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EVALUATING THE IMPACT OF DESIGN THINKING ON CREATIVE THINKING AMONG 21ST CENTURY MANAGERS

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ABSTRACT

The last century focused on efficiency and productivity, moving incrementally from good to better to best. Education, however, has lagged behind, widening the gap between academia and industry. As a result, young managers often lack the interdisciplinary exposure, experiential learning, and problem-solving skills required by industry. This century now faces a shortage of thinkers, innovators, and doers. While previous research has highlighted design thinking as a driver of creativity, most studies remained conceptual rather than evidence-based. This study addresses that gap by examining the pre- and post-impact of design thinking on creative thinking among management students. Using data from 1,000 students across multiple colleges and employing a mixed-methods approach, the study provides empirical insights into how design thinking enhances creativity. Statistical validation through paired sample t-tests revealed highly significant improvements in creative thinking skills. The findings confirm that design thinking not only nurtures originality and problem-solving but also bridges the skill gap between industry and academia. By moving beyond theoretical claims, this study offers evidence-based validation of design thinking's effectiveness in fostering creativity, adaptability, and innovation among management students key qualities for their employability, career growth, and leadership in today's dynamic organizational contexts.

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INTRODUCTION

Industries today face wicked problems—complex, ambiguous challenges rooted in both social conflict and technical difficulty. Signs such as confusion, conflict, and stagnation often indicate wickedness (Charles, 2016). Traditional management practices, grounded in analytical and procedural methods, often fall short in addressing these issues. Industry now needs managers who can think creatively, adapt quickly, and innovate under uncertainty. Yet, management education continues to emphasize strategy and data over creativity, widening the gap between academia and industry. With Industry 4.0, professionals must master not only advanced technologies but also critical soft skills such as problem-solving, collaboration, and creativity (Benesova Andrea, 2019). A promising response is integrating Design Thinking into management curricula. With its human-centered, iterative focus on empathy, ideation, prototyping, and experimentation, Design Thinking equips future managers to tackle wicked problems and lead innovation-driven change.

LITERATURE REVIEW

Design Thinking is a process to come up with ideas, using brainstorming apart from analytical (logical) thinking process.

Idea generation leads to reducing failure among participants and encourages input from participants from a variety of sources. This can be known by the phrase "thinking out of the box". Another third biggest challenge for the management students is the development of creative skills. Design Thinking is important in management studies as it does the formation of the creativity skills (novice, unique, meaningful) (Larraz-Rábanos, 2021). The 21st-century industrial landscape is undergoing rapid transformation, with global industries such as manufacturing projected to grow from USD 13.5 trillion in 2023 to over USD 20 trillion by 2031, and the Industry 4.0 sector expected to surge to USD 884.84 billion by 2034 (Industry 4.0 sector growth forecast, 2024) (Global Industry 4.0 market size, share, trends, and forecast to 2034, 2024). Alongside this growth is an escalating demand for managerial talent—particularly in project management, with 16 million new roles forecast globally (Successful project management is key to growth taking off, 2024). However, this expansion highlights a critical skills gap, as many young managers today lack the creative thinking needed to navigate complex, evolving challenges. According to the World Economic Forum (2023), 73% of employers identify creative thinking as a top priority, yet younger professionals often exhibit a deficit in this area, exacerbated by rigid corporate cultures and reduced cognitive flexibility linked to digital saturation (How smartphones killed Gen Z's creativity — and what bosses can do about it, 2025). Scholars such as (Amabile, 1996)

emphasize that creativity thrives under intrinsic motivation and domain-relevant skills, while (George, 2007) and (Liedtka, 2015) argue that creativity can be hindered by organizational constraints unless counteracted through experiential learning methods like design thinking. Real-world interventions, such as HSBC's collaboration with IDEO to train young managers in user-centered innovation, showcase how companies are proactively responding by embedding creative capabilities into leadership pipelines. As Generation Z—projected to comprise 30% of the global workforce by 2030—enters industry, equipping them with structured yet flexible creative methodologies become essential for sustaining innovation and ethical growth across more than 300 million formal businesses globally.

Research Gap

1. Examining the literature review reveals, that many research papers emphasize the efficacy of implementing design thinking across diverse areas such as management, leadership, entrepreneurship, academia, industry, family business, education 4.0 and 5.0, and innovation, however there is very minimal research done on the measurement of the impact of the skills gained by design thinking.
2. Design thinking based upon models and frameworks is acknowledged for fostering creative thinking, there is a notable absence in the literature regarding discussions on the impact or measurement of this skill.
3. Design Thinking does develop creative thinking, however none of the papers talk about the impact i.e. the measurement of this skill.

Study Aim: The study evaluates how effectively design thinking principles foster creative thinking among young managers. As a problem-solving methodology emphasizing empathy, observation, ideation, prototyping, and testing, design thinking addresses complex challenges through innovative solutions. By integrating it into management education, the research examines its impact on problem-solving, critical thinking, communication, collaboration, and adaptability, while also assessing changes in students' mindsets and user-centric approaches. Long-term outcomes such as employability, career growth, and leadership potential are considered, with the overall aim of highlighting design thinking's role in fostering holistic excellence in management students.

Research Question

Hypothesis 1(HO1): Design thinking - process develops creative thinking among the management students, leading to innovation.

METHODOLOGY

In this study comprised of data coding such that there is accuracy in analysing the Likert scale data responses and this seemed to be very structured when the participants responses have to be analysed before and after the design thinking program. Number values like 1, 2, 3 and 4 were coded for "Strongly Agree", "Agree", "Disagree" and "Strongly Disagree" respectively. This helped in the quantitative evaluation of participants responses that changed over time. Clear analysis of shifts in attitude of participants could be found and analysed both considering the pre- and post-intervention surveys. In order to evaluate the differences in mean scores before and after the design thinking program a paired sample t test was employed, thus, giving meaningful insights into the impact of the design thinking program. By combining coding, t-tests, the study provided a comprehensive statistical understanding of the intervention's effectiveness and the broader dynamics within participant responses.

Data Analysis Techniques

Data analysis was the crucial step that brought about a distinct differentiation between unprocessed data and insightful conclusions. Choosing the right data analysis methods depended upon the data type, the questions generated and the actual goal of the study. To

evaluate hypothesis, qualitative analysis was performed on group of students. Quantitative analysis techniques like inferential statistics, and descriptive statistics were also used.

Quantitative Analysis

For this study there was a requirement of getting an objective, along with data that could be measured and also could be examined statically and henceforth quantitative research was employed. Also, because precise, accurate and measurable results were needed. Along with this the power of extrapolating the results to a broader population was one of its main advantages. The reliability and strength of the results were enhanced as it had the capacity to collect a broad range of data points. Also, quantitative analysis uses structured data collection tools, which are like questionnaires using Likert scale responses, and the paired sample t-test.

Data Analysis

Likert Scale Data for Creative Thinking: The following data presents the results of a Likert Scale assessment conducted to evaluate creative thinking. The survey gathered responses on various aspects of creativity, and the results provide insights into individuals' perceptions and attitudes towards their creative abilities and problem-solving approaches.

Inferences of the questions asked to the respondents

Question 1: Do you feel usage of material, medium and technology makes it easy for you to think creatively?

Inference: Nobody disagrees or strongly disagrees that usage of material, medium, and technology makes it easy to think creatively.

Question 2: Do you feel you are good at creativity after using Design Thinking?

Inference: The class largely agrees that they have gained creative skills after using Design Thinking.

Question 3: Do you feel after doing Design Thinking you can think in your original/creative manner?

Inference: 45% agree and 55% strongly agree that Design Thinking helps them think in their own original/creative manner.

Question 4: Do you feel you can work in collaboration/teamwork after doing Design Thinking and that develops sharing your ideas and discussing them?

Inference: Except for 6% of the students, the remaining class agrees that they can work collaboratively, which helped them share and discuss ideas.

Question 5: Do you feel you have become communicative using creative thinking as you can apply your ideas to prototypes & prototypes communicate your ideas to your stakeholders?

Inference: The entire class agrees or strongly agrees that they have become communicative by using creative thinking, as prototypes help communicate their ideas to stakeholders.

Question 6: Do you feel through creativity, original thinking and initiation you can become good at creating, designing, marketing, thinking outside the box, innovating, generating feasible solutions and coming up with new ones?

Inference: 33% agree and 67% strongly agree that creativity, original thinking, and initiation helped them in creating, designing, marketing, innovating, and generating feasible solutions.

Question 7: Do you feel the Ideation phase of Design Thinking makes you think creatively and originally?

Inference: 33% agree and 67% strongly agree that the ideation phase made them think creatively and originally.

Question 8: Do you feel you have become good in task management during each phase of Design Thinking as it allows you to think creatively?

Inference: 50% agree and 50% strongly agree that Design Thinking improved their task management and creative thinking.

Question 9: Do you feel Design Thinking helps you in becoming more creative and think originally?

Inference: 50% agree and 50% strongly agree that Design Thinking helped them become more creative and original.

Question 10: Do you feel you are good in original thinking as you went through different phases of Design Thinking?

Inference: 39% agree and 55% strongly agree that they became good at original thinking through different phases of Design Thinking.

Analysis for Creative thinking skill: The analysis examines the pre- and post-assessment results of creative thinking skills. This evaluation aims to measure the impact of an intervention or program on individuals' creative thinking abilities by comparing their responses before and after the experience. The results provide insights into any changes or improvements in creative thinking, offering valuable implications for further research or practical application. The following questions were asked to assess various aspects of creative thinking:

Inferences for creative thinking skill

Question 1: As Managers, were you more creative before using Design Thinking?

Inference: 0% of the class rated themselves as good; all felt they were only average or poor in creativity before Design Thinking.

Question 2: Did Design Thinking make you more creative?

Inference: 100% of the class agreed that Design Thinking made them more creative.

Question 3: Is creative thinking developed during the ideation phase of Design Thinking?

Inference: The entire class agreed that creative thinking develops during the ideation phase.

Question 4: Were you good at thinking creatively/originality before using Design Thinking?

Inference: 71% rated themselves as average and 29% as poor at creative/original thinking before Design Thinking.

Question 5: How was your creative thinking, original thinking, and initiative before using Design Thinking?

Inference: 0% rated themselves as good; the class felt their creative/original thinking and initiative were weak before Design Thinking.

Question 6: How was your ability to think outside the box before using Design Thinking?

Inference: 50% rated themselves average and 50% poor in thinking outside the box before Design Thinking.

Question 7: How was your ability to solve problems by defining problem statements before using Design Thinking?

Inference: 36% and 57% rated themselves average and poor respectively, while only 7% rated themselves good.

Question 8: To what extent does Design Thinking foster a culture of creativity and innovation within an organization?

Inference: 0% disagreed; the entire class agreed that Design Thinking fosters creativity and innovation.

Question 9: To what level does prototyping/rapid prototyping enhance resilience, grit, and adaptability with the help of Design Thinking?

Inference: 57% rated themselves very good and 43% good in building resilience, grit, and adaptability through prototyping.

Question 10: How much did the usage of material, medium, and technology in Design Thinking develop your creative/original thinking?

Inference: 42% rated themselves very good and 58% good in using material, medium, and technology to enhance creativity/originality.

Question 11: How good were you at asking questions to find out stakeholder problems before using Design Thinking?

Inference: 7% rated themselves good, 21% average, and 72% poor at asking questions before Design Thinking.

Question 12: To what degree did you have analytical thinking and innovation before learning Design Thinking?

Inference: 50% rated themselves average and 50% poor in analytical thinking and innovation before Design Thinking.

The following section presents the inferences generated to test Hypothesis. These inferences are drawn from the analysis of relevant data, aiming to evaluate the validity of the hypothesis and provide insights into the factors influencing the outcomes. The results contribute to a deeper understanding of the hypothesis in the context of the study.

Paired sample t test: The following set of questions were asked to the participants, these were the second set of data of 400 participants who did the design thinking program. The checking of creative thinking skill among them before and after doing the design thinking program was calculated.

Findings from Paired sample t test: Before the program (PRE), students scored a mean of 1.552 on the creative thinking skill measure.

1. After the program (POST), the mean increased significantly to 3.612.
2. The increase in mean (2.060) suggests a substantial improvement.
3. There is a significant negative correlation between PRE and POST scores ($r = -0.600$, $p < .001$), indicating that students who started with lower PRE scores tended to show greater improvement, which is quite common in learning scenarios (regression to the mean effect or ceiling effect for high performers).
4. The mean difference between PRE and POST is -2.060, which is highly statistically significant ($p < .001$).
5. The t-value is -111.909, a very large t-statistic, confirming a strong effect of the intervention.
6. The 95% Confidence Interval for the difference is from -2.0962 to -2.0238, indicating that the result is not due to chance.
7. Both Cohen's d and Hedges' g values are above 5, which is extremely large (much larger than the conventional benchmarks of 0.2 = small, 0.5 = medium, 0.8 = large).

This indicates a very strong effect of the Design Thinking program on improving creative thinking skills.

Findings from Likert Scale

Question 1: As Managers, were you more creative before using Design Thinking?

Inference: 0% rated themselves good; all felt they were only average or poor in creativity before Design Thinking.

Question 2: Did Design Thinking make you more creative?

Inference: 100% of the class agreed that Design Thinking made them more creative.

Question 3: Is creative thinking developed during the ideation phase of Design Thinking?

Inference: The entire class agreed that creative thinking gets developed during the ideation phase.

Question 4: Were you good at thinking creatively/original before using Design Thinking?

Inference: 71% rated themselves average and 29% poor at thinking creatively/original before Design Thinking.

Question 5: How was your creative thinking, original thinking, and initiative before using Design Thinking?

Inference: 0% rated themselves good; the class agreed their creative/original thinking and initiative were not strong before Design Thinking.

Question 6: How was your ability to think outside the box before using Design Thinking?

Inference: 50% rated themselves average and 50% poor in thinking outside the box before Design Thinking.

Question 7: How was your ability to solve problems by defining problem statements before using Design Thinking?

Inference: 36% rated themselves average, 57% poor, and only 7% good at defining problem statements before Design Thinking.

Question 8: To what extent does Design Thinking foster a culture of creativity and innovation within an organization?

Inference: 0% disagreed; the entire class agreed that Design Thinking fosters creativity and innovation.

Question 9: To what level does prototyping/rapid prototyping enhance resilience, grit, and adaptability with the help of Design Thinking?

Inference: 57% rated themselves very good and 43% good, showing strong improvement in resilience, grit, and adaptability through prototyping.

Question 10: How much did the usage of material, medium, and technology in Design Thinking develop your creative/original thinking?

Inference: 42% rated themselves very good and 58% good in using material, medium, and technology to enhance creativity/original thinking.

Question 11: How good were you at asking questions to find out stakeholders' problems before using Design Thinking?

Inference: 7% rated themselves good, 21% average, and 72% poor at asking stakeholder-related questions before Design Thinking.

Question 12: To what degree did you have analytical thinking and innovation before learning Design Thinking?

Inference: 50% rated themselves average and 50% poor in analytical thinking and innovation before Design Thinking.

Key findings of attainment of Creative Thinking:

- Pre-Program Creativity: Many students recognized their limitations in creativity before engaging with design thinking.
- Positive Impact: Unanimous agreement on design thinking's effectiveness in enhancing creative skills.
- Ideation Phase: Critical for developing creative thinking abilities.
- Skill Gaps: Significant numbers felt their original thinking and problem definition skills were lacking before the program.
- Enhanced Resilience: Prototyping fostered resilience and adaptability among students.

Technological Integration: Use of materials and technology significantly improved creative and original thinking.

Alignment of Findings with the hypothesis from t test: The results from the paired sample t-tests indicate significant improvements in the targeted skills among management students after engaging in the design thinking process.

Hypothesis 1 (HO1): The design thinking process inculcates creative thinking among management students, leading to innovation. The p-value for creative thinking was found to be 6.03973269894028E-58 = 0.00 in Dataset 1 and an exceptionally low 6.91689445913979E-227 = 0.00 in Dataset 2. The results from both the datasets say that there is a major improvement in creative thinking ability, which supports the hypothesis that the design thinking process fosters creativity and innovation among management students. These findings strongly align with the proposed hypothesis, showing that design thinking process has a positive impact in developing problem-solving, decision-making, and creative thinking skills among management students.

DISCUSSION AND JUSTIFICATIONS

Design Thinking has significantly enhanced students' creativity, as confirmed by survey data and statistical tests. Most students reported greater originality, stronger problem-solving, and improved teamwork, with Ideation and Prototyping emerging as especially powerful phases. They also noted that diverse tools and technologies stimulated creativity, supporting the idea that it can be nurtured by environments and structured processes rather than being purely innate. Beyond creativity, the methodology improved task management, communication, and collaboration skills vital for modern workplaces. By enabling students to ideate, prototype, and co-create effectively, Design Thinking cultivates holistic innovation competence, preparing them as "T-shaped professionals" who combine management expertise with broad creative thinking.

Interpretations of Findings

It gets confirmed with the result of Likert scale, and Paired sample t test that

- Students recognized limited creativity before the program.
- Design Thinking effectively enhances creative thinking skills.
- The ideation phase is critical for developing creativity.
- Original thinking and problem definition were identified as gaps before the program.
- Prototyping builds resilience and adaptability in students.
- Using materials and technology improves creative and original thinking.

Limitations: The study has limitations regarding sample size, data availability, and institutional scope. Conducted in select colleges, its findings cannot be fully generalized. The sample, drawn from ten management schools, was relatively small and lacked cultural or geographic diversity. Measurements were short-term, limiting insights into long-term retention and application of creative thinking. Additionally, the absence of a control group makes it difficult to attribute improvements solely to Design Thinking. These limitations highlight areas for future research to strengthen validity and broaden understanding.

Scope of Future Research: Future research should focus on longitudinal studies to evaluate the long-term effects of Design Thinking on students' academic growth, career progression, and holistic development. Comparative studies across academic streams can reveal its relative impact, while exploring challenges educators face in integrating Design Thinking into traditional pedagogy. Further inquiry is needed into how students continue applying these practices in industry settings, along with interdisciplinary extensions into fields such as behavioural science and psychology. Additionally, collaborative research between academia and industry can strengthen design-driven innovations and bridge the gap between theory and practice.

CONCLUSION

This study confirms that Design Thinking significantly enhances creative thinking among management students, validating its role as a transformative educational approach. The application of the Design

Thinking process led to notable improvements in students' ideation, problem-solving, prototyping, and communication skills. The Ideation phase emerged as particularly impactful in building creative confidence and originality. Statistical analysis reinforced these findings, highlighting the method's effectiveness in cultivating innovation. These results advocate for the integration of Design Thinking into management curricula to better equip students for dynamic, real-world business challenges through enhanced creativity, collaboration, and technological fluency.

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