Design Thinking in Management and Higher Education

This document is meant for faculty in higher education and management institutions who would like to incorporate Design Thinking into their teachings. We start by introducing the concept of Design Thinking. We then move on to explaining how this concept is useful in higher education and management studies and provide some information on the techniques and tools that students can use in Design Thinking. Finally, we discuss some tips that teachers can use in the classroom.

Design Thinking (hereafter mentioned as DT) is a powerful tool that is used in classrooms globally today. Faculty in higher education institutions (hereafter mentioned as HEIs) need to equip students with problem-locating, problem-framing, and problem-solving skills. So far, colleges and universities across the world have woefully failed at ensuring that their graduates are armed with good problem-solving and reasoning skills – these skills are thought to be critical for higher education students since they help with solving real-world problems that are complex in nature. When students from HEIs start working, they need DT to design products and services, making it imperative for HEI faculty to incorporate and apply DT in their courses.

WHAT IS DESIGN THINKING?

DT has its roots back in the 1950s and 1960s. In the 1960s, people had begun applying scientific methods to understand design processes, and attempts were being made to make design 'scientific' in the use of problem-solving. Horst Rittel[1] advocated the use of design in solving complex and multi-dimensional problems, which were also referred to as *wicked problems*.

In the 1970s, Nobel Prize laureate Herbert A. Simon became the first scientist to have looked at design through the lens of thinking. This concept found a mention in his book, *The Sciences of the Artificial*. He had spoken about prototyping and testing, which form principles of design thinking today.

In the 1980s, Nigel Cross, in his 1982 paper titled "Designerly Ways of Knowing", compared designers' problem-solving processes to the non-design-related solutions we develop to problems in our everyday lives.'[2] In the same decade, Bryan Lawson, Emeritus Professor at the School of Architecture, University of Sheffield, UK, found through experiments that when problem-solving, scientists were more problem-focused, while designers were more solution-focused. In 1987, DT was being compared to architecture.

Since the 1990s, DT has gained momentum in universities, B-schools, and across industries. DT is constantly being explored to solve real-world, wicked problems, and bring about significant societal changes.

Here's a simple DT Process Timeline:
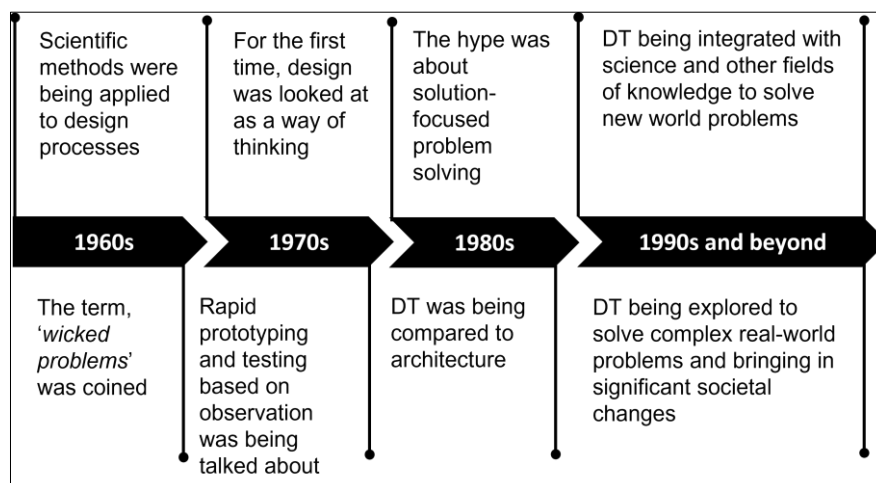
**Source:** Compiled from data available on Interaction Design Foundation

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[1] Horst Wilhelm Johannes Rittel was a design theorist and university professor. He is best known for popularizing the concept of wicked problem, but his influence on design theory and practice was much wider.
[2] https://www.interaction-design.org/literature/article/design-thinking-get-a-quick-overview-of-the-history

DT progressed through several fields of specialization since the 1960s. It is a non-linear and iterative process conducted in five stages usually, which include understanding the requirements of the humans/users involved; stating those needs and problems; brainstorming to find feasible solutions to those problems; working on solutions by way of prototyping; and finally, testing those prototypes. In a nutshell, DT is a human-centered design that considers factors like what is desirable, sustainable, technologically feasible, and equitable when solving complex, undefined, or ill-defined problems.

Going further, we will discuss how the stages work in higher education.[3]

Researching
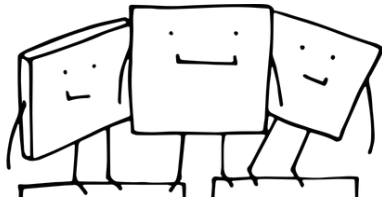
Today HEIs, mainly the business schools (hereafter mentioned as B-schools) are striving to make students understand the importance of researching users' needs if they have to come up with a business solution to their problems. This research part helps students step into the shoes of customers/consumers, empathize with them, and understand their needs. The initial data can help startups or businesses design a product or service as a solution.

A small number (about 20) of qualitative interviews are usually sufficient to develop an initial set of hypotheses on what interventions may be required. A larger sample is usually not required as new information from additional interviews will reach saturation. Other ways of helping with research are through literature reviews and consultations with industry leaders. The educator can use project-based learning and center the curricular activities around guiding students with important questions that would help them in their research and inquiry on the human needs, while throwing light on the necessary deliverables.
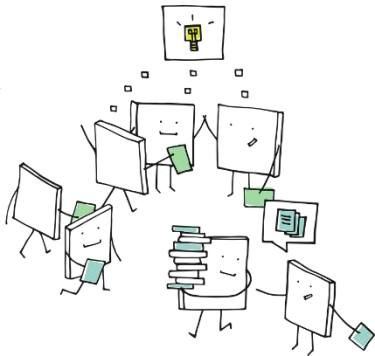
Problem-framing
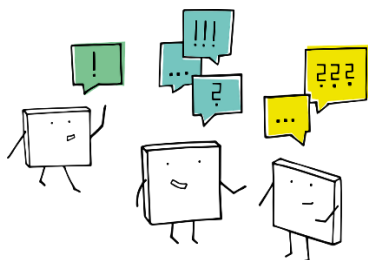
B-school faculty may use case studies to help students learn from the experience of the protagonists/business owners on those teaching cases. Similarly, HEI faculty can pull experience from previous projects. This experience will be helpful in opening up new research areas and frame problems once students are done with their research. After analyzing the data collected from the surveys and polls, students can get into discussion groups and define a problem scope in preparation for ideating.

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[3] https://www.celt.iastate.edu/instructional-strategies/teaching-strategies/design-thinking/#:~:text=Design%20Thinking%20is%20part%20of,innovative%20solutions%20to%20vexing%20problems

Ideating

Brainstorming and ideating on finding solutions to problems or addressing user needs is a stage that is crucial in business studies. B-school students are required to consider the present and future conditions specific to the product and come up with solutions. Group discussions and presentations facilitated by the faculty maybe a chosen approach for students to get creative and think about potential solutions.

Faculty at HEIs and B-schools may encourage collaborative participation through active learning and image-oriented methods like visualization to help students document all the brainstorming that they do. Educators can facilitate the discussion by focusing on the expectations and guiding the proposals from students. They can offer feedback while encouraging students to probe further – for instance, an educator could say, 'Your proposed solution does not have the potential to make this sector go net-zero by 2030, but the solution can help reduce carbon footprint by 40-50% by 2030.' At this stage, educators will also need to align activities with the course objectives and be prepared for iterations. Educators can help students narrow the range of potential solutions in preparation to start working on the prototyping.
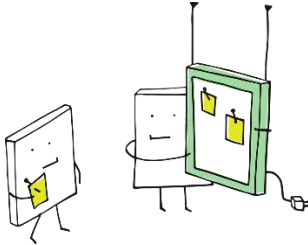
Prototyping
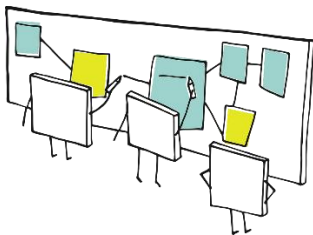
Once the problems are framed, it is time to test the parameters of the problems. This is the experimentation stage; students need to consider the failures that come up in the testing process, which makes for deep learning opportunities. Solutions must meet the objectives – with this thought in mind, students must keep testing the potential solutions.

Educators can help the class understand how practical conditions like pandemic, code requirements, etc. have a direct influence on the evaluation process. They can also help students see how economic, social, governance, and cultural conditions can impact the solutions that they are coming up with.

Students must be made aware that redesigning of the prototype is normal as that means there is scope for improvement. When solutions offered by students are accepted or rejected and/or calls for improvement, students have a better understanding of customer behavior and they begin to think like

the people for whom the solution is being developed. This gets them aligned to the objective and come up with better, revised prototypes.

Testing

At this stage of DT, the practical application of alternative problem solutions is tested. The prototype is deployed to see if it works in solving a real-world issue. On successful application of the solution, students might be encouraged to build a narrative around its development and present it.

A predetermined group of stakeholders/users can be engaged to gain reviews and feedback on the introduction of the solution in the pilot phase. The feedback would help faculty and students identify the hurdles in the path to implement and integrate the solution.

The DT Model
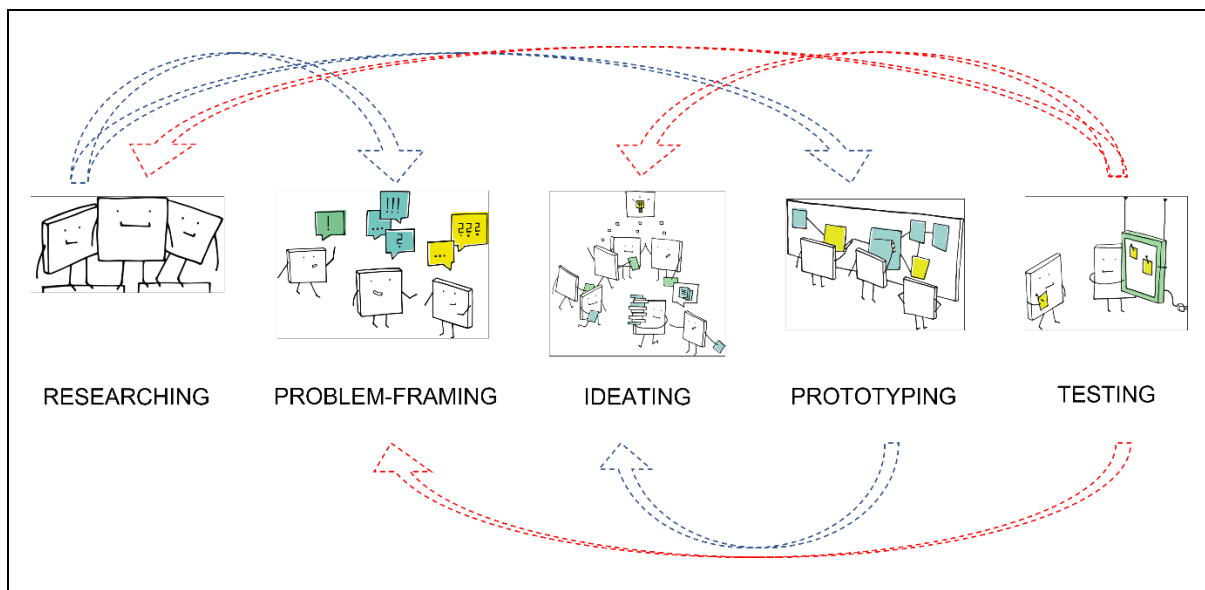
Source: Interaction Design Foundation

As stated earlier, the model of DT is non-linear and iterative. This implies that each stage maybe involved more than once in the process and in a non-linear manner.

For example, with the research being complete on understanding user needs, B-school students will move on to the problem-framing part as depicted in the diagram above. However, more researching would be involved around customer needs, when building a prototype/solution. While building a prototype, it would also require more ideating.

Besides, if the testing fails, the students will be asked to work on reframing the problems to get the right problem-solution fit. Similarly, brainstorming and ideating will also be repeated if the testing

reviews are not good. Failure at the testing stage will also involve more researching (see the diagram above, arrows marked in red).

Techniques Used in Design Thinking

There are several techniques in DT that can be explored by HEIs to locate opportunities for innovation and growth and work toward them. The techniques include:

1. **Visualization:** This technique is all about creating images in the mind. Students may be pushed to think about solving a real-world problem without speaking a word, and draw a solution based on the objectives.

2. **Mind mapping**: This technique allows students in HEIs to link several ideas to each other and map those ideas to a central idea or objective in the quest to problem solving. This technique helps students visualize and structure their ideas, which is the benchmark of key DT process.

3. **Experience mapping**: Experience or journey mapping helps students trace a customer's journey when they contact an organization in the hopes of receiving a service or product. This mapping is focused on the emotional ebbs and flows; based on this input, students can identify the real needs of customers even when the latter fails to express their needs clearly.

4. **Storytelling**: Students should be capable of linking their ideas, not as points, but as a story. This makes the ideas appear compelling and real.

5. **Customer co-creation**: Customer co-creation techniques allow students to explore how customers should be engaged when building business ideas that are mutually beneficial and profitable. These techniques can reduce risks in the path to innovation and growth.

6. **Rapid prototyping**: This technique helps students create hypotheses about potential business opportunities. They use their learning from the brainstorming sessions and quickly emerge with the design of a working model of a product, which maybe a visual, a model, or a ready-to-test product.

7. **Value chain analysis**: Analyzing the value chain throws light on how businesses and organizations should behave and interact with their value chain partners to build products, market their services, and distribute any new offers.

8. **Assumptions testing**: This testing can be done once the risk information is collected. Assumptions of problems are evaluated to understand if they are accurate. The focus should be on collecting feedback from users to improve the product/service through a series of trial and errors gradually.

Tools that can aid Design Thinking

There are some tools that students can use when designing solutions for stakeholders. The educator can introduce students to such apps and tools that can help them in each stage of DT. The Researching or Empathizing stage requires data collection, and the tools should help students collect raw information and structure that information.

The Problem-framing stage of DT would require apps that filter out the real problems. The tool should be able to assist students with attaching problems and needs to different sets of users and then summarizing those problems to define one problem statement.

In the Ideating stage, it is expected that the app assists with finding the possible solutions to an identified problem. The tool should also help with organizing ideas and prioritizing.

The Prototyping stage demands tools that can help present the solution designed. Apps that help with storyboarding or transforming sketches into animations would be helpful.

The Testing stage requires user testing apps. Students can use these to understand how users will interact with the solution designed.

A few of those tools and their uses have been presented in a tabulated format below.[4]

DT Stages	Tools/Apps	Functions
Researching/Empathizing	Zoom	Tool for video conferencing. Students can interview their intended users to understand their needs.
	Typeform	Survey-making tool. Students can use it to create a survey form that intended users can fill. The data collected would help students understand the users' needs.
	Batterii	Information organizing and visual database tool. It can be used to structure the information gathered. Students may also use the app's templates for empathy mapping and stakeholder analysis.
Problem-framing	Smaply	Tool to manage customer experience. Students can use it to crate and present customer journey maps and stakeholder maps. The persona editor can help define users in DT.
	Make My Persona-HubSpot	This tool can help structure user information. It can help students build their users by answering 19 questions on the app.
Ideating	Ideaflip	App for sharing sticky note boards. Students can use it for brainstorming.
	Stormboard	A whiteboard and sticky note app. Students can use it to

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[4] [20 Useful Online Tools for Design Thinking | SessionLab](#)

		collaborate, rate and evaluate the ideas generated.
Prototyping	Boords	Film making app. It can help students create storyboards with pictures, voiceover, action text, etc. Its animation tool helps turn the storyboard frames to animation with sound.
	Mockingbird	Wireframe creating tool. Students can use it for prototyping, linking multiple mock-ups, resizing smart text, and collaboration.
Testing	UserTesting.com	User testing app. Students can use this to test an app they have designed as a solution; they can pick the users/testers and understand how they navigate and every move they make while on the app being tested.
	Hotjar	Feedback tool. It can help students with data collection on funnel conversions. Feedback from users and polls may be collected to understand the problems in the app designed by students.
	PingPong	Platform for user research. Database of thousands of testers across the world. Interviews may be scheduled with testers who are automatically chosen by the platform (based on suitability).

Another software tool that can be useful in all stages of DT is Sprintbase. It guides users on innovating better through its templates and tutorials.

Why must DT be a part of higher education today?

According to the World Economic Forum,[5] by 2025, students, businesses, and managers should have the following top 15 skills. These skills are analytical thinking and innovation; active learning; complex problem solving; critical thinking and analysis; creativity, originality, and initiative; leadership and social influence; technology use, monitoring, and control; technology design and programming; resilience, stress tolerance, and flexibility; reasoning, problem-solving, and ideation; emotional intelligence; troubleshooting and user experience; service orientation; systems analysis and

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[5] What is Design Thinking in Education? - Designing Schools

orientation; and persuasion and negotiation. The human-centered framework of DT, if used in HEIs, B-schools, and practised by businesses, can equip students and managers with all the skills mentioned.

HEIs today should not be focused only on solving a work-related problem or a technology problem – the focus should mainly be on solving human challenges utilizing advanced technology. The conventional methods of teaching and learning should go through this change if educators want students to be able to take a complex problem and simplify it, while coming up with a technology-driven solution to problems.

According to Ganesh Prabhu, Professor and Chairperson of Strategy area at the Indian Institute of Management Bangalore, the gamut of higher education requires higher order abilities to ask good questions, interpret unfamiliar texts, create new texts, build new arguments, do more complex assessments, develop original solutions, learn complex techniques, and make judgment calls. These attributes are also useful in work life. He also believes that a course must be designed in a way that students would find useful; what students learn in the classroom, they should be able to apply in the work context. Faculty should be in charge of controlling the design of the course to encourage a fulfilling experience in the classroom.

In his talk on Design Thinking in Higher Education,[6] Prof. Prabhu says:

> DT needs flexibility and openness to all possible ideas and suggestions from students and stakeholders to improve on the prototype solutions that they are shown for comments. DT-driven experimentation and multiple prototype cycles eventually result in effective new design solutions that can never be planned by the students or the educators initially. Educators must have final control on standards to be met, not students and not employers who may be limited in their own point of view.

In a fast-paced world, it is also not possible to be familiar with future work or have any understanding of the technology and jobs that will be there in a decade. In such a world, educators can only give their students the gift of creative problem-solving. Educators, mainly in B-schools, can facilitate this further by creating environments in which students get to practise DT techniques that would help them succeed as managers and businessmen in future.

The following section provides tips on how educators can create such an environment in the classroom.

Facilitating DT in Groups - Tips for Educators[7]

Educators can divide the classroom in five groups/teams based on the five stages of DT, creating a roadmap for collaboration and creative thinking in the process. This way the teams can work together and formulate solutions ensuring that the stakeholder's or the intended user's need is prioritized.

The **Researching** team can probe deeper into the needs of the intended users and empathize with their needs. They could build an empathy map for doing so; it allows them to better understand the challenges and requirements of the stakeholders involved. This in turn enables the second group – the Problem-framing team to work better with the user's needs details.

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[6] https://www.youtube.com/watch?v=iag8gD-4CEA
[7] 7 tips for better virtual group work with design thinking - P-TECH.org (ptech.org)

Based on the inputs received from the Research team, the **Problem-framing** team puts everything together in a list or in a deck and defines the problem.

Once the problem is identified, the **Ideating** team should start work on finding the right problem-solution fit. Individual team members can come up with ideas that might solve the problems of the intended users and they can start putting them down together. They can then narrow their ideas down and as a team discuss the selected ones with the class. They would also explain how that could help solve the identified problem. This could be done through a presentation.

The **Prototyping** team could now begin building their solution. They can come up with a working model or design a solution or just present some slides that tell what the solution is and how it will help solve the problem and share it with the class. The other teams can start questioning at this point if they think there are areas that needed improvement or would not work as claimed, and the Prototyping team would be responding to them.

The **Testing** team would play the role of stakeholders/intended users in the classroom and would finally test the solution designed. Based on the feedback that this group provides, the other teams might have to repeat and fine-tune the work that was previously done so that it can meet the needs of the stakeholders.

Once the above exercise is completed and the desired results are achieved, the educators can assess the experience based on the students' learning. For this a rubric maybe used. Sample rubric has been provided below:

Rubric Criteria	1 – Not yet meeting expectations	2 – Approaching expectations	3 – Meeting Expectations	4 - Exceeding Expectations
Quality of solutions generated				
Individual adaptation and flexibility				
Relationships and Trust in Team				
Innovation				
Implementation support				

Source: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0265902

Future of DT in HEIs

Higher education has always been more content-focused where a curriculum is followed with students preparing for an exam, writing their papers, and forgetting most of the concepts they learned. In DT, when students design solutions, they work from the knowledge they gained through past and present experiences. They also have an ownership of the work they do, since it's their idea, their prototype, and their problem-solution fit. DT is also about the relationship;[8] being able to arrive at a consensus working in a team and being able to empathize with the intended users. All of these help students learn and remember their learning better.

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[8] https://www.youtube.com/watch?v=aNhPS1DLc94

Today's HEIs need to change to survive. They must be able to support innovations and there is a greater need to make students capable of thinking creatively and innovating. DT is a great tool here. However, there are critics who think that DT is an 'odd-fit' for higher education.[9] DT has been accused of being popular only in management studies and B-schools and that it's used to further 'corporatize higher education'.

Peter D. Eckel[10] and Adrianna Kezar[11] also argue in their paper[12] that 'unmodified business innovation strategies may be harmful to higher education institutions and note that failure to adjust business-oriented practices for higher education can contribute to organizational dysfunction.' Their argument suggests that DT needs to be worked on to be effective in the higher education innovative strategy.

However, it cannot be denied that DT is a flexible tool and powerful method to help HEIs encourage their students to think innovatively about fresh solutions to the world's increasing complex or wicked problems.

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[9] Design thinking for higher education innovation | by Jeff Freels | UX Collective (uxdesign.cc)
[10] Senior Fellow, Policy, Organizations, Leadership, and Systems Division | Director of Leadership Programs, Penn AHEAD | Co-Director, Penn Project on University Governance
[11] Dean's Professor of Leadership, Wilbur-Kieffer Professor of Higher Education and Director of the Pullias Center for Higher Education at the University of Southern California
[12] Kezar, A., & Eckel, P. (2002). The effect of institutional culture on change strategies in higher education: Universal principles or culturally responsive concepts? The Journal of Higher Education, 73(4), 435-460.