12.ED.3	Evaluate several models of the same type of product and make recommendations for a new design based on a cost benefit analysis.
8.2.12.ED.4	Design a product or system that addresses a global problem and document decisions made based on research, constraints, trade-offs, and aesthetic and ethical considerations and share this information with an appropriate audience.
	Engineering design evaluation, a process for determining how well a solution meets requirements, involves systematic comparisons between requirements, specifications, and constraints.
8.2.12.ED.5	Evaluate the effectiveness of a product or system based on factors that are related to its requirements, specifications, and constraints (e.g., safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, ergonomics).
ETW	Effects of Technology on the Natural World
	Development and modification of any technological system needs to take into account how the operation of the system will affect natural resources and ecosystems. Impacts of technological systems on the environment need to be monitored and must inform decision-making. Many technologies have been designed to have a positive impact on the environment and to monitor environmental change over time.
HS-ETS1	Engineering Design
HS-ETS1-1	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
	Asking Questions and Defining Problems
	Asking questions and defining problems in 9–12 builds on K–8 experiences and progresses to formulating, refining, and evaluating empirically testable questions and design problems using models and simulations.

ETS1.A	Delimiting Engineering Problems
	Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them.
	Humanity faces major global challenges today, such as the need for supplies of clean water and food or for energy sources that minimize pollution, which can be addressed through engineering. These global challenges also may have manifestations in local communities.
HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.
	Constructing Explanations and Designing Solutions
ETS1.C	Optimizing the Design Solution

Integrated Accommodation and Modifications, Special Education students, English Language Learners, At-Risk Students, Gifted and Talented students, Career Education, and those with 504s