Design Thinking

Texas Education Agency

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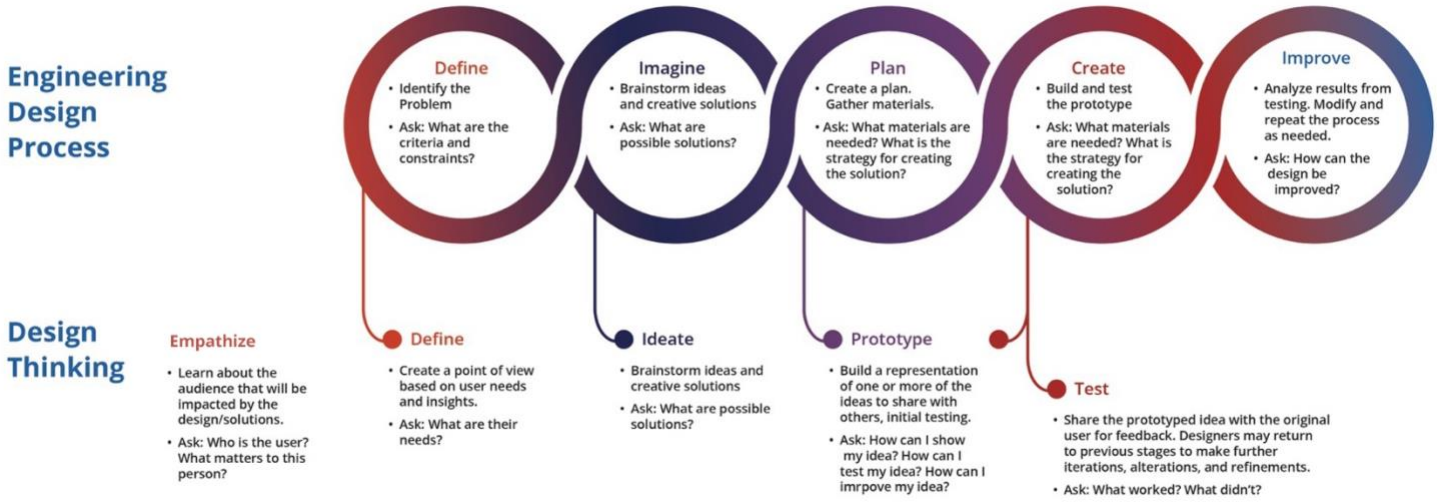
Design Thinking is a creative and user-centered design methodology that provides a solution-based approach to solving problems. The methodology combines empathy for the context of the problem, creativity in the generation of insights and solutions, and rationality and feedback to analyze and fit solutions to the appropriate context. A design mindset is solution-focused and action-oriented. The methodology draws on logic, imagination, intuition, and systems thinking to tackle complex problems that are ill-defined or unknown. Design thinking requires an understanding of the human needs involved and frames problems in human-centric ways.

Design Thinking Process

The design thinking process involves five stages and does not have to follow any specific order, can occur in parallel, and can be repeated iteratively. The stages can be understood as different modes that contribute to a project rather than sequential steps. This process is often used in conjunction with the engineering design process within STEM careers.



Stage 1: Empathize

The first stage of the design thinking process is to empathize. Designers engage in research to better understand the motivations and the needs of the users or individuals impacted by the product or solution. This inquiry is conducted without judgment to keep personal biases from influencing design choices. Various methods can be used to gain insight into the user's context, including the following:

- Designers observe real users
- Designers conduct photo and/or video-based studies of users' natural environments or discussions with the design team
- Users keep personal photo/video journals in which they record their own experiences with approaching a problem
- Designers interviewing users and engaging with users of differing degrees of needs and problems
- Designers wear equipment to gain first-hand experience with users in their environment

Stage 2: Define

The goal of the define stage is to identify the problem and interpret the research results. Synthesis of information occurs in this stage and involves creatively organizing, interpreting, and making sense of the data gathered during the empathize stage. Strategies used to synthesize collected information may include engaging in empathy mapping, creating analogies to draw parallels, sharing inspiring stories, creating customer journey maps, or creating personas or fictional characters based on real users. An integral part of the design thinking process is finding connections and patterns within those insights to create a meaningful and workable problem statement or point of view.

Stage 3: Ideate

Ideation, the third stage of the process, is a creative process where designers generate ideas to address the problem identified in the define stage. Designers often gather in teams to engage in ideation sessions. Designers may use various ideation techniques such as brainstorming, brain dumping, brainwriting, brainwalking, mind-mapping, sketching, storyboarding, generating the worst possible idea, and crowdstorming, among other strategies. This stage is a time for designers to challenge assumptions and look for alternative ways to view the problem and identify innovative solutions.

Stage 4: Prototype

Designer turn ideas into prototypes, or simplified versions of potential solutions or products, during this stage. This method involves producing an early, inexpensive, scaled-down version of the product or solution to reveal any problems with the design. Prototyping provides the opportunity for designers to bring their ideas to fruition by testing the practicality of a design or solution. The prototyping stage is an experimental phase, and the aim is to identify the best possible solution for each of the problems identified during the first three stages. As solutions are implemented, they are investigated and either accepted, improved, re-examined, or rejected. By the end of this stage, designers will have a clearer view of how real users behave, think, and feel when interacting with the end product or solution.

Stage 5: Test

Designers or evaluators test the complete product or solution using the best solutions identified during the prototyping phase. The results generated from these tests are then used to redefine one or more of the problems established in the earlier stages of the project and build a greater understanding of the problems users may have when interacting with the product or solution in the intended environment. In practice, the design process is carried out in a more flexible and non-linear fashion. Designers may return to previous stages to make further iterations, alterations, and refinements.

Connection to STEM

Design thinking provides a potential scaffolding technique to help craft problem/project-based learning (PBL) experiences. The engineering design process (EDP) is a complementary design thinking framework commonly used in STEM education that is driven by a problem and involves designing a solution with a product, process, or proof of concept. The EDP is used in engineering careers and is appropriate for a STEM project where learners need to design a solution and create a prototype, process, or proof of concept.