



# DESIGN THINKING: INCORPORATING “THINK, MAKE, AND DO” IN DESIGN EDUCATION

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**Abstract**— In today's rapidly evolving world, equipping students with the skills to become innovative problem-solvers is crucial. Design thinking, with its human-centered approach, offers a powerful framework for achieving this goal. This article explores the incorporation of its core framework of design thinking, "Think, Make, and Do." The phrase "Think" emphasizes empathy and understanding; the "Make" translates ideas into prototypes; and the "Do" means tests and iterates the ideas. This article investigates the effectiveness of integrating the "Think, Make, Do" framework, a core tenet of design thinking, across diverse design disciplines such as art, design, and architecture. Further, it explores effective methods for assessing student learning and outcomes, which include creativity, problem identification and solving skills, analytical representation skills, and real-world design thinking capabilities. Other challenges, such as time constraints and resource limitations, will be addressed, along with potential solutions and future research directions. This article concludes by highlighting the potential of “think, make, and do” in design education, equipping educators with practical strategies to foster a generation of innovative and empathetic designers.

**Keywords**— Design Thinking, Think, Make, Do, Design Education, learning theories, creativity, innovation, problem-solving, assessment, student outcomes.

## I. INTRODUCTION

The "Think, Make, Do" framework is a powerful tool for iterative design exploration. Here's a breakdown of each step:

**Think:** This is the brainstorming and ideation phase, where explore a wide range of possibilities and generate a large number of potential ideas. Techniques like mind mapping, sketching, and design thinking workshops can be helpful here.

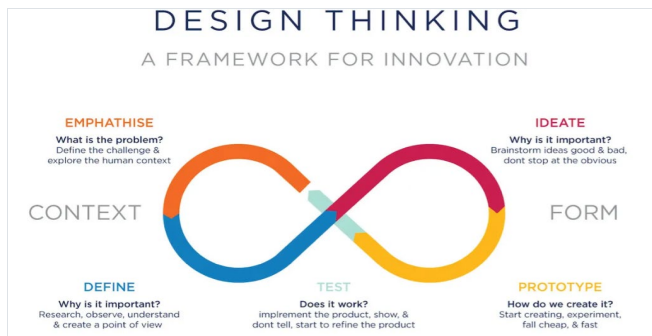
**Make:** After selecting promising ideas from the "Think" phase, it's time to move beyond thinking and actually start creating physical prototypes. These prototypes can be low-

fidelity (made from simple materials) or high-fidelity (more polished and representative of the final product). The goal is to gain a deeper understanding of the chosen ideas and how they might work in practice.

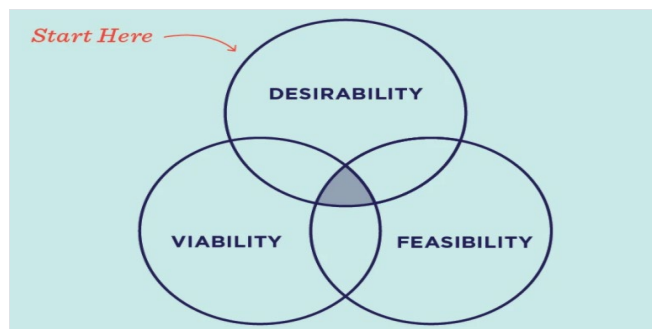
**Do:** This is the testing and evaluation phase, where you put your prototypes in front of real users or in real-world situations. This helps gather feedback, identify strengths and weaknesses, and ultimately refine designs based on the collected data.

One reason that rather than going into direct design testing, physical prototyping typically follows sketching is the relative speed and cost of sketching compared to prototyping and testing. This reflects a strategy of minimizing resources spent when design uncertainty is the highest and progressively increasing resources as uncertainty is reduced (Eppinger & Ulrich, 1995).

The term design thinking has gained attention over the past decade in a wide range of contexts beyond the traditional preoccupations of designers. (Lucy Kimbell, 2015). Design thinking has been receiving increased scholarly and popular interest in education; yet, teachers are often uncertain about what it means to implement this in their educational settings. (Danah Henriksen, Sarah Gretter & Carmen Richardson, 2018). Design thinking can be described as “a discipline that uses the designer’s sensibility and methods to match people’s needs with what is technologically feasible and what a viable business strategy can convert into customer value and market opportunity” (Brown, 2008, p. 86). “What is Design Thinking? Design Thinking provides a solution-based approach to solving problems. It is a way of thinking and working and provides a simple-to-follow hands-on approach that allows us to systematically solve the problem with the user and his/her needs at the centre. So, we need to understand the people for whom the solution is being designed— whether it is a product or service. To be successful, we need to carefully observe the target user and empathize with his/her problem. It is a structured way for questioning, questioning the problem, questioning the assumptions, and questioning the implications” (5).



Courtesy: <https://www.uxbeginner.com/ux-design-processes/>



Courtesy: <https://www.ideou.com/blogs/inspiration/what-is-design-thinking>

In the diversified fields the design thinking One of these skills is called design thinking. Design has been widely considered to be the central or distinguishing activity of engineering (Simon, 1996). In these cases, design thinking is widely understood as a human-centered approach to innovation that includes inspiration, ideation, and implementation cyclically and iteratively that includes prototyping, building to think, using stories, and having an inspired and inspiring culture (Brown, 2009). Design thinking is not an exclusive property of designers-all great innovators in literature, art, music, science; engineering and business have practiced it. Design thinking is that designers' work processes can help us systematically extract, teach, learn, and apply these human-centered techniques to solve problems creatively and innovatively- in our designs, in our business, in our countries, and our lives. Design thinking also involves ongoing experimentation: sketching, prototyping, testing, and trying out concepts and ideas (6). According to Renard (2014), the term design thinking has roots in various disciplines and is frequently, although not exclusively, associated with engineering, architecture, and related design disciplines in early literature focused on design thinking (7).

## II. LITERATURE REVIEW

While the concept of design thinking within the academic dialogue of design has been under discussion for more than 30

years, its recent adoption as an innovation method has led to its popularity in various disciplines (Wrigley & Straker, 2017). As Goldschmidt (2017) stated, the term design thinking means different things to different communities. The author distinguishes two facets: (1) Descriptive models of the design process, based on observational research of real-life or laboratory design activities by individuals or teams; (2) a method to be practiced in industries that strive to introduce innovative products or services.

Definitions, terminology and the number of process steps described for DT vary somewhat in the literature (d.school, n.d.; Brown, 2008; Seidel and Fixson, 2013; Carlgren et al., 2016b; Fleury et al., 2016). Liedtka (2015) nevertheless concludes that there are some typical characteristics of this type of innovation process: "All descriptions of the process emphasize iterative cycles of exploration using deep user research to develop insights and design criteria, followed by the generation of multiple ideas and concepts and then prototyping and experimentation to select the best ones - usually performed by functionally diverse groups working closely with users."

An Example of Problem-Solving: The Encumbered Vs. the Fresh Mind Thinking outside of the box can provide an innovative solution to a sticky problem. However, thinking outside of the box can be a real challenge as we naturally develop patterns of thinking that are modelled on the repetitive activities and commonly accessed knowledge, we surround ourselves with.

Some years ago, an incident occurred where a truck driver tried to pass under a low bridge. But he failed, and the truck was lodged firmly under the bridge. The driver was unable to continue driving through or reverse out.

The story goes that as the truck became stuck, it caused massive traffic problems, which resulted in emergency personnel, engineers, firefighters, and truck drivers gathering to devise and negotiate various solutions for dislodging the trapped vehicle.

Emergency workers were debating whether to dismantle parts of the truck or chip away at parts of the bridge. Each spoke of a solution that fitted within his or her respective level of expertise.

A boy walking by and witnessing the intense debate looked at the truck, at the bridge, then looked at the road and said nonchalantly, "Why not just let the air out of the tires?" to the absolute amazement of all the specialists and experts trying to unpick the problem.

When the solution was tested, the truck was able to drive free with ease, having suffered only the damage caused by its initial attempt to pass underneath the bridge. The story symbolizes the struggles we face where oftentimes the most obvious solutions are the ones hardest to come by because of the self-imposed constraints we work within (6).



Because so many people are paid to design things and systems, Lawson (2006) argued that design challenges are the most essential category of problems to explore. It is commonly acknowledged within the idea of design thinking that there is more than one appropriate way to do things. Designing or bringing about alternatives, as opposed to making decisions, is what a design mentality entails (10).

The goal here is to identify the optimum solution given the available skills, time, and resources. It is assumed that design will need the creation of new possibilities. A decision attitude, in contrast to a design attitude, stimulates new possibilities by the management as an idea producer. "A design mindset views each project as an opportunity for creativity that includes a questioning of underlying assumptions and a desire to leave

the world a better place than we found it," according to Boland and Collopy (2004) (10).

### III. METHODOLOGY

The study was carried out using Internet search engines, works of literature, and research papers. Studied several design colleges curricula, courses, and units, as well as course content to look at how design and design thinking are taught to students in institutions. Conducted open Interviews with faculty, and students from design backgrounds.

For instance, two different approaches were observed to designing educational programs: subject-wise/unit-wise vs. week-by-week learning activities.

Feature	Subject-wise/Unit-wise	Week-by-week activities
Structure	Organized around topics or units	Organized around weekly modules
Depth	Offers in-depth study of each topic	Introduces new concepts more frequently
Flexibility	Less flexible	More flexible, and adaptable to student needs
Engagement	Can be less engaging due to the linear structure	Can be more engaging due to the variety and shorter modules
Adaptability	Difficult to adapt to individual needs	Easier to adapt to individual needs and learning styles

Professionals in the field were also contacted to confirm the nature and correctness of outcomes.

### IV. DISCUSSION

Design thinking is a strategy-making process that avoids making mistakes by applying the use of certain tools from the world of design shifting the focus to human behavior and analysing how certain things will affect different individuals. It was popularized by David M. Kelly and Tim Brown of IDEO and Roger Martin of the Rotman School.

#### The 3 Major Stages

The major stages of the design thinking process ensure that the design will be able to meet the future.

First stage: Think (Invent the Future)

In the first stage, start with forming a few theories about what users might want, by immersing in their lives. Instead of polling them about specific design features, observe and ask questions about their behavior. The process stops at realizing what they might want (that currently don't have), and moves on to the next step.

Second stage: Make (Test Your Ideas)

Use iterative prototyping on the designs, create and conduct a few quick experiments to see how users respond. Iterative prototyping is a repeating cycle of designing, prototyping,

testing, and refining multiple "versions" of a product. After done with the iterative prototyping process, make the necessary changes and move on to the final stage of the design thinking process.

Third stage: Do (Bring it to Life)

The last stage of the design thinking process involves bringing the new design to life. After done with the iterative prototyping process and picking a winner, start developing the final product based on all the points collected in the previous two stages.

Prototypes and solutions will be fine-tuned. Prototype iterations are improved via testing. This may need to go back to the drawing board. To gain a better understanding of the user. Testing is another way to develop empathy via observation and interaction, and it frequently offers surprising results.

### V. CONCLUSION

Organizing workflow into the design process makes way for improvement and innovation. Design thinking is about solving problems. By implementing this process in design education, students and designers can know the entire design process. Usually, nowadays students end up with ideas and few are with the prototypes. Not going into real testing or the third phase, how their ideas compete with the real world is also important. Educational institutions by incorporating these



three models, every design education institutions can be a startups or innovation centre.

Design Thinking is an iterative and nonlinear process. This simply means that the student design team continuously use their results to review, question and improve their initial assumptions, understandings and results. Results from the final stage of the initial work process inform our understanding of the problem, help us determine the parameters of the problem, enable us to redefine the problem, and, perhaps most importantly, provide us with new insights so we can see any alternative solutions that might not have been available with our previous level of understanding.

Students who are taught to think, make, and do may be better prepared to deal with tough situations and solve complicated challenges in school, in their jobs, and life. Current educational methods, on the other hand, are often based on out-of-date learning and pedagogy ideas, as indicated by a so-called content obsession.

Faculty can also look at the impact of this model, activities, and their complexity on improving design thinking abilities, which are thought to improve students' learning outcomes.

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