# Design Thinking Process Employed in Real-Life Design Studio Context

## A Case Study from Sri Lanka

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**Abstract.** The design studio is a unique environment typically situated at the center of design education. This study explores the transition from a conventional design studio to a real-life design context and examines the changes in the design process adopted by students in such a setting. For this study, 25 interior design undergraduates were included through a convenience sampling technique. The students were exposed to a real-life context where they could engage with contextual scenarios and collaborate with end users whom they encountered in a workplace setting. In the architectural design process, end users are the individuals who will benefit from the design once it has been constructed. The Manin Market in Peliyagoda, Sri Lanka, was selected as the real-life context for this study. Action research methodology was employed, with data collected through naturalistic observation, focus group interviews, and photographs. The data were analysed by using a six-phased thematic analysis. The findings reveal the emergence of the empathizing phase as a critical component, interwoven with all major design thinking phases. Additionally, the study identifies the use of information and communication technology (ICT) tools as essential mediums for design communication throughout the students' design process in a real-life context.

**Keywords:** design process · real-life context · empathizing · end-user · ICT tools

## 1 Introduction: Conventional Design Studio

The architectural design process has been shaped by design studio pedagogy since the 19th century and has continuously evolved up to the present [10]. Typically, design students engage in design activities within a conventional design studio (CDS), which is a fixed learning environment located within an institutional setup and created for collaborative design learning [16, 18]. Traditionally, design studios follow a mode of


W.-S. Wang et al. (Eds.): ICITL 2025, LNCS 15914, pp. 66–75, 2026.
https://doi.org/10.1007/978-3-031-98197-5_8

delivery where students address problems through design interventions [23]. This traditional work environment is designed to foster creativity and innovation. However, design studio practices within this context remain conventional and still adhere to a master-apprentice model that has been in place since the Renaissance. Consequently, CDS has significantly influenced the design process of students. Nonetheless, the CDS context has many inherent limitations that distance students from real-life scenarios [3]. Students are often assigned ill-defined design problems to solve within a CDS context [8]. However, CDS are not equipped to explore real-life problem scenarios. Although the context of education has evolved over time, design studio practices have not sufficiently adapted to meet new challenges. The CDS studio context fosters a peer learning environment that encourages reflective learning; however, this reflection typically occurs only between students and facilitators [10]. In the CDS context, reflective learning is confined to interactions between students and facilitators [23].

### 1.1 Empathy – As a Part of the Design Process

The field of design continually seeks more meaningful methods to address human needs [6]. Bridging the empathy gap between users and designers is the key challenge. Empathizing, the process of understanding user needs, is crucial but often hindered in architectural education due to limited real-world exposure [2, 20, 22]. CDS limits the direct interaction with real user leads to hypothetical design solutions [17]. Established design thinking models encourage designers to maintain a direct and ongoing dialogue with end users [9]. However, there appears to be a gap in the literature regarding the natural design thinking process of architectural students. These students often do not adhere to established methods and processes during their design work [15]. This study focuses on uncovering the natural design thinking process that students adopt while designing in a real-life context rather than in a CDS environment.

### 1.2 Role of ICT Tools in the Design Process

The support students receive from ICT tools in design pedagogy is substantial. Students use ICT tools to connect to virtual platforms, collaborate with teams, and enhance their design ideas [1, 13]. The dynamic functions available in ICT tools have made the design thinking process of students more complex. The use of ICT tools spans from initial web browsing for design inspiration to digital prototyping using software in design pedagogy [12]. ICT tools have altered how students interact with design studies [25]. However, the use of ICT tools has led to a notable reduction in interpersonal connections within studios [22]. Excessive exposure to these digital design domains may limit the natural design generation that comes from inherent creativity and experience [4]. These external stimuli have diminished the creative idea generation ability of students while working in a CDS setup [11]. The restricted learning environment created by CDS motivates students to explore virtually rather than physically. Our previous empirical study found that students' design processes often begin with ideation without any form of empathizing with the end-user when working in a CDS context, which is problematic [15].

## 2 Problem Statement

ICT tools play a crucial role in shaping the design process. The way these tools are employed can reflect the design thinking process. The inherent limitations of (CDS) motivate students to rely more on ICT tools [18]. Gathering user feedback and exploring real-world contexts are often substituted by ICT tools, allowing students to browse the internet. This shift has contributed to the development of assumption-based design processes. When students place greater trust in information obtained from their devices rather than their own experiences, they may not question or critically analyse the content they consume. This can result in passive acceptance of information, which limits the ability to engage in critical thinking. This study aims to explore how the design process can be manifested in real-life contexts and to investigate the role of ICT tools in such contexts.

### 2.1 Research Questions

The following research questions guided this study:

1. What is the design thinking process employed by students in a real-life context?
2. How does the Empathizing phase unfold in a real-life design studio context?
3. How can students use ICT tools in a real-life design studio context?

## 3 Research Methodology

We employed an action research methodology, which involved systematically studying a problem in a real-world context with the collaboration and active involvement of several participants, including researchers [24]. Action research methodology provides a framework for critically reflecting on the research area by engaging stakeholders relevant to specific research problems [21]. The actions were carried out by students, and data was collected through their active participation. We adopted the eight-phase action research framework introduced by Cohen [7]. In our previous empirical studies, we identified that students were not effectively empathizing during their design process, which we attributed to their overreliance on ICT tools [15]. To address these issues, we moved from the CDS context to a real-life context. We immersed students in real-world settings that presented multiple design challenges. For this action study, we selected the bustling Manin Market complex in Peliyagoda, Sri Lanka, as the real-life design studio context. The rationale behind choosing this dynamic location was to provide students with ample opportunities for direct collaboration with real users. Students were tasked with developing new interior design solutions for the selected open retail shops at Manin Market, and the researcher observed their design processes.

### 3.1 Data Collection and Analysis

This study involved 25 second-year interior design students from NSBM Green University, selected through convenience sampling due to their representative skill level and accessibility. Students were divided into five random groups, each observed over

three days in a real-world setting, totaling 15 days of data collection. A combination of naturalistic observation, participant narratives, and focus group interviews ensured data reliability. Data were analyzed using a six-phase thematic analysis, with textual and non-textual data coded separately and then aligned [5]. Primary categories were clustered in the secondary categories (labelled as "sca" in the thematic map: Fig. 1), and meaningful themes (labelled as "t" in the thematic map: Fig. 1) were developed based on the secondary categories. After reviewing the themes, dimensions (labelled as "d" in the thematic map: Fig. 1) were developed based on the meanings and values identified in the themes. Themes and dimensions were refined through iterative coding and categorized into primary, secondary, and thematic layers. An inter-coder analysis with a qualified academic researcher who is an architect by profession yielded 94% agreement, enhancing the trustworthiness and reliability of the findings.

The study obtained ethical approval from NSBM Green University and relevant authorities for student and vendor participation. Legal compliance and participant privacy were ensured, with informed consent collected after clear briefings. Anonymity was maintained, and participation was voluntary, with no withdrawals despite a standby team being prepared.

## 4 Results

Through thematic analysis, we identified 34 initial codes, 19 initial categories, 19 secondary categories,18 themes, and 12 dimensions. These dimensions provided a structural framework for interpreting and presenting the results. Below are the 12 dimensions identified through the data analysis (labeled as d1,d2, etc.. Please refer to the thematic map in Fig. 1): d1) Context-motivated empathy process, d2) Investigative design approach, d3) User-centred idea development process, d4) Ideas developed through internal stimuli found in a real-life context, d5) Continues end-user collaboration, d6) ICT tools as a data recording medium d7) ICT tool supported Design Communication, d8) Iterative empathizing phase, d9) Functionality over aesthetics, d10) Ideas developed through external stimuli, d11) Real world testing, d12) Synthesizing information fed by real users and ICT devices.

### 4.1 The Design Thinking Process Employed by Students in Real Life Design Studio Context

In answering Research Question 1, regarding the design thinking process employed by students in a real-life context, the 12 dimensions identified through the thematic analysis provide valuable insights. The students began with site observations and user interactions (sca1), explored contextual demands (sca2), and initiated an understanding of user requirements and behaviour in the real-life context (sca3 & sca4) as their initial steps and activities. These actions heightened their sensitivity to contextual significance (t1) and deepened their understanding of user needs (t2 & t3). They started their design thinking process by focusing on understanding the end user and contextual demands, which are categorized as empathizing acts [19]. These empathizing acts were driven by the contextual situations (d1). Thus, the design process in the real-life context

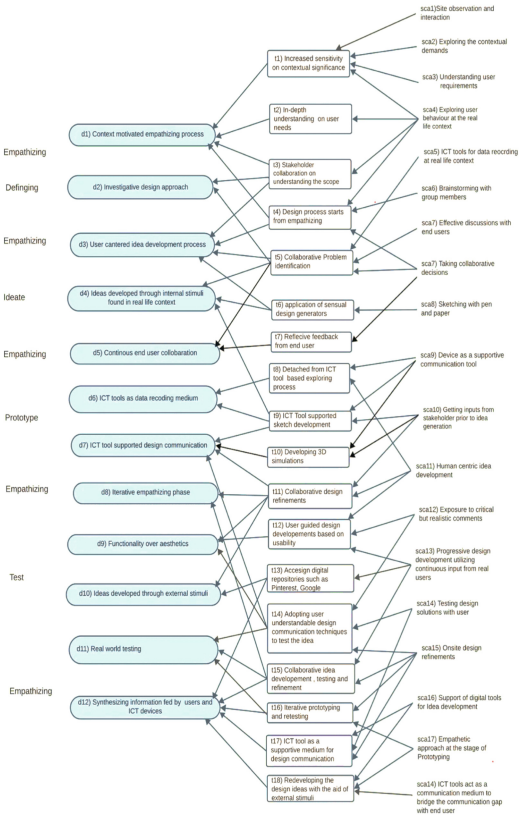


**Fig. 1.** Thematic map with codes, categories, themes and dimensions (Developed by authors)

appropriately began with empathizing with the end user and the environment. Following the empathizing phase, students began brainstorming with group members (sca6) and recording data related to the user and context (sca5). The investigative design approach (d2) appears to have led them to define the problem they identified. This marks the defining phase, which follows empathizing. Sca6 and Sca7 describe empathizing acts that were revisited after the defining phase. After this second iteration of the empathizing phase, students proceeded to the ideation phase, as reflected in d3: the user-centred idea development process. D4: ideas developed through internal stimuli found in the real-life context further explain the ideation phase, which follows the second empathizing phase after the defining stage. D5: Continuous end-user collaboration was developed through t7 and sca7. The subcategories, themes, and dimensions illustrate another empathizing phase that occurred in the real-life context, following the ideation stage. According to the results, students developed their sketches into 3D prototypes using digital software. T10: collaborative design refinements, along with t12: user-guided design developments based on usability, demonstrate the presence of empathizing acts even after the prototyping phase. The testing phase occurred following the fourth iteration of the empathizing phase. T15 and t16 led to the development of d11: real-world testing. Students made

onsite design refinements (sca15 & sca14) in response to end-user feedback. They synthesized information provided by both the end users and ICT tools (d12) to refine their designs during testing. The results show that continuous end-user involvement fostered empathy throughout all major phases of the students' design thinking process.

### 4.2 Manifestation of the Empathizing Phase of Design Thinking Process of Students in Real Life Context

In answering RQ2, *How does the empathizing phase unfold in a real-life design studio context?* we identified six dimensions that explain the empathizing phase of the students' design thinking process in a real-life context. Those are: d1) Context-motivated empathy process, d2) Investigative design approach, d3) User-centred idea development process, d4) Ideas developed through internal stimuli found in a real-life context, d8) Iterative empathizing phase, d9) functionality over aesthetics. D1 was developed based on the themes t1, t2, t3, and t4. The shift from a CDS context to a real-life context heightened students' sensitivity to contextual significance (t1) and deepened their understanding of real user requirements (t2 & t3). The real-life context motivated students to engage more with end users and explore real-world contextual situations in greater depth (D1). Stakeholder collaboration leads to an investigative design approach (t3, D2). D3 explains the user-centred idea development process that occurred in a real-life context (t3, t4, t5, & t6). Stakeholder collaboration in understanding the project scope (t3), beginning the design process by empathizing with real users (t4), and the collaborative problem identification by students and stakeholders (t5) led students to develop user-centred design ideas (D3). In the real-life context, students relied on their sensory experiences and prior knowledge to generate ideas (t6) instead of searching for them on the internet. D4: "Ideas Developed Through Internal Stimuli Found in Real-Life Context" was constructed based on themes 5, 6, and 8. Students worked collaboratively with end users in the real-world context to understand contextual situations and user requirements (t5). This reinforced a deep understanding of the problem and stimulated their thinking about ways to solve existing issues. T6: "Application of Sensual Design Generators" illustrates how these real-life contextual experiences inspired design students to create more grounded, user-centred solutions. Collaborative design refinements (t11) heightened their awareness and sensitivity to user needs and contextual factors. This collaboration was identified as an internal stimulus that inspired students to generate design ideas. According to the results, empathizing acts were iterated multiple times (d8) throughout the design process. By working closely with users to exchange design ideas (t11 and t12), students were able to develop more practical and user-centric design solutions that aligned with real-world requirements. D9: "Functionality Over Aesthetics" was constructed by combining the meaningful insights from t10 and t12. User-guided and collaborative design developments focused on usability (t10 & t12) highlight the importance of prioritizing real functionality over aesthetics. This hands-on design experience in a real-world context allowed students to better understand and prioritize users' practical needs over aesthetic considerations.

### 4.3 Role of ICT Tools

To address Research Question 3, five dimensions were identified to explain how students used ICT tools in a real-life design studio: d6 (data recording), d7 (design communication), d10 (external stimuli), d11 (real-world testing), and d12 (synthesizing user and device input). Unlike in the conventional design studio, where ICT tools were used mainly for idea browsing [14, 15], in the real-life context, students employed ICT tools throughout the process. They recorded contextual data (d6), used platforms like WhatsApp (ca9) for collaboration (d7), and integrated information from sources like Pinterest and TikTok to expand on their initial ideas (d10, sca17). They combined insights from digital and human sources (d12) to refine designs. Prototypes were iteratively tested and refined with user feedback using ICT tools (d11), supporting empathic design (d8). Overall, ICT tools have enhanced designers' ability to communicate with stakeholders in a real-life context. It is evident that ICT tools have increased empathy between students and real users, particularly during the prototyping and testing stages (Fig. 2).

**Fig. 2.** Real life design testing (d11) Testing design solutions by developing 3D simulations (Photographs were taken by the researcher with the informed consent of the participants and authorities.)

## 5 Discussion

### 5.1 Emergence of Iterative Empathizing Acts in Real-Life Design Studio

Based on the results, we developed a design thinking model adopted by students in a real-life design studio context (See Fig. 3). A significant finding of this study is the emergence of the empathizing phase as a recurrent, iterative activity interwoven throughout all phases of the design process. This continuous empathy not only enhanced the practicality and usability of the designs but also fostered a more dynamic and responsive design process. The transition from a CDS to a real-life context has significantly elevated the level of empathy. This is a significant variation from the design thinking model used in a conventional design studio context [14, 15].

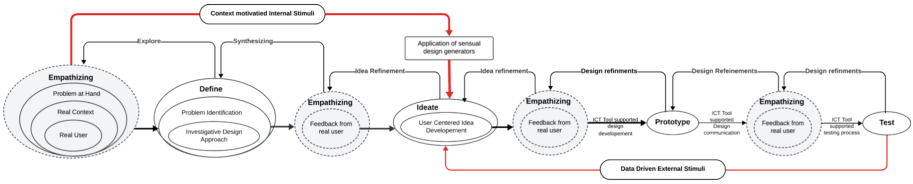


**Fig. 3.** Design thinking process employed by students in a real-life design studio (extended design thinking model developed by authors based on IDEO design thinking model [9]

### 5.2 Role of ICT Tools in Real Life Context

The RLDS marked a positive shift, as students prioritized understanding and addressing real requirements over merely developing aesthetically pleasing design solutions. ICT tools facilitated improved idea sharing and development by connecting students to a wide range of digital repositories. Their role extended beyond connecting students to external sources; they also enabled seamless collaboration among students. The use of digital tools for prototyping supported the rapid development of 3D visualizations, which could be easily tested with real users in the market. Initially, manual tools were predominant during the early phases of the design thinking process (empathizing, defining, and ideating), but there was a gradual shift towards the use of ICT tools for prototyping and testing.

## 6 Conclusion

This paper reports on an action research study involving 25 interior design undergraduates in Sri Lanka, aiming to explore how the empathizing phase unfolds in real-life contexts and how ICT tools are used in the design process. The study resulted in a revised design thinking model featuring an iteratively repeated empathizing phase, which enabled more effective refinement and validation of design solutions than the traditional linear model used in conventional design studios (CDS) [15]. It also identified notable differences in how ICT tools are utilized in real-life versus CDS contexts.

Students extensively used ICT tools to capture user requirements, provide feedback, document, reflect on ideas, and, most importantly, refine those ideas through software-based prototyping. This digital integration between real users and students enhances not only communication and collaboration but also allows for more dynamic and responsive design iterations. We believe a paradigm shift is essential for the evolution of design pedagogy to include novel practices. Incorporating real-life design experiences and fostering empathy in design education are crucial for developing competent and compassionate designers. This holistic approach to design pedagogy will ultimately lead to more innovative, user-centred, and impactful design solutions.

**Disclosure of Interests.** Authors have no competing interests to declare.

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