

## Education 5.0: Using the Design Thinking Process - An interdisciplinary view

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### Abstract

*This paper explores the integration of design thinking in education, focusing on the Ideate phase of Stanford University's design thinking process. It takes an interdisciplinary view and examines the concept of Education 5.0, which promotes the development of essential 21st century skills through interdisciplinary learning. The paper explores the integration of LEGO Serious Play (LSP) into the Ideate phase and highlights its potential to enhance ideation, collaboration, and creativity. The benefits of using LSP in education are discussed, along with considerations for successful implementation. By using design thinking and LSP, educators can empower students to become critical thinkers, effective communicators, and lifelong learners. The paper provides valuable insights and practical guidance for educators, practitioners, and researchers seeking to use innovative methods in education to prepare students for the challenges of a complex and dynamic world.*

**Keywords:** Creativity, Design Thinking, Design Process, Education 5.0, Higher Education, Ideation, Innovation, Learning, Lego Serious Play, Stanford University

### 1. Introduction

In an ever-evolving world, education must adapt to meet the needs of students and prepare them for the challenges of the future. Traditional approaches to education are no longer sufficient to equip learners with the skills, mindset and tools needed to thrive in a rapidly changing landscape. As a result, innovative methodologies have emerged to revolutionize the field of education and foster a holistic learning experience that transcends traditional subject boundaries. One such methodology is Design Thinking, a human-

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centered approach that emphasizes empathy, creativity, and problem solving. Design Thinking encourages students to tackle complex problems, explore multiple perspectives, and generate innovative solutions through an iterative and collaborative process. By incorporating this methodology into the classroom, educators can empower students to become critical thinkers, effective communicators, and lifelong learners. This paper explores the integration of design thinking in education, focusing specifically on the Ideate phase of Stanford University's design thinking process. We explore the concept of Education 5.0, which embraces interdisciplinary learning and promotes the development of essential 21st century skills. Through an interdisciplinary lens, we examine the potential of design thinking to bridge the gaps between disciplines and foster a holistic educational experience. We also explore the integration of LEGO Serious Play (LSP) into the ideation phase of the Design Thinking process. LSP harnesses the power of LEGO bricks as a hands-on, visual, and metaphorical tool to enhance ideation, collaboration, and creativity. We explore the benefits of using LSP in the ideation phase and discuss considerations for its successful implementation. In this paper, we aim to provide educators, practitioners, and researchers with valuable insights and practical guidance on how to use design thinking and LSP in the context of education. By embracing Education 5.0 and integrating innovative methodologies, we can equip students with the skills and mindset needed to thrive in an interconnected, complex, and ever-changing world.

## **2. Education 5.0: Shifting Paradigms in Education**

Education 5.0 represents a paradigm shift in the field of education, as it seeks to harness the power of technology and personalized learning to create an education system that meets the needs of individual students. This new approach emphasizes a more student-centered approach, with technology acting as an enabler of personalized learning experiences. Education 5.0 also places a strong emphasis on developing skills such as critical thinking, problem solving, and social-emotional learning, in addition to traditional

academic subjects. One of the key aspects of Education 5.0 is the recognition of the importance of lifelong learning and skills development. In a rapidly changing world, it is critical for individuals to continuously acquire new knowledge and skills throughout their lives. Education 5.0 aims to equip students with the ability to adapt and thrive in a dynamic environment by fostering a mindset of continuous learning. It promotes skills such as adaptability, resilience, creativity, and effective communication that are essential for success in the 21st century. Education 5.0 harnesses the power of emerging technologies to enhance the learning experience. Technologies such as artificial intelligence, virtual reality, augmented reality, and gamification offer new ways to engage students and make learning more interactive and immersive. These tools can provide personalized instruction tailored to each student's needs, allowing them to learn at their own pace and in their preferred style. By effectively integrating technology, Education 5.0 enables educators to create engaging and dynamic learning environments that foster deeper understanding and critical thinking. A fundamental feature of Education 5.0 is its focus on student-centered learning. Instead of a one-size-fits-all approach, Education 5.0 recognizes that each student has unique strengths, weaknesses, and learning preferences. Personalized instruction allows educators to tailor learning experiences to meet the needs of individual students, promoting greater engagement and motivation. In addition, Education 5.0 emphasizes individualized assessment methods, moving away from traditional standardized tests to more authentic and holistic assessments that capture students' overall growth and skill mastery. Education 5.0 promotes collaborative and interdisciplinary learning to prepare students for real-world problem solving. Recognizing that many challenges require multidisciplinary approaches, Education 5.0 encourages students to work together across subjects and disciplines. Collaborative projects, group discussions, and team-based activities foster communication, teamwork, and the ability to integrate knowledge from different disciplines. By cultivating these skills, Education 5.0 equips students with the ability to tackle complex problems and contribute to innovative solutions. Another important aspect of Education 5.0 is empowering students to take control of their own education.

Self-directed learning involves fostering students' ability to set goals, manage their time, and take responsibility for their own learning journey. Technology plays a critical role in facilitating self-directed learning by providing access to vast resources, online courses, and interactive platforms that allow students to explore their interests and pursue personalized learning paths. Education 5.0 encourages students to become independent learners who are motivated, curious, and capable of driving their own educational growth. Education 5.0 aims to bridge the gap between education and the demands of the job market. By integrating real-world applications and industry-relevant skills into the curriculum, Education 5.0 prepares students for the changing world of work. This includes collaboration with industry professionals, internships, project-based learning, and exposure to entrepreneurship. By aligning educational practices with industry needs, Education 5.0 equips students with the skills and knowledge they need to succeed in the workforce and make meaningful contributions to society. Education 5.0 represents a transformative approach to education that embraces technology, personalized learning, skill development, collaboration, and industry relevance. Educators must embrace these principles and adapt their teaching practices to create student-centered, engaging, and future-ready learning environments. By embracing Education 5.0, educators can empower students to become lifelong learners, critical thinkers, problem solvers, and active contributors to society.

### **3. The Role of Students in Education 5.0**

In Education 5.0, students take on the role of protagonists rather than passively listening to educators. This chapter explores the evolving role of students in the context of Education 5.0, highlighting the shift from a traditional teacher-centered approach to a student-centered approach. It emphasizes the importance of empowering students, fostering their agency, and recognizing their individual strengths and needs. Education 5.0 aims to create active, engaged, and self-directed learners who are prepared for the challenges of the future. Education 5.0 places a strong emphasis on student-

centered learning. This approach recognizes that each student is unique, with their own interests, learning styles, and strengths. Student-centered learning involves tailoring instruction and learning experiences to meet the needs, interests, and goals of individual students. It encourages active engagement, critical thinking, and problem-solving skills. In Education 5.0, students are active participants in their learning journey, taking ownership of their education and becoming partners in the learning process. One of the key aspects of Education 5.0 is the delivery of personalized instruction. Recognizing that students have different learning preferences and paces, personalized instruction adapts to their individual needs. This can be achieved using technology, adaptive learning platforms, and differentiated instructional strategies. Personalized instruction allows students to progress at their own pace, delve deeper into topics of interest, and receive targeted support in areas where they may need additional assistance. By tailoring instruction to individual students, Education 5.0 promotes better learning outcomes and engagement. Education 5.0 promotes self-directed learning and empowers students to take control of their own education. Self-directed learners are motivated, curious, and able to manage their learning experiences. They set goals, make decisions, and seek out resources and opportunities for growth. In Education 5.0, educators guide and support students in developing self-directed learning skills such as goal setting, time management, and reflection. Self-directed learning fosters independence, creativity, and lifelong learning habits that are essential for success in today's fast-paced, ever-changing world. Education 5.0 recognizes the importance of collaboration and communication skills in today's interconnected world. Students are encouraged to work in teams, engage in discussions, share ideas, and solve problems together. Collaboration develops critical skills such as effective communication, teamwork, empathy, and respect for diverse perspectives. Through collaborative learning experiences, students develop social skills, cultural competence, and an appreciation for collective intelligence. Education 5.0 prepares students to thrive in collaborative work environments and make a positive contribution to society. Critical thinking and problem-solving skills are at the heart of Education 5.0. Students are

encouraged to think critically, analyze information, evaluate evidence, and develop creative solutions to complex problems. Education 5.0 goes beyond rote memorization and focuses on developing higher-order thinking skills. Students are challenged to apply their knowledge in real-world contexts, engage in inquiry-based learning, and approach challenges with curiosity and a growth mindset. By developing critical thinking and problem-solving skills, students become adaptable, innovative thinkers who are well-prepared for the challenges of the future. Education 5.0 recognizes the importance of social-emotional learning (SEL) in student development. SEL includes skills such as self-awareness, self-regulation, empathy, and responsible decision-making. Education 5.0 integrates SEL into the curriculum to promote the holistic development of students. SEL helps students develop emotional intelligence, resilience, and positive relationships, equipping them with essential skills for personal well-being and success in life. In Education 5.0, students play an active role in their learning journey. They are empowered, engaged, and equipped with the skills necessary to thrive in the 21st century. Education 5.0 prioritizes student-centered learning, personalized instruction, self-directed learning, collaboration, critical thinking, and social-emotional development. By embracing the evolving role of students in Education 5.0, educators can create dynamic and inclusive learning environments that prepare students to become lifelong learners, responsible citizens, and contributors in a rapidly changing world.

#### **4. Design Thinking: An Overview**

Design thinking is a problem-solving approach that has gained significant traction in various fields, including education. This chapter provides an overview of design thinking, exploring its principles, process, and application in the context of Education 5.0. Design thinking provides a structured framework for tackling complex problems, fostering creativity, innovation, and user-centered solutions. By understanding the key concepts and steps of design thinking, educators can use this approach to improve teaching,

learning, and problem-solving experiences. Design thinking is a human-centered and iterative problem-solving methodology that places the user or learner at the center of the process. It emphasizes empathy, collaboration, and experimentation to generate innovative solutions. Design thinking encourages a mindset of curiosity, open-mindedness, and embracing failure as a valuable learning opportunity. It draws inspiration from multiple disciplines, including engineering, design, psychology, and business, to create a holistic approach to problem solving. The design thinking process typically consists of several iterative stages, which may vary depending on the specific framework or model used. A commonly used design thinking model is the five-step process developed at the Hasso Plattner Institute of Design at Stanford University:

- Empathize: This stage involves understanding the needs, motivations, and perspectives of the users or learners for whom the solution is being designed. It requires active listening, observation, and engagement with users to gain insight into their experiences and challenges.
- Define: This stage synthesizes the information gathered in the empathize stage to define the core problem or challenge. It involves reframing the problem statement based on user insights and identifying the underlying needs and aspirations that the solution should address.
- Ideate: Ideation is the stage where creative thinking and brainstorming takes place. It encourages the generation of a wide range of ideas and potential solutions without judgment or evaluation. The focus is on quantity and variety, fostering a culture of free thinking and exploration.
- Prototype: Prototyping involves creating tangible representations of ideas generated during the ideation phase. Prototypes can take many forms, from physical models to digital simulations or role-playing scenarios. The goal is to test and iterate ideas to gather feedback and refine the solution quickly and inexpensively.
- Test: The final stage of the design thinking process involves testing prototypes with users or learners to gather feedback and insights. This feedback informs further iterations and refinements of the solution. The

testing phase provides an opportunity to validate assumptions, identify potential improvements, and ensure that the solution effectively meets user needs (Auernhammer & Roth, 2021).

- Design thinking can be applied to a variety of educational contexts, including curriculum design, instructional strategies, and the development of learning experiences. In Education 5.0, design thinking provides a framework for creating student-centered and engaging learning environments. It encourages educators to understand the unique needs and perspectives of their students, foster empathy, and design solutions that address individual learning styles and preferences (Calavia et al. 2023).

## **5. Applying Design Thinking in Education**

The Design Thinking process provides a structured framework for applying design thinking principles to education. By following this iterative process, educators can effectively address complex problems and create innovative solutions that meet the needs of students. Design thinking can be enhanced by incorporating creative learning elements such as Lego Serious Play, art-based activities, or storytelling. These elements encourage students to think creatively, explore different perspectives, and express their ideas in unique ways. By incorporating creative learning elements into the design thinking process, educators can foster a rich and engaging learning experience. Students are encouraged to use their imaginations, collaborate with peers, and bring their ideas to life through a variety of creative mediums. Applying design thinking in education offers several benefits for both educators and students. By using design thinking principles, educators can foster critical thinking and problem-solving skill. Design thinking encourages students to analyze problems, think critically, and develop innovative solutions. It cultivates a mindset of curiosity and inquiry that enables students to tackle complex challenges. Design thinking emphasizes collaboration and interdisciplinary approaches. Students learn to work in teams, communicate



effectively, and value diverse perspectives. Collaboration builds social skills, empathy, and the ability to work effectively in groups. Design thinking sparks creativity and encourages students to think outside the box. It promotes the development of innovative ideas and solutions and fosters an environment that values experimentation and risk-taking.

Through the design thinking process, students learn to embrace failure as a learning opportunity. They develop resilience, adaptability, and the ability to iterate and refine their ideas based on feedback and new insights. Design thinking places a strong emphasis on understanding the needs and perspectives of users or learners. Students learn to empathize with others, consider different points of view, and design solutions that address real-world problems. By incorporating design thinking into education, educators can equip students with key competencies and skills necessary for success in the 21st century. Students become active participants in their learning, develop a growth mindset, and gain the ability to navigate ambiguity and complexity in a constantly evolving world. The use of design thinking in education provides a powerful approach to addressing complex challenges and creating innovative solutions. By following the design thinking process and incorporating creative learning elements, educators can foster critical thinking, collaboration, creativity, and empathy in students. Design thinking empowers students to become active problem solvers, preparing them to thrive in a rapidly changing world where adaptability, creativity, and collaboration are essential skills.

## **6. Lego Serious Play in Education**

Now we turn to a topic that at first glance may seem to have nothing to do with design thinking. It's an activity most of us engaged in as children: building with colorful, interlocking blocks. However, this activity goes beyond mere play; it is a robust methodology used in educational settings to foster creativity, improve communication, and hone problem-solving skills.

This section discusses how this brick-based pedagogical approach is used in educational contexts and its benefits in various fields. Creative learning methodologies are strategies and tools designed to support students' creativity and innovation in their academic journey. These approaches aim to make learning engaging and enjoyable, encouraging learners to adopt new perspectives, experiment with fresh ideas, and pursue their curiosity. One particular creative learning method involves the use of interlocking bricks and other materials to create immersive and interactive learning experiences. This method is a structured process that uses the tactile engagement with bricks to increase learning effectiveness. Through hands-on activities with these bricks, learners are motivated to visually articulate their concepts, construct models, and participate in narrative storytelling. This approach promotes critical thinking, teamwork, and communication skills, while fostering creativity and problem solving. This brick-based educational tool has been integrated into educational ventures such as Edyou Play, targeting students, educators, school leaders, and even parents. It represents a novel and engaging educational technique that resonates with the 4 C's of education: Cooperation, Collaboration, Creativity and Critical Thinking.

The benefits of integrating brick building into the classroom are many. First, it stimulates creativity and imagination by giving students the freedom to build and design with bricks. Second, it enhances problem-solving skills as students tackle construction and design challenges. Third, it helps develop fine motor skills and visual-motor coordination, especially in younger students. In addition, bricks serve as versatile teaching tools across subjects, making education more interactive and fun. In addition, it promotes teamwork and communication among students, encouraging effective collaboration and interpersonal skills. In order to maximize the benefits of this method in educational settings, it is recommended to begin with a warm-up phase to stimulate participants' creativity. In this initial phase, instructors encourage participants to experiment with bricks, creating simple figures or stable structures. After the warm-up, the process unfolds through four stages: Exploration, Metaphor, Sharing, and Reflection. Each stage includes

different activities that guide participants through a journey of problem solving and storytelling.

## **7. Incorporating LEGO Serious Play into Stanford's Ideate Phase**

LEGO Serious Play (LSP) is a powerful methodology that can be integrated into various stages of the design thinking process. This chapter explores an innovative method that, while seemingly unrelated to design thinking, plays a critical role in enhancing the Ideate phase, particularly at Stanford University. The focus is on the use of a distinctive facilitation technique involving interlocking bricks to foster creativity, communication, and problem solving. During the Ideate phase of the Design Thinking process, the goal is to generate a wealth of inventive solutions to a given challenge. This stage encourages expansive thinking, pushing participants to think outside the box and consider novel solutions. This technique uses these bricks as a medium for ideation and dialogue, allowing participants to visualize and share their thoughts through the construction of tangible models. This approach not only fosters deeper engagement and collaboration, but also enhances creativity. Interlocking bricks serve as a tactile tool that stimulates imaginative thinking and allows ideas to be expressed in a dynamic and visual way. This method ensures the active participation of all participants, ensuring that every voice is heard and contributing to a culture of inclusivity that values diverse viewpoints. Building with these bricks helps bridge communication gaps and provides a universal medium for sharing ideas, which is especially beneficial for those who are less comfortable with verbal expression. When integrating this brick-based technique into the ideation phase, several key considerations are essential for its fruitful incorporation. Preparation is paramount, requiring an adequate supply of bricks and various components to allow for unrestricted creative expression. Setting clear goals and challenges guides the creative process and ensures that solutions are aligned with the project's objectives. Establishing guidelines provides structure and directs creative efforts toward productive outcomes. The

facilitator's role is critical, guiding participants through the methodology, emphasizing the importance of metaphor building and narrative, and steering the session toward meaningful outcomes. Storytelling is an essential element, encouraging participants to delve into the narratives behind their creations, fostering deeper connection and understanding. Reflective dialogue further enriches the session, allowing ideas to be explored and emerging patterns to be identified. Documenting insights is critical to capturing the wealth of ideas generated and serving as a resource for further development. Creating a supportive environment where ideas can be shared freely without fear of judgment is essential to fostering innovation. Effective time management ensures that the activity aligns with the broader design thinking timeline, maintaining focus while allowing for exploration. The facilitator's expertise is key to ensuring a dynamic and insightful session, skillfully managing group dynamics and drawing out valuable insights. Combining this method with other ideation techniques can enhance the effectiveness of the ideation phase and provide a multifaceted approach to creative problem solving. This integration opens new avenues for creativity and innovation in the Ideate phase at Stanford University, leveraging the tangible and immersive qualities of interlocking bricks to inspire creativity. However, its success depends on careful preparation, skillful facilitation, and a thoughtful approach to its unique dynamics. The versatility of this brick-based method is demonstrated across a range of disciplines, from ICT and urban planning to law, cultural studies and financial analysis. Each example demonstrates the method's ability to make complex concepts tangible, and to increase understanding and engagement across a wide range of topics. Encouraging creative thinking and exploring new pedagogical approaches can enrich the learning experience, underscoring the method's broad applicability and potential in educational settings.

## **8. Unlocking the benefits: Improving Student Learning through LEGO Serious Play**

Integrating hands-on construction activities into the design thinking framework significantly increases student engagement and innovation. This approach uses tactile construction exercises, which offer a variety of benefits and allow students to unlock their creative potential in unique ways. Through these construction-based tasks, students are motivated to unleash their imagination and envision novel solutions. The act of creating physical models and representations facilitates a deep dive into innovative problem solving that pushes the boundaries of traditional thinking. The challenges presented by these construction activities sharpen critical thinking skills. Students are tasked with dissecting complex issues, recognizing patterns, and developing strategic solutions to overcome difficulties. This methodology cultivates a refined approach to critical analysis and problem solving, and encourages students to look at challenges from multiple angles. Effective communication is critical to any team-based design process. Using construction as a medium, this method provides a distinctive way for students to communicate their concepts. By using metaphors and physical representations as communication tools, students can express their ideas more clearly and increase mutual understanding within groups. At its core, collaborative construction exercises promote teamwork. By working together to create models and share ideas, students hone their collaborative skills. They hone their skills in active listening, valuing different points of view, and synergizing efforts toward common goals. This approach also fosters prototyping skills, moving students' ideas from abstract thoughts to tangible results. Through the iterative process of model building, students refine their designs, bringing clarity and concrete form to their innovative visions. In addition, this hands-on methodology fosters a culture of innovative thinking among students. Immersed in this creative process, they are inspired to seek inventive solutions to complex problems, fostering an entrepreneurial spirit of adaptability and perseverance. Such an environment is conducive to developing the skills needed to meet the challenges of the modern world.

By combining the design thinking approach with hands-on construction activities, students gain access to a comprehensive educational experience. This synergy cultivates a rich set of skills, including creativity, analytical thinking, clear communication, effective collaboration, practical prototyping, and forward-thinking problem solving. This dynamic fusion empowers students to be proactive in their educational pursuits and equips them with the tools to excel in an ever-evolving global landscape.

## **9. Lessons Learned**

Allowing students to articulate their visions through interactive brick-building exercises unleashes their creative potential and encourages innovative thinking. Engaging in these group tasks fosters a spirit of collaboration, appreciation of diverse viewpoints, and clear dialogue among learners. By fostering an environment of support and encouragement, students are encouraged to pursue original ideas and venture into uncharted territory without fear of criticism. Tackling challenges in this way sharpens students' analytical skills, enabling them to dissect challenging problems and forge groundbreaking solutions. The practice of sharing and expanding the group's ideas underscores the value of active engagement and mutual respect, essential components of a collaborative learning environment. This interactive approach also teaches students about the cyclical nature of design, emphasizing the critical role of prototyping in the iterative refinement and evolution of their concepts. Motivating students to consider their constructs and the symbolic meanings behind them enriches understanding and fosters introspective skills. As participants navigate different viewpoints, modify their constructs, and adapt their approaches to new insights, they cultivate an adaptable and resilient mindset. Such flexibility is essential for navigating the complexities of modern problem solving. In addition, recognizing and celebrating the diversity of unique ideas and solutions that emerge during these sessions underscores the value of each individual's contribution and

fosters a culture of inclusiveness. By adopting these nine pedagogical strategies, instructors can fully harness the transformative power of integrating interactive brick-building into the design thinking framework. This methodology not only enhances the learning experience, but also equips students with the skills they need to thrive in an ever-evolving world.

## **10. Conclusions**

The implementation of the Design Thinking process in education, referred to as Education 5.0, holds great promise for transforming traditional approaches to learning. It offers a student-centered, interdisciplinary approach that fosters creativity, problem solving, and collaboration. Design Thinking empowers students to become active participants in their learning journey. By engaging in hands-on, real-world projects, students develop critical thinking skills, empathy, and a deep understanding of complex problems. The interdisciplinary nature of Design Thinking allows students to connect knowledge and skills from different disciplines, fostering a holistic and integrated learning experience. It encourages students to think beyond silos and apply their learning in meaningful ways. Design Thinking promotes a growth mindset, encouraging students to embrace challenges, learn from failure, and iterate their ideas. It cultivates resilience, adaptability, and risk-taking, all of which are essential for success in a rapidly changing world. Collaboration is at the heart of the design thinking process. Through teamwork and effective communication, students learn to value diverse perspectives, leverage collective intelligence, and co-create innovative solutions. The design thinking process fosters creativity and innovation by giving students the opportunity to ideate, prototype, and test their ideas. It encourages out-of-the-box thinking, curiosity, and the exploration of multiple possibilities. Education 5.0 embraces technology as an enabler of learning and creativity. Digital tools and resources enhance the design thinking process, enabling virtual collaboration, data analysis, and the integration of emerging technologies. Authentic assessment practices align with the

principles of Education 5.0. Performance-based assessments, portfolio evaluations, and peer feedback provide opportunities for students to demonstrate their learning and growth throughout the design thinking process. Professional development plays a critical role in enabling educators to effectively implement Education 5.0. Teachers need ongoing support, training, and resources to adopt the design thinking mindset and facilitate meaningful learning experiences for their students. Education 5.0 is a paradigm shift that requires a systemic approach. It requires educational institutions, policymakers, and stakeholders to embrace a learner-centered model, foster collaboration across disciplines, and provide the infrastructure and support necessary to implement Design Thinking. In conclusion, Education 5.0 has the potential to revolutionize education through the adoption of the Design Thinking process. It empowers students to become creative problem solvers, critical thinkers, and effective collaborators. By embracing interdisciplinary approaches, leveraging technology, and fostering a growth mindset, Education 5.0 prepares students for a future that demands adaptability, innovation, and a deep understanding of complex challenges.

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