

A Versatile Approach to Design Thinking Applied in Educational Contexts

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Abstract — Design thinking has emerged as an innovative, human-centered approach to addressing complex challenges in education by fostering creativity, collaboration, critical thinking, and problem-solving. This paper explores the versatility of design thinking and its application across diverse educational contexts, including school, higher, and professional education. It examines the core stages of the design thinking process—empathize, define, ideate, prototype, and test—and their role in promoting learner-centered, experiential, and inquiry-based learning. The study highlights how design thinking enables educators to develop inclusive teaching strategies, redesign curricula, enhance student engagement, and encourage interdisciplinary collaboration. Furthermore, it discusses the integration of digital technologies and real-world problem-solving activities that prepare learners with essential 21st-century skills. The paper argues that adopting design thinking as both a pedagogical framework and an institutional innovation strategy can transform teaching and learning environments by encouraging adaptability, empathy, and continuous improvement. It concludes that the widespread implementation of design thinking can contribute significantly to educational quality, innovation, and lifelong learning.

Keywords— Design Thinking, Educational Innovation, Learner-Centered Learning, Creativity, Critical Thinking, Problem-Solving, Experiential Learning, Higher Education, Professional Education, Curriculum Design, Collaborative Learning, 21st-Century Skills, Educational Technology, Inclusive Education.

I. INTRODUCTION

Design Thinking (DT) is a strategy rooted in art that has now expanded into various fields, including science, technology, and education (Buchanan, 1992). It is famous for its organised, creative, and unpredictable problem-solving applications (Panke, 2019). To solve complex problems, design thinking methodology initiates a sequence of creative steps. The same reason has proven DT's wide range of applicability, capturing many scholars' attention (Buchanan, 1992).

Its applications have expanded beyond traditional traces into various fields, including education. This method also focuses on the core problem of raising compatible questions and rerouting enquiries in the correct direction. While doing so, it comes up with practical and relevant solutions, regardless of field applications. The main aim of these solutions is to address immediate goals. This demonstrates the potential of design-thinking strategies to upgrade the relationship between teaching and learning in the educational field (Panke, 2019).

Application of design thinking in education, its benefits in inclusive learning, and its integration with classroom pedagogical adaptations

In educational settings, design thinking encourages educators and learners to shift from divergent thinking towards more structured topics, enhancing understanding, studying, and

connecting with concepts (McLaughlin et al., 2022). These applications in educational settings promote and enhance value. With design thinking as an influence, contemporary education emphasises the importance of learners' need to gain more than rudimentary education. The design thinking method focuses mainly on improving the teaching and learning balance ratio. This method also provides several opportunities for students to flourish dynamically to foster their knowledge. This can also help with adaptability among learners, which in turn can help them thrive in this complex world (Gane et al., 2024). Cultivating problem-solving abilities in learners is the greatest advantage of the design thinking method. One example is gamified learning techniques which are a positive approach to design thinking (Gopinathan et al., 2022). In addition, educators can enhance teaching and learning using this approach. This can also be used to effectively address institutional challenges, including inclusive education (Henriksen et al., 2017).

Another positive aspect of design thinking methodology in the educational field is that it encourages inclusive education. It has equal access and learning opportunities regardless of their differences. This celebrates individual challenges and strengths. According to this definition, an inclusive classroom can accommodate various mindsets. Design thinking strategies support these differences by embracing unique challenges. It offers them the autonomy to choose, provides flexibility to

accommodate and work alongside their limitations, and encourages them to strive for solutions (Salend, 2015). It helps educators personalise solutions to meet diverse student needs and cultivate inclusive learning environments. This is accomplished by focusing on empathy and identifying points that are most important through problem definition (Sharma and Sande, 2020).

Issues related to society, communities, and personnel can also be deciphered using the latest technologies and applicability of design thinking strategies. Design thinking principles align with those of the community and collaborations, and support effective inclusion education.

These inclusive education programs are culturally responsive, evidence-based, universally designed, and practically applicable to various departments of educational institutions. These principles can also be considered factors that can influence learners' achievement. It also encourages the use of universally adapted study-based designs that are both assistive and responsive to diverse cultures (Salend, 2015).

Recently, scholars have reported a positive approach towards design thinking methodology (Panke, 2019), especially in the classroom pedagogical context. This makes it an interesting field of research (Buchanan, 1992). In expansion, design thinking strategies are built on a foundation that is a fusion of various components. These components include observation, collaboration, exploration of updated demands, redefining problems, visualisation of notions, concepts, ideas, prototyping, and institutional developments (Sharma and Sande, 2020). This strong foundation contributes significantly to the adaptation of classroom pedagogy to an inclusive environment.

In addition, while analysing pedagogical orientations, pedagogical practices, and digital pedagogies (Väättäjä and Ruokamo, 2021), it is clear that these elements are closely parallel to design thinking strategies. It is obvious that classroom pedagogy comprises divergent and convergent thinking. These two types of thinking incorporate five steps that form the structure of the design thinking approach. The five steps include empathize, define, ideate, prototype, and test. It is important to ensure that these steps align with the three criteria. The three criteria are desirability, feasibility, and viability. This ensures that students become familiar with design thinking strategies, as they play an important role in enhancing classroom pedagogy (Wang, 2024).

III. DT'S INFLUENCE ON LEARNERS' NEEDS, CURRICULUM DESIGN, TEACHING STYLES, DELIVERY, AND LEARNING OUTCOMES PARALLELS PEDAGOGICAL AND ANDRAGOGICAL APPROACHES

According to the latest research, design thinking strategies profoundly affect curriculum design, teaching, and delivery. This methodology promotes interdisciplinary learning, supports professional development, and encourages innovative approaches to teaching and assessment (Wang, 2024). Thus, DT methodologies can enhance students' problem-solving skills and adaptability. This helps them to prepare for future challenges.

Another advantage is that educators can create more engaging and relevant learning experiences by incorporating design thinking principles. DT strategies influence educators to focus on students' needs and to adapt to changing educational contexts. This is much like how weather conditions require a new umbrella design. Students' needs can be likened to umbrellas, a universally relatable symbol of protection against diverse weather conditions. Although weather fluctuations are difficult to detect, new designs are needed. This will address challenging weather conditions, including harsh rain and strong wind. This accelerates the need to update an object from its traditional form by pushing its current limits (Ganesh et al. 2023). Similarly, the actions of highly engaged students are often shaped by the expanded norms and practices associated with design thinking strategies. It steers to the road of a more self-observed and analysed understanding of oneself. As a reaction, this opens the possibility of a positive change in the process (VanGronigen et al., 2023).

Even though the design thinking process typically follows a predefined series of orderly patterns, it is metaphorically described as a strategic method that operates within an undefined imaginary abstract space. These two spaces provide room for various activities that facilitate the exploration and development of innovative solutions (Brown, 2008). This can also turn into an advantage in curriculum design and teaching delivery. This imaginary space allows doers to think creatively and innovatively to aim towards a practical solution. The balance of the orderly steps and the flexibility allowed with its imaginary space supports a cohesive and dynamic educational environment. It also creates a strong bond between teaching, learning, and achievements. This strong bond emphasises the interdependencies and links between them (Wang, 2024). For the same reason, it is safer to state that DT strategies have

proven to be effective for interdisciplinary curricula in education, teaching, and learning.

The outline of how teaching-learning, achievement, and attainment are interdependent emphasises the clear emergence of ideas on holistic interactions among individuals. Compared to an isolated approach, this interconnected perspective shows that individuals working alone often find themselves at a disadvantage. Similarly, learners become less advantaged when isolated (Wyatt et al., 2020).

This underscores the importance of interdependence as a linked element to the coexistence of teaching and learning. This enables design thinking to become a reliable strategy for developing a scheme of work, interdisciplinary curriculum design, teaching methods, and learning outcomes (Wang, 2024).

DT methodologies can contribute to young learner's learning outcomes by guiding them in their strategies. It can also provide amateur learners with flexible opportunities to improve their learning outcomes. Design thinking strategies guide learners in enhancing their learning outcomes through creative and innovative thinking (Gane et al., 2024).

In addition, an educational institute can tailor student training programs to incorporate professional, civic, and personal needs. This can be achieved by understanding how higher-grade students learn and absorb design thinking methodologies. This understanding is in favour of andragogy and can influence curriculum design, teaching, and delivery style (McLaughlin et al., 2022).

The analysis indicated that design thinking roles differ in the context of professional development and education, but educators often turn out to be the core of this process. Regardless of whether it is a pedagogical or andragogical approach, the five categories influence learners' achievements. These are discovery, ideation, experimentation, evolution, and deployment. Discovery revolves around empathy, research, and problem definition.

Ideation includes interpretation, creation, and making. The experimental phase included prototyping, testing, and evaluation. The evolution category included rethinking, remaking, and repetition. Finally, the deployment section concludes with socialisation, piloting, and integration (Blundell, 2022).

IV. DT'S IMPACT ON THE RELATIONSHIP BETWEEN TEACHING, LEARNING, SUCCESS, AND PROGRESS

To understand the impact of design thinking methodologies on teaching, learning, success, and progress, one needs to understand how DT works. The Kaiser Nursing School team case study is a good example of understanding DT from all perspectives. When analysing the case study of the Kaiser Nursing School team, discipline and repetitive processes capture the attention behind their achievements. The final results are rooted in a consistently planned method.

Systematic teamwork scheme instead of single-scoured masterpiece breakthrough. This scheme includes a repeated loop of prototyping, testing, and refinement guided by a humancentred approach. This approach emphasises that effective solutions and results are rooted in carefully monitored and repeatable steps, rather than the outbreak of an electrified work of a mastermind. Design-thinking strategies emphasise the importance of empathy, experimentation, and repetition as alternatives to instant quantum leaps. With these design thinking strategies, innovation can be acquired through thoughtful, brilliant, and iterative designs (Brown, 2008).

Another study analysed the impact of design thinking on higher sustainability education using digital transformative pedagogy. This study focused on revamping learning using a digital platform using design thinking strategies. It focused on the alignment of DT methods with digital transformative pedagogy, its learning outcomes, and its influence on learning experiences. This methodology was observed by examining two courses that were implemented at universities in Japan and Germany. The design and execution of these courses were analysed to evaluate their integration within the digital transformative pedagogy framework. The participants' perspectives on their experiences with these courses were gathered and analysed. The findings were in favour of the adaptability of design thinking pedagogy to digital transformative pedagogy. It also helped create a learning environment that supported both hybrid and fully digital settings. Design thinking strategies created an opportunity to engage in interactive learning experiences that promote critical thinking, problem-solving, and a sustainable mindset among learners. This study provides valuable insights into how design thinking can be effectively used in digital settings to support transformative learning in higher sustainability education (Taimur and Onuki, 2022). This also suggests that numerous problems perceived as technical may be adaptive.

As suggested, if a problem is adaptive, a completely different approach is required to obtain a successful solution. Identifying the correct core problem can lead to institutions and organisations moving in the correct direction. DT strategies offer an expanded range of options rather than being stubborn on a singular solution (VanGronigen et al., 2023). Design thinking methodologies are effective because they transform technical problem-solving into a consistent, iterative process. It is structured around different stages including inspiration, empathy, problem definition, ideation, prototyping, and testing. Otherwise known as I.E.P.I.P.I.. The feasibility of the results can be analysed and tested to determine whether they are aligned

with practical needs at every stage. This structured approach not only transforms educational practices, but also aligns them with the needs of learners. It helps enhance and cultivate the overall performance of both the educator and the learner.

The researcher stated that the main goal of design thinking is to support the user by focusing on the final impact. This conclusion was reached while researching in depth to understand the interconnected relationship between teaching, learning, and its results under the influence of DT. Those engaged and invested in the process are likely to be significantly impacted. However, the effectiveness of design thinking methodologies in managing challenges, risks, and limitations remains a subject of debate. This is primarily because the entire process is influenced by different factors. These factors include cost, communication, integration, quality, procurement, resource allocation, managing risk, stakeholder engagement, schedule, and scope. Even with these management tools, there is growing trust in design thinking and its credibility in encouraging inclusive teaching and learning (Canfield and Bernardes, 2021).

V. EFFECTIVE TEACHING STRATEGIES BASED ON THE ANALYSIS OF DT SUPPORTED BY THE VARK MODEL

The VARK learning model can be categorised into four types. These four types include visual, auditory, read/write, and kinesthetic the name VARK. This supports the fact that regardless of learners' status, learning styles can be categorised into these four types of learning (Fleming and Mills, 1992). Although design thinking encompasses different approaches customised to learners' needs, kinesthetic learning tends to align well with DT. This is primarily because the kinesthetic learning style is result oriented. To explain in detail, complex issues often lack a structured solution, challenging traditional engineering, scientific, and methodological approaches (Panke,

2019). However, routine teaching challenges such as curriculum development, lesson planning, disciplinary actions, student motivation, etc. are closely tied to learners' backgrounds (Henriksen et al., 2017). These challenges force educators to adapt to solving the issue, giving individual attention to learners' needs. Keeping VARK a strategy, along with the influence of DT methodologies, educators can adopt an innovative method. Because this innovative method is built with a strong foundation, it clearly addresses practical problems related to a particular learner.

The latest developments in design thinking, especially in the field of innovation, have attracted significant interest from professionals outside the traditional creative fields. This fastdeveloping interest necessitates a revised teaching approach to design thinking (Wrigley and Straker, 2017). For example, the latest contribution using design thinking strategies was during the time of Covid-19. During the time of Covid-19 pandemic, design thinking methodologies have proven effective in addressing worldwide issues, especially in the field of education. It has facilitated the adoption of digital pedagogy and emphasised the need for an accessible, technologically enhanced learning environment (Baidoo-Anu and Ansah, 2023). Addressing a global challenge, design thinking activation initiated a domino effect, enhancing the adoption of technology and digital pedagogy in educational institutions. However, scholarly attention to design thinking has led to the accumulation of a wealth of articles and journals. Despite the vast number of journals and articles, the literature remains complex and fragmented (R€osch et al., 2023). As interest in design thinking has grown, it has also been criticised for its general perception and applications. In response, dedicated design thinkers argue that one should carefully observe and analyse DT, instead of oscillating between adoption and rejection. This approach facilitates a comprehensive understanding of its potential and limitations (Laursen and Haase, 2019). In the worst-case scenario, using the design thinking method can lead to unsettling pandemonium experiences for educators and others (Brown, 2008). However, once the method is observed, understood, and accepted, individuals can travel with ease and confidence.

In conclusion, design thinking provides solutions to address complicated issues by focusing on its core origin. It has a deep penetration perspective along with brainstormed strategic planning. This combination gives DT a significant positive impact on teaching and learning. With this advantage, educators can foster creativity, inclusivity, and adaptivity in teaching practices. Although the educational field continues to evolve according to societal requirements and demands, design thinking strategies have a profound positive impact (Henriksen

et al., 2017). Finally, the transformation of methodologies in the educational field under DT's influence is very subtle. This subtle transformation has replaced the traditional educational teaching methods to meet the needs of enthusiastic learners. As we continue to explore these methodologies, the purview of design thinking for transforming education becomes pertinent.

VI. CONCLUSION

Design thinking has proven to be a versatile and transformative approach that enhances teaching, learning, and educational innovation across diverse educational contexts. By placing learners' needs, experiences, and perspectives at the center of the learning process, it promotes creativity, critical thinking, collaboration, and effective problem-solving. The iterative stages of design thinking—empathize, define, ideate, prototype, and test—encourage learners to engage actively with authentic challenges while developing practical solutions through reflection and continuous improvement.

The integration of design thinking into educational practice supports learner-centered pedagogy, interdisciplinary collaboration, and experiential learning, making education more relevant to real-world needs. It also enables educators to redesign curricula, adopt innovative teaching strategies, and create inclusive learning environments that accommodate diverse learning styles and abilities. Furthermore, the incorporation of digital technologies and collaborative practices strengthens students' readiness for higher education, professional careers, and lifelong learning.

In an era characterized by rapid technological advancement and evolving societal demands, educational institutions must embrace flexible and innovative approaches that prepare learners for uncertainty and change. Design thinking offers a practical framework for cultivating adaptability, resilience, and innovation while fostering a culture of continuous learning. Its widespread adoption can contribute significantly to improving educational quality, institutional effectiveness, and the development of graduates who are capable of addressing complex global challenges with empathy, creativity, and confidence.

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