International Journal on Science and Technology (IJSAT)
E-ISSN: 2229-7677 ● Website: www.ijsat.org ● Email: editor@ijsat.org

Implementation of Design Thinking in schools: Empowering Students to Solve Real-World Problems

Pooja Satnur[1], Nithin A[2], P Sushmitha Nayak[3], Pabolu Venkata Sai Rupak[4], Rohan S[5], Sukhendu Maity[6], Dr. M H Sharieff[7]

[1,2,3,4,5,6] MBA Students (2024-26), Faculty of Management Studies, CMS Business School, JAIN (Deemed-to-be University), Bengaluru
[7] Professor, Faculty of Management Studies, CMS Business School, JAIN (Deemed-to-be University) , Bengaluru

1.Abstract:

With the world requiring innovation, problem-solving, and creativity, the traditional school system has fallen short of equipping learners with the necessary tools to manage real-life challenges. This essay explores how Design Thinking is used in schools as a transformative approach that boosts students' critical thinking, collaboration, and innovation. Design Thinking is a human-centered, iterative process that encourages students to thoroughly comprehend problems, develop innovative solutions, build prototypes, and test their ideas in real-world environments.

The research highlights the current awareness, implementation, and hindrances to implementing Design Thinking in educational curricula. From the assessment, a data-driven comparison is made which reads, despite the fact that students and educators do realize the use of the practice, its implementation remains limited due to resource constraints, failure to train teachers, and rigid curricula. Yet, the research indicates that effective integration through the help of systematic models, teacher education programs, and project-based learning models can effectively bridge the gap.

By incorporating Design Thinking into the conventional education system, institutions are able to yield a new generation of innovative problem solvers who are not just armed with classroom learnings but also poised to tackle real-world challenges with empathy and imagination. This paper proposes critical recommendations to policymakers, educators, and schools for integrating Design Thinking without interruption so that students build 21st-century skills in order to thrive in the years to come.

2. Review of Literature:

2.1) Introduction to Design Thinking in Education

Design Thinking is an imaginative, human-centric approach that promotes problem-solving, originality, and analytical thinking within educational settings (Brown, 2009). Originally developed within business and design environments, it has gained traction in educational institutions as a method to enhance student engagement and apply knowledge to real-world issues (Goldman et al., 2016).

2.2) Theoretical Foundations

The theoretical underpinnings of Design Thinking are rooted in constructivist learning theories, emphasizing experiential and inquiry-based learning (Piaget, 1952; Vygotsky, 1978). Papert's constructionism posits that students achieve deeper understanding by participating in the creation of constructive solutions rather than merely receiving information (Papert, 1980). Kolko (2015) and Razzouk and Shute (2012) further assert that Design Thinking also nurtures creative confidence, adaptability, and persistence in learners, making it an essential skill for the 21st century.

2.3) Advantages of Design Thinking in Schools

Research highlights several significant benefits of incorporating Design Thinking into school curricula:

• Problem-Solving Competence: Design Thinking provides a structured yet flexible problem-solving framework that enhances students' abilities to analyse and resolve problems (Carroll et al., 2010).

• Creativity and Innovation: By promoting interdisciplinary learning and open-ended exploration, Design Thinking nurtures creativity and innovation among students (Henriksen et al., 2017).

• Teamwork Learning: Design Thinking project activities cultivate teamwork, communication, and leadership skills (Koh et al., 2015).

• Student Motivation: Design Thinking has been employed to enhance motivation and encourage student engagement in the learning process (Scheer et al., 2012).

2.4) Implementation Challenges

Despite its benefits, several obstacles hinder the broader implementation of Design Thinking in educational settings:

• Inadequate Teacher Training: A majority of educators lack formal training in Design Thinking, making effective classroom application challenging (Luka, 2014).

• Conventional Curricula: Standardized assessments and traditional educational structures leave limited room for creativity and problem-oriented learning (Henriksen et al., 2017).

• Lack of Resources: Often, schools lack the necessary infrastructure, such as makerspaces, prototyping tools, and digital technology, to facilitate hands-on learning experiences (Wrigley and Straker, 2017).

Case Studies of Design Thinking Implementation in Schools

Several schools have successfully implemented Design Thinking, demonstrating its effectiveness:

• Stanford school's K-12 Initiative: Provides training for educators and curriculum development to incorporate Design Thinking in educational institutions (Doorley et al., 2018).

• Hasso Plattner Institute of Design Thinking (HPI): Focuses on equipping students with entrepreneurial problem-solving abilities through structured workshops (Meinel and Leifer, 2011).

• Singapore's Education System: The nation has effectively woven Design Thinking into STEM education, allowing students to engage in real-world projects that tackle societal issues (Koh et al., 2015).

3. Introduction:

3.1) Background

The modern education system is undergoing a major metamorphosis as schools work to equip students for the issues of the 21st century. Traditional teaching practices, which too often focus on rote memorization and multiple-choice testing, too often neglect the cultivation of valuable skills like critical thinking, creativity, problem-solving, and collaboration. In an era where technological progress occurs at an unprecedented rate and global challenges become increasingly intertwined, there is a pressing need for learning methodologies that equip students to think for themselves and enact their knowledge on real-world issues. One of the methodologies that has received increased attention over the past few years is Design Thinking—a human-centered, iterative design methodology that very much prioritizes empathy, ideation, prototyping, and testing.

First developed for use in design and business contexts, Design Thinking has become an influential teaching strategy that allows students to deeply explore problems, come up with creative solutions, and put their knowledge into practice. By incorporating the strategy into educational curricula, teachers can encourage an innovative mindset and flexibility of thinking, allowing students to become active learners and efficient problem solvers.

3.2) Significance of Design Thinking in Schools

Design Thinking surpasses traditional problem-solving methods through a focus on user needs, repeated learning, and practical implementation. When applied to schools, it turns classrooms into vibrant settings in which students are actively participating in collaborative learning exercises, testing, and reflection. Studies have shown that students who practice Design Thinking become more self-confident, resilient, and creative as they learn how to incorporate failure into the learning process as an essential step and continually refine their solutions. In addition, Design Thinking fosters interdisciplinary learning, allowing students to link ideas from one discipline to another like science, mathematics, humanities, and arts to come up with holistic solutions for practical problems. Either used in STEM education, social projects, or entrepreneurial ventures, this methodology prepares students with the flexibility needed to thrive in a fast-changing world.

3.3) Challenges in Implementing Design Thinking

While Design Thinking has many benefits, its implementation in schools is hindered by a number of challenges. Limited awareness, poor teacher training, inflexible curricula, and a lack of resources are some of the main obstacles to its widespread adoption. Most teachers are not aware of Design Thinking approaches and can find it difficult to implement them effectively in their teaching. Furthermore, conventional school structures tend to focus on systematic learning and standardized testing, with little room for experimental and student-led models of learning.

❖ **Keywords** – Design Thinking, Education Innovation, Problem-Solving Skills, Student-Cantered Learning

4. Objectives of the Study

1. To assess the level of awareness and understanding of Design Thinking among students and educators in Schools.
2. To examine the benefits and challenges associated with Implementing Design Thinking in school curricula.
3. To propose effective strategies for integrating Design Thinking into mainstream education to enhance student Problem-solving and creativity.

5. Research Methodology:

5.1) Research Design

The research adopts a mixed-methods study design with both quantitative and qualitative approaches for investigating the application of Design Thinking in education. It utilizes primary data collection by conducting surveys and secondary data analysis from the existing literature such as research articles, journals, and case studies. This allows the subject to be comprehensively addressed by blending first-hand information from teachers and students with the pre-existing scholarly understanding.

5.2) Data Collection Methods

• Primary Data Collection

The major data for this study were gathered using structured questionnaires and surveys administered to students, instructors, and school officials. The survey sought to measure the awareness and knowledge level of Design Thinking, the benefits and difficulties associated with incorporating Design Thinking into school programs, as well as the prevalence of its implementation in schools and its influence on student learning outcomes. The survey included a combination of closed-ended and open-ended questions to obtain both quantitative statistical information and qualitative opinions from the participants.

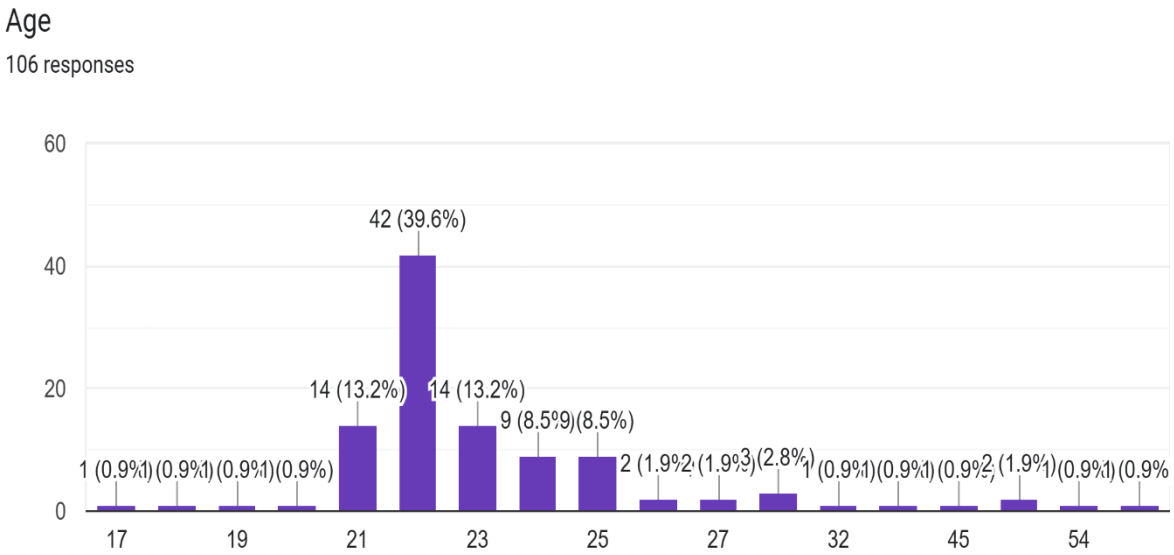
• Secondary Data Collection

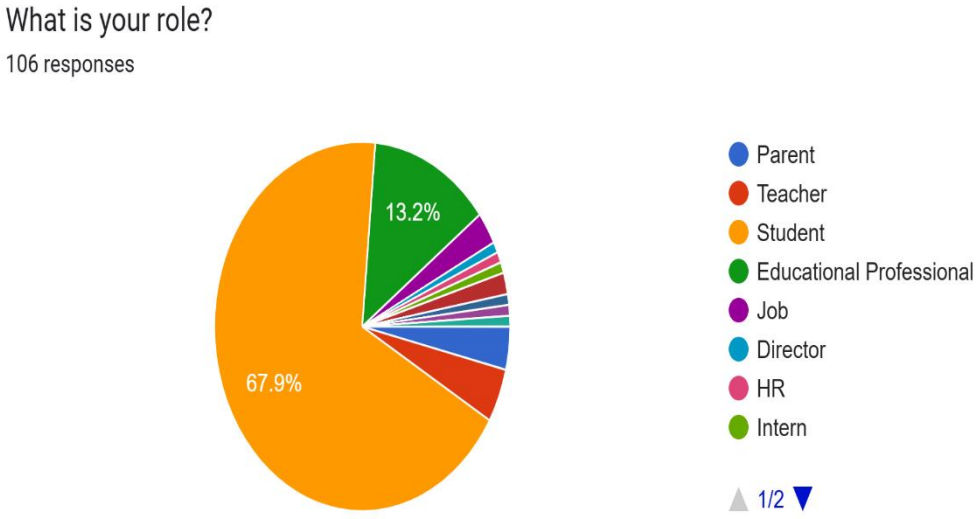
In order to complement the observations from the primary data, secondary data was obtained from different academic and industry sources, including research studies from educational and pedagogical literature, case studies of schools and institutions where Design Thinking has been effectively put to use, and reports and documents from international bodies involved in educational innovation. The secondary data offered a wider theoretical framework and assisted in supporting the results of the primary research.

6. Data Analysis

A Google Form was circulated to gather insights on the impact of Design Thinking in schools. The survey first identified the respondents' roles, whether they were parents, teachers, students, or working professionals before assessing their familiarity with Design Thinking. Participants were then asked to share their opinions on traditional versus modern teaching methods that incorporate Design Thinking, followed by their views on the importance of integrating Design Thinking into education and the potential challenges associated with its implementation.

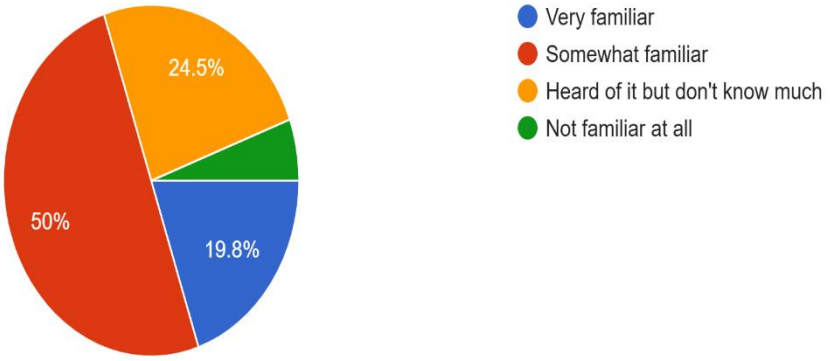
Responses:


Age
106 responses
60
40
20
0
42 (39.6%)
14 (13.2%)
14 (13.2%)
9 (8.5%)
9 (8.5%)
2 (1.9%)
2 (1.9%)
3 (2.8%)
1 (0.9%)
1 (0.9%)
1 (0.9%)
2 (1.9%)
1 (0.9%)
1 (0.9%)
1 (0.9%)
17
19
21
23
25
27
32
45
54


What is your role?
106 responses
13.2%
67.9%
Parent
Teacher
Student
Educational Professional
Job
Director
HR
Intern
1/2

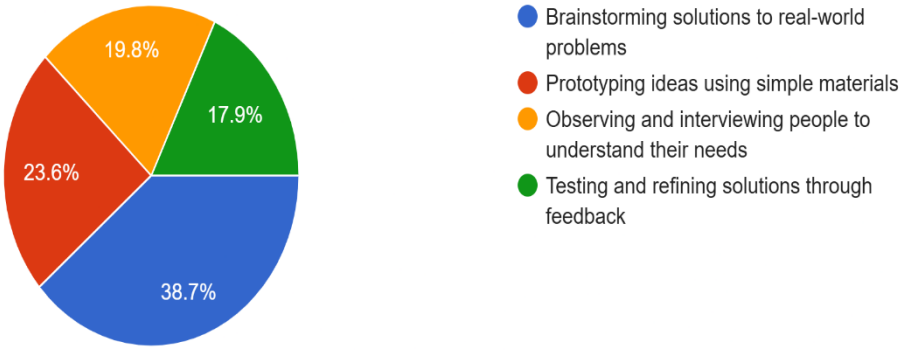
How familiar are you with Design Thinking?

106 responses



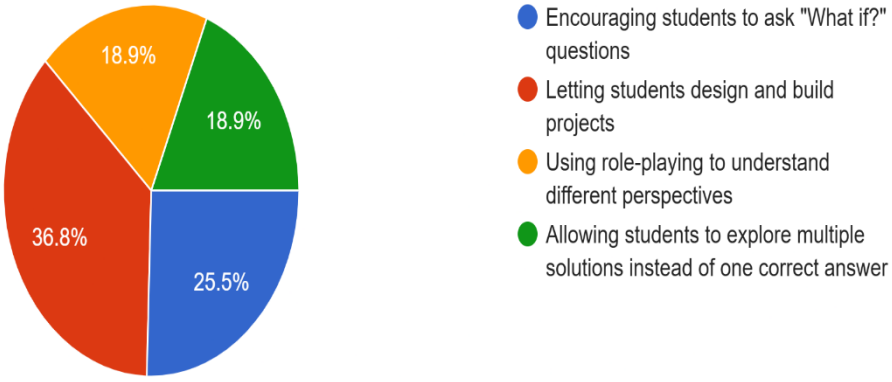
Which of the following Design Thinking practices do you think is most effective in developing problem-solving skills?

106 responses



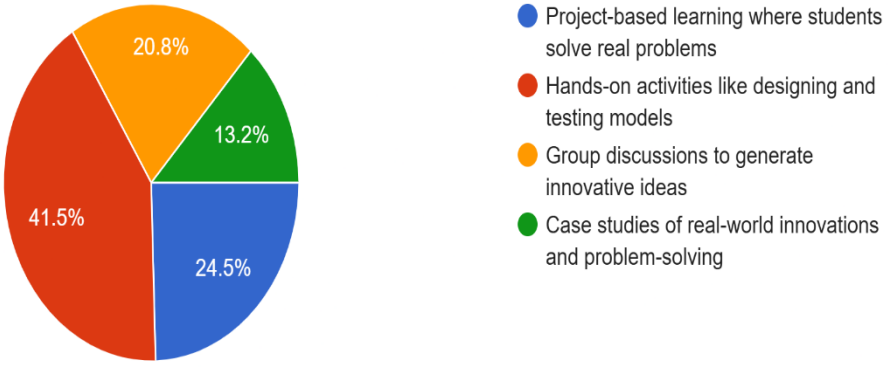
Which Design Thinking practice do you believe enhances creativity the most?

106 responses



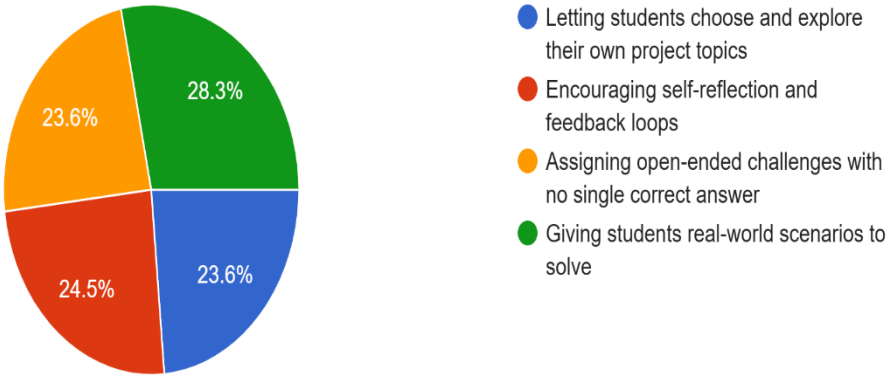
Which approach is best for making learning more engaging for students?

106 responses



Which method best supports independent learning in students?

106 responses

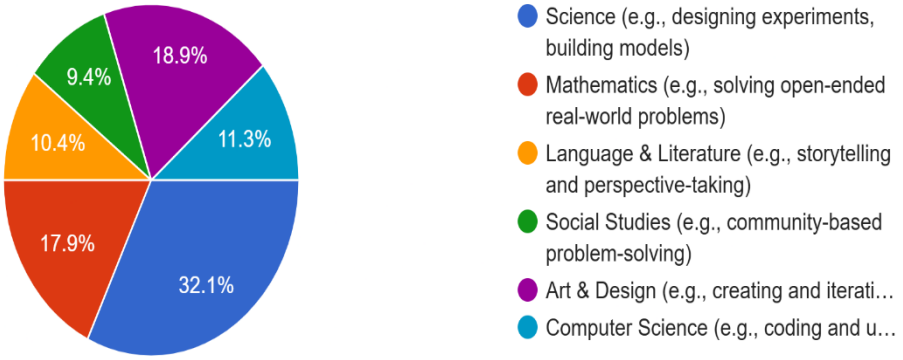


Which practice best helps students learn from failure and improve their ideas?

106 responses

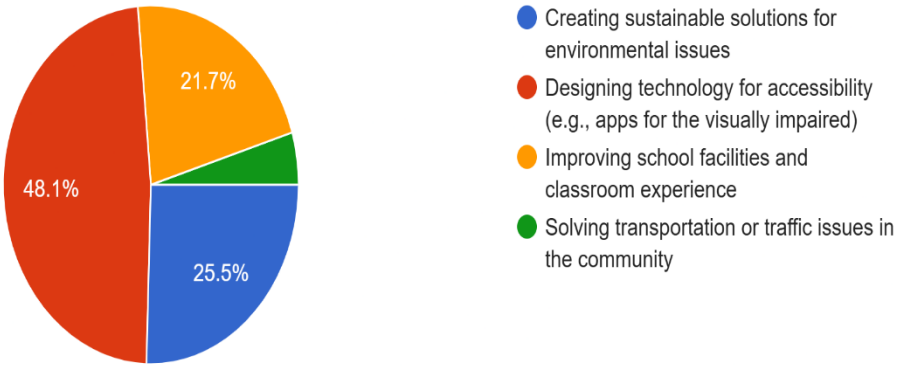
Which subject would benefit the most from a Design Thinking approach?

106 responses



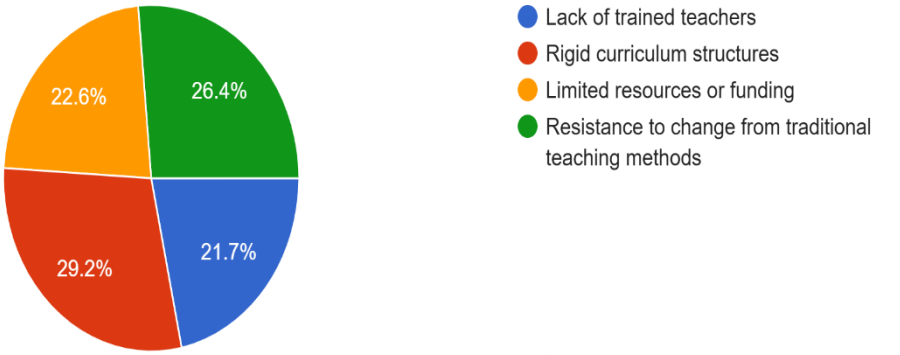
Which real-world challenge would be best tackled using Design Thinking in schools?

106 responses



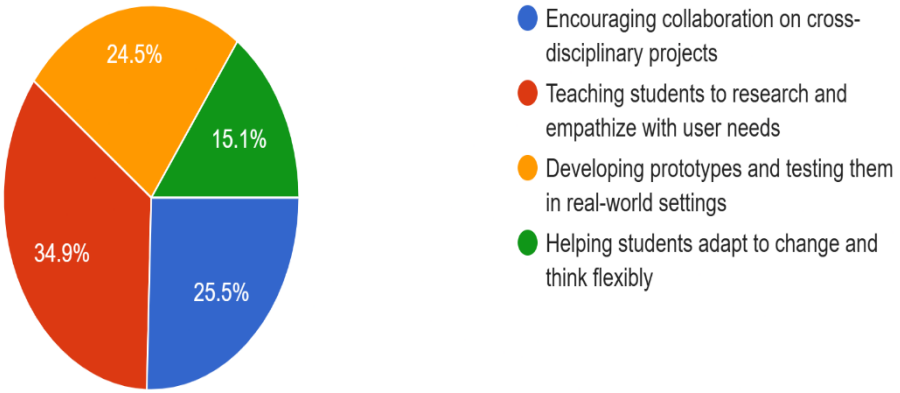
What is the biggest challenge schools face in implementing Design Thinking?

106 responses

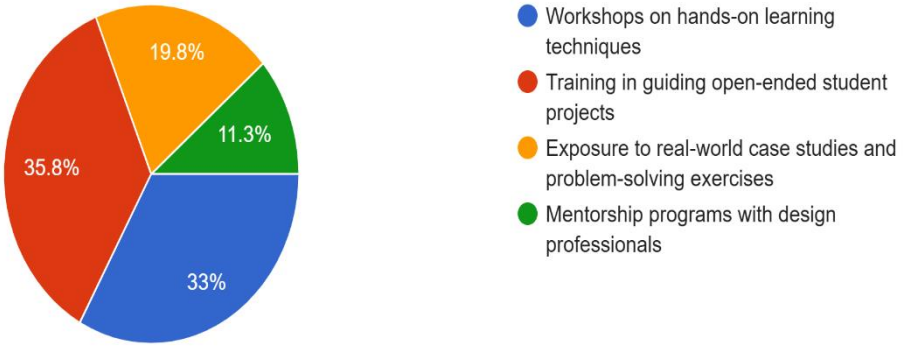


Which Design Thinking approach is best for preparing students for future careers?

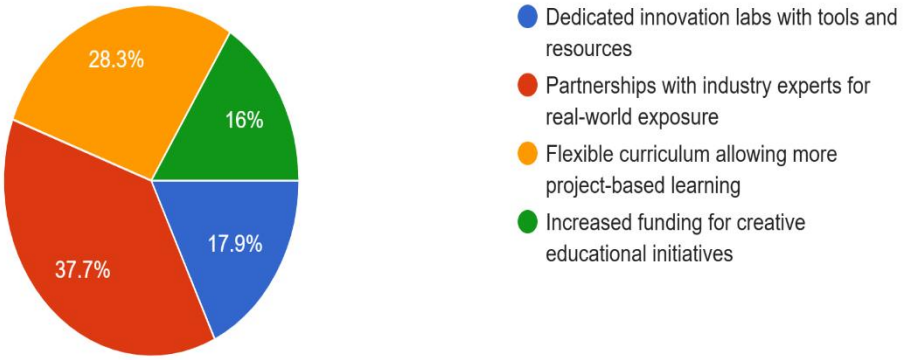
106 responses

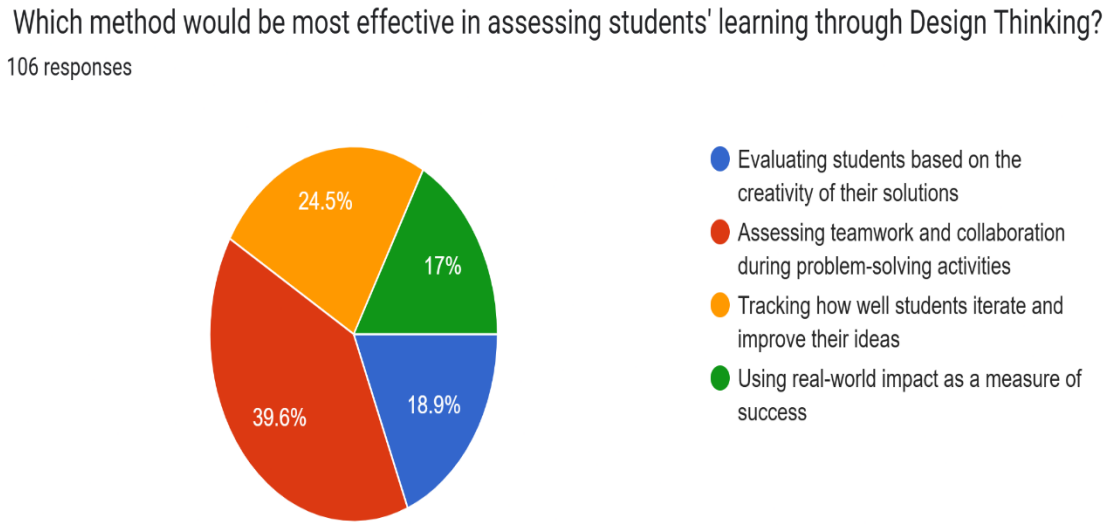


Which type of teacher training would be most useful for integrating Design Thinking in schools?
106 responses



Which support system would be most beneficial for schools to implement Design Thinking?
106 responses





7. Findings & Suggestions

7.1) Findings

a. Teachers' and students' understanding of design thinking

The data reveals that a high percentage of educators and students are unaware of the concept of design thinking. This implies that even though it is increasingly becoming important in innovation and problem-solving, it is not yet popularly accepted in the education sector.

While a large percentage of the respondents are familiar with design thinking, they are not adequately knowledgeable on its principles and application. This means that while the theory is gaining traction, it has not yet been adequately applied in learning institutions.

This is attested by the fact that very few of the respondents are knowledgeable about design thinking. Official exposure to the idea is therefore limited to a particular school or extracurricular program today.

Key Insight:

Where design thinking is mentioned, there is an evident knowledge gap. This points towards the need to have well-structured training courses to enhance awareness while enhancing understanding for students as well as teachers.

b. Perceived Benefits of Design Thinking

Most of the respondents indicate that the integration of design thinking in school encourages creativity, critical thinking, and problem-solving skills. These are key attributes in developing imaginative and adaptive learners.

Several respondents equate design thinking with teamwork and collaboration, suggesting that the approach encourages collaborative learning.

But a tiny percentage of responders are undecided on its advantages. They either do not have enough knowledge regarding design thinking or have not witnessed tangible evidence of its utility.

Key Insight:

The upbeat perception of design thinking is aligned with international educational trends, which see it as a means to prepare students for actual challenges. Yet, there need to be more case studies and successful implementations to persuade the critics.

c. Implementation of Design Thinking in Schools

The numbers indicate that not many schools have actually incorporated design thinking into their curriculum. Those that have, for the most part, only implemented it in extracurricular programs, innovation labs, or as a special project, and not as part of standard subjects.

Schools that use design thinking often do so through STEM subjects, project modules, or cross-disciplinary activities that encourage students to think creatively and solve authentic problems.

Most of the respondents indicate that, although design thinking is taught in their curriculum, there is no formal strategy or practical implementation.

Key Insight:

The existing application of design thinking is fragmented and unsystematic. Without an orderly structure and prescribed learning goals, students will have difficulty comprehending its concepts and advantages.

d. Difficulties in Using Design Thinking

The shortage of trained teachers familiar with design thinking and capable of translating it into practice is the primary challenge highlighted. These practices are not learned during usual teacher training sessions, making it difficult for educators to adapt. Insufficiency of resources is a second issue. Perhaps many schools do not have the digital equipment, makerspaces, and innovation labs necessary to facilitate creative thinking among students.

Fixed curricula are the primary issue. The traditional forms of learning take precedence in many school boards, with not much room for experimentation and imagination.

Adoption is further constrained by legislators' and educators' resistance to change. Teachers who are accustomed to traditional teaching strategies may be resistant to investigating new ones.

Key Insight:

Unless there is proper teacher training, curriculum flexibility, and budgeting, mass implementation of design thinking in schools will prove to be challenging.

e. Interest in Learning Design Thinking

A sizable majority of students and instructors expressed an interest in hearing more about design thinking and how to apply it in their studies and careers.

But the formal training programs and workshops in the field are now few, limiting the ability of interested individuals to acquire expertise in the field.

There is also a significant trend of self-learning, where students utilize online courses, YouTube tutorials, and independent projects to learn design thinking.

Key Insight:

This surge in interest is an opportunity for schools, colleges, and educational administrators to invest in structured programs that make design thinking more accessible.

7.2) Suggestions

a. Comprehensive Teacher Training Programs

For successful application of design thinking in schools, teachers should be provided with the right skills and knowledge. Schools can engage universities, schools of design, and industry professionals to develop systematic teacher training courses. The training courses should include hands-on practices so that the teachers can acquire firsthand experience in design thinking prior to applying it to their students. In addition, online certification courses and degree programs can be designed to provide flexible training options for teachers who are not able to access face-to-face training. If schools invest in teacher training, they can ensure that design thinking is successfully introduced and delivered consistently across different learning environments.

b. Curriculum Integration

In order to have a long-lasting impact, design thinking has to be a part of the core curriculum instead of being seen as an extracurricular activity. Planning in schools needs to attempt integrating design thinking concepts into general subjects such as science, mathematics, and social studies. This could be done by incorporating problem-solving exercises, practical case studies, and interdisciplinarity projects that ask students to employ design thinking techniques. Schools are also able to offer special innovation or entrepreneurship classes that include experiential problem-solving exercises. Integrating design thinking into the education system means students will have more opportunities to acquire essential 21st-century skills.

c. Infrastructure and Resource Development

Proper infrastructure and resources are essential in facilitating design thinking education. Schools must establish makerspaces, innovation labs, and digital learning centers where students can have access to the tools and resources necessary to address creative challenges. These spaces can be equipped with prototyping tools, 3D printers, design software, and collaborative workstations to facilitate experimentation and ideation. In addition, grants and funds should be given by government agencies and private organizations to schools who want to invest in such tools. Through the provision of a hands-on learning experience, students will be able to implement design thinking concepts in a practical and applicable manner.

d. Encouraging Project-Based Learning

In order to make the design thinking actually apply, there should be a project-based learning approach implemented in schools. Rather than relying solely on conceptual training, students should be motivated to engage with actual problems and design new solutions using the ideas of design thinking. Schools can collaborate with local firms, NGOs, and community organizations to find real-life problems which can be solved by students as part of the curriculum. By engaging students in pertinent projects, they will not only enhance their problem-solving skills but also gain a better understanding of how design thinking can be applied across a range of fields, such as technology, business, and social impact initiatives.

e. Awareness Campaigns and Public Outreach

Creating awareness regarding the advantages of design thinking is essential to implementing it successfully in schools. Schools need to organize seminars, webinars, and awareness programs for students, teachers, and parents. Highlighting success stories, case studies, and testimonials of schools that have implemented design thinking successfully can assist in increasing faith in its efficiency. Working with media platforms, education influencers, and social networks will also help propagate knowledge about design thinking to the wider population. Creating an awareness and passion culture, more institutions will be incentivized to take on and apply design thinking strategies.

8. Conclusion

Applying Design Thinking in the classroom presents a revolutionary method for providing students with the problem-solving, creativity, collaboration, and adaptability needed to thrive in the twenty-first century. On the basis of direct and secondary data, the research names key barriers to widespread adoption of Design Thinking but emphasizes increasing enthusiasm among educators and students for the idea.

The findings of the primary data reveal that despite most respondents' recognition of the potential benefits of Design Thinking, such as enhanced critical thinking, creativity, and teamwork, its application and recognition remain wanting. The survey further revealed that the highest barriers to integrating it into routine education are stringent curricula, inadequate resources, and a lack of teacher training.

Nevertheless, the high rate of interest and preparedness from both students and educators suggests that Design Thinking could be successfully implemented into school curriculum with the appropriate institutional backing, training programs, and legislative amendments.

The report suggests the following measures to deal with the problems highlighted by this study: In-depth teacher training programs, curriculum overhaul, Infrastructure and resource allocations, and collaboration among educators, business executives, and lawmakers.

Overall, Design Thinking is a mindset that fosters creativity and prepares students to tackle complex real-life issues instead of merely being an instructional approach. With or without the challenges of implementation, this research demonstrates that Design Thinking has the potential to revolutionize education and create critical, creative, and future-capable problem solvers with proper institutional dedication, training, and systematic policies. In the future, more research should be conducted to examine long-term effects and distill best practices for large-scale implementation in diverse learning environments.

References

1. Brown, T. (2009). Change by design: How design thinking creates new alternatives for business and society. Harper Business.
2. Carroll, M., Goldman, S., Britos, L., Koh, J., Royalty, A., & Hornstein, M. (2010). Destination, imagination and the fires within: Design thinking in a middle school classroom. International Journal of Art & Design Education, 29(1), 37–53. https://doi.org/10.1111/j.1476-8070.2010.01632.x
3. Doorley, S., Holcomb, S., Klebahn, P., Segovia, K., & Utley, J. (2018). Design thinking bootleg. Stanford d.school.
4. Goldman, S., Kabayadondo, Z., Royalty, A., Carroll, M. P., & Roth, B. (2016). Taking design thinking to school: How the technology of design can transform teachers, learners, and classrooms. Routledge.
5. Henriksen, D., Richardson, C., & Mehta, R. (2017). Design thinking: A creative approach to educational problems of practice. Thinking Skills and Creativity, 26, 140–153. https://doi.org/10.1016/j.tsc.2017.10.001
6. Koh, J. H. L., Chai, C. S., Wong, B., & Hong, H. (2015). Design thinking for education: Conceptions and applications in teaching and learning. Springer Science & Business Media.
7. Kolko, J. (2015). Design thinking comes of age. Harvard Business Review, 93(9), 66–71.
8. Liedtka, J. (2015). Perspective: Linking design thinking with innovation outcomes through cognitive bias reduction. Journal of Product Innovation Management, 32(6), 925–938.
9. Luka, I. (2014). Design thinking in pedagogy. Journal of Education Culture and Society, 5(2), 63–74.
10. Meinel, C., & Leifer, L. (2011). Design thinking research: Studying co-creation in practice. Springer.
11. Papert, S. (1980). Mindstorms: Children, computers, and powerful ideas. Basic Books.
12. Piaget, J. (1952). The origins of intelligence in children. Norton.
13. Razzouk, R., & Shute, V. (2012). What is design thinking and why is it important? Review of Educational Research, 82(3), 330–348.
14. Scheer, A., Noweski, C., & Meinel, C. (2012). Transforming constructivist learning into action: Design thinking in education. Design and Technology Education: An International Journal, 17(3), 8–19.
15. Vygotsky, L. S. (1978). Mind in society: The development of higher psychological processes. Harvard University Press.
16. Wrigley, C., & Straker, K. (2017). Design thinking pedagogy: The educational design ladder. Innovations in Education and Teaching International, 54(4), 374–385.