Design Thinking: As a Digital Tool to Enhance the Creativity and Problem-Solving Ability of Students

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Abstract

One of the most difficult challenges in education in the twenty-first century is to teach students to deal with deception, information confusion, value conflicts, a lack of a clear formula, and interconnected concerns. Design thinking is a student-centered method for connecting with students and teachers in a constructivist learning environment. This improves students' learning by connecting real-world experiences, problem-solving and creativity foundations, and numerous reflections and reconstructions. Design thinking enables students to approach unclear and unsuccessful situations with confidence by gradually implementing the five processes to test solutions or prototypes for tackling wicked problems. In Design thinking method, teacher provide the problem, then students find the solution through Environmental exposure and create prototype in a digital mode, then teacher provide a feedback based on the prototype and recreate a model effectively. This is practical and student-centred approach, where students work in an Experimental way. Design thinking is a Project based learning, which establish the connection between inner and outer world and allows students to develop artefacts/products (charts, presentations, speeches) that reflect and communicate their emerging understanding. Through these activities, students develop the understanding of concepts and content, creativity and problem-solving abilities. It helps children prepare for the intricacies of future challenges. It is primarily a volatile, unpredictable, complex, and ambiguous (VUCA) world, and we must provide our children with the abilities of digital skills, creativity, problem-solving, decision-making, responsibility, and cooperation to enable them develop inventive, out-of-the-box solutions.

Keywords: Design Thinking, Digital Skills, Creativity, Problem-Solving ability.

Introduction

Design thinking is an effective framework for addressing complex issues and encouraging creative solutions. The principles and practices of design thinking as an innovative problem-solving approach are examined in this research paper. By emphasizing empathy, creativity, and iterative processes, design thinking goes beyond traditional problem-solving methods. It promotes a user-centric approach, with a focus on understanding the needs and perspectives of those affected by the problem. Design thinking offers a methodical yet adaptable framework for addressing complex difficulties by incorporating steps such as empathising, defining, ideating, prototyping, and testing. But in Educational context, It follows the iterative process, where teacher provide a problem to the students and students finds out the solution of problem through environmental exposure then students create a prototype in an effective way. At the end, teacher provide feedback to the students. On the basis of the feedback, students recreate a model because it is an iterative process, which helps to enhance the creativity and problem-solving ability of students in an effective way, which is the foremost demand of 21st century. This paper delves into the history and evolution of design thinking, as well as its applications. Applications in a variety of fields, as well as the impact it has on fostering innovation and improving problem-solving outcomes. It also looks at case studies of educational organizations that have successfully implemented design thinking and the key factors that contribute to its success. The study seeks to shed light on how design thinking can be used as a practical framework for enhancing creativity, innovation, and problem-solving in a variety of contexts, from the classroom perspectives, which is the foremost demand of 21st century skills.

Design Thinking

Design thinking (DT) is one such scientific approach that helps one to create prototypes taking into consideration the creativity, visualization, design and redesign of things based on feedback, thus offering feasible solutions to any educational and socio-economic problems. In other words, Design thinking include definition, observation, brainstorming, rapid prototyping, testing and feedback with multidisciplinary collaboration and iterative experimentation to achieve desirable, user-friendly and tangible solutions. For the successful of this innovative approach, school environment offers the possibility to design learning activities that give young people opportunities to value and practice getting along and living peacefully in a highly diverse world population-highly valued skills in a 21st century world. Therefore, in order to negotiate workable solutions to global educational and political conflicts as well as environmental challenges that will surely persist into the next century, educators must create collaborative and authentic learning activities that foster students' understanding, skills, and values. (UNESCO, 2015). So, to overcome these challenges, design thinking is very innovative approach which comes up with creative solutions. Although many researches on implementation of DT strategies have been carried out globally as yet, little is known regarding how these techniques influence students learning experience and their problem-solving capabilities in educational scenario (Charles, 2022). Educators have an important role in developing the brains of the next generation. It is crucial to go beyond traditional teaching methods and empower students with the ability to think critically, collaborate effectively, and approach problems with an innovative mind set. Design thinking approach is a learning process based on Experience and uses a human approach to explore the problems and needs of its users. The students' creative thinking abilities which are different from one another require a learning condition involving a learning experience, so that the potential of creative thinking can develop (Corebima, 2017). The distinction of the design thinking approach, including the Stanford D School model, is that it is non-linear and iterative, which means that the design thinking process can be repeated at certain stages, to provide students the opportunities to explore (Dam & Siang, 2019). D Kolb's Experiential Learning theory, which incorporates students' new experiences leading to a process of observation or reflection that can help them develop concepts and apply their theories to solve issues, is the foundation of school design. One another theory which supports the principles of Design thinking is Constructivism theory given by Piaget, which points out that knowledge must be constructed by the learner and should not be supplied by the teacher. Its central claim is that knowledge is produced via individual experience, contact with the outside world, making mistakes, and seeking answers. Constructivist classrooms place more of an emphasis on learning in a purposeful setting than they do on imparting particular abilities. (Buyukduman, 2009). Design thinking is linking with the Vygotskian Sociocultural constructivist learning theory as it utilizes the scaffolding framework and predisposes a constructive way of learning. Design thinking is acknowledged as an effective teaching approach that helps students acquire 21st century abilities including creativity, innovation, teamwork, and non-linear problem-solving through firsthand encounters with the environment.

Evolution of Design Thinking in Education

Herbert A. Simon originally used the term "design thinking" in his 1959 book "The Sciences of the Artificial." Then, in his 1987 book "Design Thinking," Peter G. Rowe presented this novel approach. The book focuses on design thinking in architecture and urban planning. Then, David Kelley founded the Hasso Plattner Institute of Design at Stanford commonly known as the D. School. Since 2005, Stanford University, which initiated the practice of Design thinking, has continued to do development at the Hasso Plattner Institute of Design or “D. School”. Stanford D. School is not emphasising on “what” is produced, but more emphasis on “how” students work creatively, because Stanford D. School learning activities are focused on helping someone strengthen their creativity and problem-solving skills that are applied in everyday life. Stanford D. School design thinking is an innovative method for implementing creative problem-solving learning which consists of five stage model, namely Empathize, Define, Ideate, Prototype and Test (Pratomo, Siswandari & Wardani, 2021). In Indian context, design thinking method was first conceptualised in 2010 in Indian Institute of Technology Bombay, in Architecture and Engineering fields. However, the National Education Policy 2020 has established a number of innovative methods, approaches, and skill subjects in the curriculum, such as design thinking, artificial intelligence, and environmental education, among others. At the appropriate stages, these various important skills will be developed in students at all levels. Design thinking is an experiential learning method, where learners cooperate and collaborate in a digital environment, are encouraged to explore, experiment and solve real-world problems through play full and joyful experiences. The main aim of Design thinking method in Education, to achieve the sustainable development goals which are adopted by United Nations Members in 2015. By 2030, the 17 ambitious Sustainable Development Goals aim to create a more peaceful, healthy, and greener world. One essential tool for achieving the Sustainable Development Goals is education, which gives students the ability to create a better society.

Hasso Plattner Model of Design Thinking in Education

The Stanford D. School Design Thinking Model is a widely recognized and influential model for enhancement of 21st century skills which was developed by the Hasso Plattner Institute of Design at Stanford University, commonly referred to as the D. School, this model provides a systematic framework for tackling complex challenges and fostering creative solutions. The model consists of five distinct stages that guide individuals or teams through the design process: Empathize, Define, Ideate, Prototype, and Test. During each phase of Design Thinking model, teacher plays a supportive role, asking open-ended questions, watching the groups working independently and explaining only when required. The following steps of Design Thinking model are:

- **Step:1 Empathize**

In the first stage, students are invited to understand the problem to be solved, which are introduced by teacher in the classroom. Since the problem of the design is not really his own, he must need to acquire some empathy to be able to design for them. Empathy can take the form of observing, engaging, watching and listening through the interaction with teacher, parents and community. In this stage, teacher said to the students to look at an issue from multiple perspectives or come up with new ideas. To empathize the students, teachers used various activities like Field trips, Video clips and Role play.

- **Step:2 Define**

The second stage is define, where all information obtained by students at the empathize stage is collected and the students conduct analysis and synthesis of the problem to find out the core problem. They share with the fellow students and mapping them. It is to be noted that the problem must be human centred and not personal. The define stage helps students gather ideas and identify the potential causes of a problem, that are useful in solving the problem in a creative way.

- **Step:3 Ideate**

At this point, the creation of ideas is given more attention. The most popular method for generating ideas is brainstorming. With the teacher's assistance, students have begun to generate ideas and are being pushed to come up with novel, "out of the box" solutions to users' concerns. The best suggestions for solving the problem should be provided by the teacher, and students should gather different ideas or solutions and select a few of these. Creativity occurs during the third stage of the design thinking process, and it's important to note that the ideation stage is a judgment-free environment.

- **Step:4 Prototype**

The fourth step in the design thinking process paradigm is prototype. As a result, during brainstorming, ideas are presented in order to produce solutions. A rough and quick stage of the design process is the prototype phase. It is a means of rapidly communicating a concept in the design process. The design thinking process's fourth step is all about trying new things and making concepts into real items. The experimental stage is the name given to this phase. Depending on how well the suggested solutions perform in prototype form, they may be approved, refined, modified, or rejected at the prototype stage. Prototype planning, digital design, or physical design are more forms of this approach (D. School, 2019).

- **Step:5 Test and Feedback**

The fifth step in the design thinking process paradigm involves testing and feedback. User testing follows prototyping, but it's crucial to remember that the design thinking process rarely ends there. In actuality, the testing phase's outcome will frequently take you back to a prior stage, giving you the knowledge you need to rephrase the initial problem statement or generate fresh concepts you had not previously considered. The purpose of this step is to test the developed prototype and get user input. Testing could be useful to demonstrate whether or not the problem statement was successfully articulated. Students receive feedback through an iterative approach that includes testing. The testing phase's goal is to determine what works and make the required adjustments in light of the teacher's input. (Huyen, Lam & Tu, 2021).

Importance of Design thinking method in School Curriculum

"Design Thinking" in the school curriculum involves integrating a structured problem-solving method or approach that encourages creative thinking, empathy, and critical analysis. It equips students with the ability to identify problems, explore diverse perspectives, collaborate with others, and develop innovative solutions. Students gain practical skills that can be applied to real-world challenges, preparing them to navigate complex issues and contribute positively to society by incorporating Design Thinking into the curriculum. Students' ability to think critically, be creative, and solve problems can all be greatly enhanced by incorporating design thinking into the curriculum.

1) **Emphasize Project-based learning:** Design thinking naturally aligns with project-based learning, where students work on real-world problems or challenges. Include assignments that ask students to recognise issues, understand users, come up with solutions, create prototypes, and test their theories. Encourage interdisciplinary initiatives that foster holistic problem-solving by integrating several subjects.

2) **Integrate design thinking across subjects:** Students can apply their knowledge in real-world contexts by incorporating design thinking into a variety of topics. Design thinking, for instance, can be used by scientific students to plan experiments or come up with solutions for environmental problems. They can use design thinking in language arts to create creative narrative methods or convincing advertising strategies.

3) **Provide structured design thinking frameworks:** Introduce students to well-known design thinking frameworks, like the Empathise, Define, Ideate, Prototype, and Test process from the Stanford D. School. These frameworks walk students through every step of the design thinking process and offer an organised method for solving problems.

4) **Foster collaboration and teamwork:** Collaboration and teamwork are essential to the success of design thinking. Give students the chance to collaborate in groups, encouraging good communication, teamwork, and group problem-solving. To improve the ideation and prototype phases, promote a variety of viewpoints, brainstorming sessions, and helpful criticism.

5) **Encourage iterative thinking:** Students first develop models based on their own ideas during the prototype phase, after which they receive feedback from their teachers. This iterative process of creating, testing, and refining ideas is known as design thinking. After considering the teacher's criticism, pupils re-create the model, meeting the learning objective. Show pupils that it's okay to grow from mistakes and turn them into teaching

moments. To keep improving their solutions, encourage them to polish their prototypes, iterate on their ideas, and get user feedback.

6) **Incorporate design tools and technologies:** To assist students in their journey towards design thinking, incorporate design tools and technologies into the curriculum. In addition to digital tools like Miro boards, Canvas, Mind Mapping software, coding platforms, or online collaboration tools, this could also incorporate tangible prototyping items like arts and crafts equipment.

Incorporating design thinking into the curriculum necessitates continuous assistance from educators who foster students' creativity and problem-solving skills. They can enable pupils to develop into critical thinkers and creative problem solvers who are prepared to face obstacles in the real world in the future. (Ranjan, 2017).

Conclusion

Ultimately, we may conclude that the design thinking process is a successful strategy that is currently primarily employed in educational settings. It uses an iterative approach in which students are given an issue by the teacher, discover the solution through exposure to the environment, and then effectively produce a prototype. The teacher gives the students feedback at the conclusion. Students recreate a model based on feedback because it is an iterative process that effectively fosters students' creativity and problem-solving skills, which are the top demands of the twenty-first century. So, Design thinking as the best method in classroom learning, which helps to enhance the creativity and problem-solving ability of students, which are most important life skills in the present scenario.

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