BHARATI INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH & DEVELOPMENT (BIJMRD)

(Open Access Peer-Reviewed International Journal)

DOI Link : https://doi.org/10.70798/Bijmrd/04030040

Available Online: www.bijmrd.com | BIJMRD Volume: 4 | Issue: 03 | March 2026 | e-ISSN: 2584-1890

Understanding Design Thinking in Education: Concepts, Models And Pedagogical Implications in 21st Century Classrooms

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Abstract:

Education today is no longer confined to memorization or passive learning; rather, it is increasingly focused on nurturing creativity, problem-solving, and adaptability among learners. In this context, Design Thinking has emerged as a powerful and flexible approach that places learners at the centre of the educational process. This paper explores the concepts, models, and pedagogical relevance of Design Thinking in contemporary classrooms. Using a qualitative review of recent studies and theoretical discussions, the article highlights how Design Thinking encourages active participation, empathy, collaboration, and innovation among students. It also examines how this approach reshapes the role of teachers and redefines classroom practices. While the benefits of Design Thinking are significant, issues such as lack of training, time constraints, and assessment challenges remain. The paper argues that Design Thinking, if thoughtfully integrated, can play a vital role in preparing learners for the uncertainties and demands of the 21st century.

Keywords: *Design Thinking, 21st Century Learning, Innovation, Student-centred Pedagogy, Experiential Learning.*

Introduction:

The nature of education is changing rapidly. Classrooms today are expected to do much more than deliver content-they must prepare learners to think independently, solve real-life problems, and adapt to a constantly evolving world. However, many traditional teaching methods still rely heavily on lecture-based instruction and rote learning, which often fail to engage students meaningfully.

In response to this challenge, educators across the world are exploring innovative approaches, and Design Thinking is one such promising framework. Originally developed in the field of design and innovation, Design Thinking has gradually entered the field of education due to its strong focus on human needs, creativity, and practical problem-solving.

What makes Design Thinking particularly relevant is its emphasis on *learning by doing*. Instead of simply receiving information, students are encouraged to explore problems, generate ideas, test solutions, and reflect on their experiences. This makes learning more engaging, meaningful, and connected to real life.

Rationale of the Study

The growing importance of skills such as creativity, collaboration, and critical thinking has led to a rethinking of educational practices. While policies and frameworks emphasize these skills, there is often a gap between theory and classroom practice.Design Thinking offers a practical way to bridge this gap. It provides a structured yet flexible process that teachers can use to design learning experiences that are both engaging and effective. Despite its increasing popularity, many educators still lack a clear understanding of how Design Thinking works in educational settings. This study, therefore, aims to present a clear and comprehensive discussion of its concepts, models, and classroom implications.

Research Questions

The following research question served as guiding principles for this study:

1) How is Design Thinking conceptualized in education?
2) What models of Design Thinking are relevant to classroom practice?
3) How does Design Thinking shape pedagogy in 21st-century classrooms?

Objectives of the Study

The study aims to:

1) Understand the core ideas and principles of Design Thinking
2) Identify different models used in educational contexts
3) Explore how Design Thinking influences teaching and learning processes

Review of Literature

Recent research shows a steady rise in the use of Design Thinking in education. Many studies highlight that when students engage in Design Thinking activities, they become more active, curious, and motivated learners. Instead of focusing only on correct answers, they begin to value the process of thinking, exploring, and improving ideas.

Yu, Q., Yu, K., & Lin, R. (2024) explored the growing influence of Design Thinking (DT) in their study, "*A meta-analysis of the effects of design thinking on student learning.*" Seeking to clarify how this unconventional teaching style actually impacts students, the researchers analysed data from 25 different articles.The results clearly showed that Design Thinking isn't just a trend- it significantly boosts student performance ($r = 0.436, p < 0.001$), particularly when it comes to academic achievement, problem-solving abilities, and overall motivation. The study highlighted that DT works best in smaller settings, specifically with class sizes under 30 and small teams of seven or fewer. Long-term commitment also proved vital, as programs lasting three months or more yielded the best results. Additionally, the researchers found that while DT is effective across the board, it is especially powerful for secondary and university students, multidisciplinary projects, and learners in Asia and Africa. Ultimately, the study confirmed that using structured models—like "Empathize, Define, Ideate, Prototype, and Test"—is the most effective way to help students succeed in the modern classroom.

Alvarado, L.F. (2025) conducted a study titled *"Design thinking as an active teaching methodology in higher education: a systematic review."* The main objective of the research was to identify and analyse existing studies that explore how Design Thinking (DT) functions as an active methodology within the higher education sector.

Following the PRISMA declaration guidelines and reviewing 28 scientific documents published between 2014 and 2024, Alvarado found that Design Thinking significantly improves the student learning experience. The study revealed that this methodology is particularly effective at encouraging active participation and fostering a user-oriented approach to education. Finally, the research concluded that the integration of Design Thinking in universities is a powerful tool for developing critical thinking, interdisciplinary collaboration, and the practical skills necessary to solve complex, real-world problems.

Understanding Design Thinking: Concept And Process

1. Concept of Design Thinking

Design Thinking can be understood as a way of solving problems by focusing on human needs and experiences. It is not just a method but also a mindset that values curiosity, empathy, and experimentation. It is a creative and human-centered approach to problem-solving. In education, it means helping students learn by understanding real-life problems, thinking creatively, and developing solutions.

Instead of memorizing information, students become active learners who explore, question, and create. It focuses on "learning by doing" and makes education more meaningful and engaging.

2. Psychological Bases of Design Thinking

Design Thinking is based on important learning theories:

a) **Constructivism (Piaget)** - Students learn by doing and building their own knowledge.

b) **Social Constructivism (Vygotsky)** - Learning happens through interaction and teamwork.

c) **Experiential Learning (DavidKolb)** - Learning through experience and reflection.

d) **Humanistic Theory (Carl Rogers)** - Focus on personal growth and freedom of expression.

e) **Cognitive Theory** - Develops thinking, creativity, and problem-solving skills.

Overall, it supports active, meaningful, and learner-centred learning.

3. Process of Design Thinking

Although Design Thinking is flexible, it is generally described through five main stages. These stages guide learners in a structured yet creative way.

3.1 Empathize (Understanding the User)

This is the starting point of Design Thinking.Students try to understand the feelings, needs, and challenges of others. This stage builds empathy and emotional intelligence, which are essential for meaningful learning.

3.2 Define (Identifying the Problem)

After understanding the situation, students clearly define the problem.Instead of vague ideas, they focus on:

- What exactly is the issue?

- Who is affected?
- Why does it matter?

A well-defined problem leads to better solutions.

3.3 Ideate (Generating Ideas)

This is the most creative stage.Students are encouraged to think freely, share multiple ideas and avoid judging ideas too quickly. The goal is not to find one perfect answer but to explore many possibilities.

3.4 Prototype (Creating Solutions)

In this stage, ideas are turned into simple, practical forms such as:Models, Drawings, Plans, Role plays etc. Prototypes are not final products—they are rough versions that help in testing ideas.

3.5 Test (Evaluating and Improving)

Students test their ideas and gather feedback.They ask-

- Does this solution work?
- What can be improved?

Based on feedback, they refine their ideas. This stage highlights that learning is a continuous process.

These stages are not fixed steps but part of a flexible cycle. Learners may move back and forth between stages as they refine their ideas.

4. Nature of the Design Thinking Process

The Design Thinking process has several important characteristics that make it effective in education:

i. Iterative: It is not a one-time process. Learners continuously improve their ideas through repeated cycles of testing and refinement.

ii. Flexible: The process is not rigid. Students can move back and forth between different stages as needed, making learning more dynamic.

iii. Collaborative: Design Thinking promotes teamwork and group interaction, where learners share ideas and learn from each other.

iv. Reflective: It encourages learners to think about their own learning, evaluate their progress, and make necessary improvements.

v. Practical: The focus is on real-life problems, helping learners apply their knowledge in meaningful and useful ways.

Models of Design Thinking in Education

Design Thinking is widely used in education to promote creativity, problem-solving, and student-centered learning. Over time, different models have been developed to explain the process of Design Thinking. Although these models differ in structure, they share common principles such as empathy, innovation, collaboration, and continuous improvement.

1) Stanford (d.school) Model

The Stanford model is one of the most popular and widely used frameworks in education. It consists of five stages:

1. ***Empathize*** *– Understanding the needs and experiences of learners*
2. ***Define*** *– Clearly identifying the problem*
3. ***Ideate*** *– Generating creative ideas*
4. ***Prototype*** *– Developing simple models or solutions*
5. ***Test*** *– Evaluating and improving the solution.*

This model focuses on human-centred problem-solving and encourages students to learn through experience. It's simple and structured nature makes it highly suitable for classroom teaching.

2) IDEO Model

The IDEO model includes three main stages:

1. ***Inspiration*** *– Identifying a problem or challenge*
2. ***Ideation*** *– Generating and developing ideas*
3. ***Implementation*** *– Converting ideas into practical solutions.*

This model emphasizes creativity and innovation. It is often used in project-based and activity-based learning, where students work on real-life problems and develop practical outcomes.

3) Double Diamond Model

The Double Diamond model, developed by the Design Council, includes four stages:

1. ***Discover*** *– Exploring the problem broadly*

2. ***Define*** *– Narrowing down and identifying the core issue*
3. ***Develop*** *– Creating possible solutions*
4. ***Deliver*** *– Finalizing and implementing the best solution.*

This model highlights two types of thinking:

a) ***Divergent thinking*** *(exploring many ideas)*

b) ***Convergent thinking*** *(selecting the best idea)*

It helps students develop both creative and analytical skills.

Comparison of the Models

- **The Stanford model** is more detailed and step-by-step, suitable for beginners
- **The IDEO model** is simpler and focuses on innovation and application
- **The Double Diamond model** emphasizes the thinking process (divergent and convergent)

All models aim to make learning active, creative, and problem-oriented.Design Thinking models provide structured ways to make learning more effective and meaningful. While each model has its own features, all of them aim to develop creativity, innovation, and problem-solving skills among learners. Therefore, integrating these models into education can significantly improve teaching–learning processes in the 21st century.

Methodology

This study is based on a qualitative approach, using document analysis as the main method.

Data Sources:

a) Research articles from recent journals

b) Academic books and reports

c) Policy documents related to education

Findings And Discussion

The analysis indicates that Design Thinking significantly enriches classroom practices by promoting active engagement, skill development, and meaningful learning experiences.

1. The findings reveal that Design Thinking fosters an active learning environment where students participate as co-creators of knowledge rather than passive recipients. This shift enhances student engagement and deepens understanding.
2. Design Thinking effectively supports the development of essential competencies such as creativity, critical thinking, communication, and collaboration. These skills emerge organically through participation in problem-solving and collaborative tasks.
3. The approach strengthens the connection between theoretical knowledge and real-life contexts. Students engage with authentic problems, thereby increasing the relevance and applicability of learning.

4. The teacher's role evolves from knowledge provider to facilitator of learning. This transformation encourages inquiry, interaction, and learner autonomy within the classroom.

5. Design Thinking promotes a culture of reflection and continuous improvement. Students learn to view mistakes as opportunities for refinement, which supports the development of resilience and a growth-oriented mindset.

6. Despite its advantages, challenges such as limited teacher preparedness, time constraints, assessment difficulties, and resistance to change remain significant barriers to effective implementation.

Overall Discussion

Overall, the findings suggest that Design Thinking has strong potential to transform teaching-learning processes. However, its successful integration requires systemic support, teacher training, and alignment of assessment practices.

Pedagogical Implications

Design Thinking brings a more flexible, engaging, and human-centered approach to education. It encourages teachers to move beyond traditional methods and focus on meaningful learning experiences.

I. ***Curriculum Development:***Learning becomes more practical through projects and real-life experiences, making students active participants.

II. ***Assessment Practices:*** Evaluation shifts from exams to portfolios, prototypes, and reflection, focusing on growth rather than marks.

III. ***Teacher Education:*** Teachers act as facilitators and mentors, guiding students instead of only delivering content.

IV. ***Use of Technology:*** Digital tools support creativity, collaboration, and idea development when used meaningfully.

V. ***Inclusive Education:*** Emphasis on empathy helps address diverse learner needs and builds a supportive classroom environment.

Overall, Design Thinking makes education more creative, student-centred, and relevant to real life.

Conclusion

Design Thinking offers a fresh and meaningful way of approaching education. It aligns well with the needs of the 21st century by promoting creativity, collaboration, and problem-solving. While challenges exist, they are not insurmountable. With proper training, support, and policy alignment, Design Thinking can significantly improve the quality of education.

Ultimately, the goal of education is not just to produce knowledgeable individuals but thoughtful and capable problem-solvers. Design Thinking provides a pathway to achieve this goal.

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Citation: **Shit. Miss S., Saren. Mr. F. & Ghosh. Dr. C.,** (2026) "Understanding Design Thinking in Education: Concepts, Models And Pedagogical Implications in 21st Century Classrooms", *Bharati International Journal of Multidisciplinary Research & Development (BIJMRD)*, Vol-4, Issue-03, March-2026.