PLANT AWARENESS DISPARITY (HISTORICALLY 'PLANT BLINDNESS'): CULTIVATING A NOVEL MUTUALISTIC RELATIONSHIP BETWEEN URBAN CHINESE GENERATION Z AND INDOOR PLANTS

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DECLARATION

I Yue Leng, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis. The thesis has not been submitted for a comparable academic award.

Signed 

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ABSTRACT

This thesis examines how speculative participatory design (SPD), informed by more-than-human ethics and a living service perspective, can reduce plant awareness disparity (hereafter, PAD) among urban Chinese Generation Z. PAD is historically termed "plant blindness", although this thesis uses PAD as the primary term. Rather than adding more factual botany, the project tests whether emotionally resonant, iterative touchpoints—from role-play workshops to light-weight digital check-ins—can shift perception, sustain care routines, and support ethical reflection.

The research combines a series of Plant Hospital workshops (n=24), participatory home observations, semi-structured interviews, and eight weeks of WeChat-based reflection. Data were analysed through reflexive thematic analysis with triangulation and member checks. Findings show three consistent shifts: (1) participants began to ascribe responsive agency to plants in practical, non-sentimental terms; (2) periodic prompts and domestic micro-routines stabilised care behaviours beyond the workshop setting; and (3) ethical talk moved from abstract moral claims to situated responsibility (time, light, placement, neglect and repair).

The study contributes theoretically by reframing plant awareness as a relational and ethical problem, not only a perceptual one. Methodologically, it operationalises more-than-human ethics through SPD artefacts, domestic observations and longitudinal prompts. Practically, it specifies a minimal, replicable set of service touchpoints suitable for schools, community partners, and small commercial venues.

Limitations include a culturally specific sample, facilitator dependence, and engagement fatigue over longer intervals. Future work should test mixed-method metrics, lower-touch facilitation, and policy-linked deployments across diverse sites. Overall, the thesis provides evidence that iterative, ethically framed design can turn

short-term curiosity into sustained, situated care for indoor plants among urban Gen Z.

Keywords: Plant Awareness Disparity (PAD); Urban Generation Z; Speculative Participatory Design; More-than-human Ethics; Living Service Design.

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ABBREVIATIONS / COMMON TERMS

Plant Awareness Disparity (hereafter, PAD), historically termed "Plant Blindness".

Refers to the tendency to overlook plants' significance, treating them as background scenery or purely functional assets. Scholars such as Wandersee and Schussler (1999:82) describe it as a cognitive and cultural bias, in which plant life is seen as less interesting or important than animal life. Other researchers, including Amprazis and Papadopoulou (2020), have further explored this phenomenon in educational contexts.

Urban Chinese Generation Z.

Describes the demographic born roughly between 1995 and 2010 who live in major Chinese cities. They grow up in a context shaped by rapid urbanization, digital lifestyles, and intense academic pressures, often resulting in minimal firsthand contact with horticulture or nature (Twenge, 2017; Stagg and Dillon, 2022).

Phyto-centred Design.

Referencing the work of Drouet and Lacrouts (2020:312), phyto-centred design opposes the normative user-centered approach by re-situating plants as protagonists in the design narrative, acknowledging their agency and integral role within shared environments. This orientation asks how design might integrate plant well-being and occupant empathy to foster a more-than-human relational ecosystem (Clarke et al., 2019).

PlantCo Lab.

An MFA design project developed by Yue (2020), serves as a conceptual precursor to this thesis. While PlantCo Lab experimented with creative methods of communicating plant health data and encouraging occupant care, the current research aims to deepen and broaden these experiments, embedding them in a transdisciplinary and interpretivist framework.

"Users"-centred Design.

Although user-centered design typically focuses on the human user's needs and experiences (Norman, 2013), the "users"-centred design perspective described here merges user-centered practices with phyto-centred philosophies (Drouet and Lacrouts, 2020). As a result, plant needs and occupant–plant reciprocity become central design considerations rather than peripheral constraints.

More-than-Human Design.

A design philosophy that moves beyond human-centered perspectives to include nonhuman entities—such as animals, plants, and ecosystems—as active stakeholders. It challenges anthropocentric assumptions by acknowledging other life forms' agency, needs, and value (Light, 2024; Haraway, 2008).

Speculative Participatory Design.

A hybrid approach combining speculative design (which creates imaginative, future-oriented scenarios; Dunne and Raby, 2013) with participatory design (which actively involves stakeholders in co-creation; Manzini, 2015). This method encourages participants to explore unconventional ideas—like "Plant Hospital"—and reflect on their values and behaviors toward plants (DiSalvo, 2022).

Living Service Approach.

Refers to a design mindset in which a service evolves over time, emphasizes ongoing relationships, and acknowledges more-than-human stakeholders (Clatworthy, 2019).

Instead of treating interactions as one-off transactions, living service design sees continual adaptation, collaboration, and emotional engagement between occupants and plants (Stickdorn et al., 2018).

Plant Hospital Concept.

Researchers conducted an experimental workshop where participants engaged with indoor plants as metaphorical patients, fostering novel perspectives on plant life and agency through direct care interactions (Leng, 2020). Similar speculative interventions have been explored in other contexts by designers advocating for more-than-human approaches (Chen and Pschetz, 2024).

Speciesism.

Coined by thinkers like Singer (1975:6), speciesism critiques the hierarchy that places certain species (often humans) above others in moral importance. In the context of this thesis, it highlights how plants are habitually ranked below animals in considerations of ethical or emotional care (Haraway, 2008; Regan, 1983).

Occupant–Plant Reciprocity.

A concept underscoring a mutual relationship between humans (occupants) and indoor plants. Rather than a user–object dynamic, occupant–plant reciprocity suggests that plants and humans can both shape and benefit from shared living environments, especially when design fosters ongoing empathy and attention (Drouet and Lacrouts, 2020; Clarke et al., 2019).

1 INTRODUCTION

1.1 UNDERSTANDING PLANT AWARENESS DISPARITY IN URBAN CONTEXTS

Indoor plants have long occupied a special place in diverse cultural contexts, serving as sources of visual appeal, emotional solace, and—at times—edible or medicinal resources. Despite their pervasive presence, a growing body of research highlights the phenomenon of plant blindness, wherein individuals fail to notice or adequately value the plants populating their immediate surroundings (Amprazis and Papadopoulou, 2020:1067). Throughout this thesis I adopt plant awareness disparity (PAD) as the primary term for the phenomenon widely known historically as "plant blindness". This choice follows recent scholarship that reframes the issue as a spectrum of awareness rather than a universal deficit and addresses concerns about disability-as-metaphor associated with the word "blindness" (e.g., Parsley, 2020; Amprazis & Papadopoulou, 2020). I use the phrase "plant blindness" only when (a) quoting titles or authors who employ the original term, or (b) discussing the historical development of the construct. Unless otherwise specified, both terms refer to the same phenomenon. In keeping with inclusive language, this thesis avoids using "blindness" metaphorically to signify ignorance. Although plant blindness broadly refers to the inability to perceive and appreciate plants in general—including outdoor and wild vegetation—this study specifically focuses on indoor plants. Indoor plants offer unique potential to reconnect urban dwellers, especially multicultural Generation Z, with nature within their immediate living spaces.

This phenomenon involves neglecting plants and undervaluing their ecological roles (Balas and Momsen, 2014; Gagliano, 2013; Hoekstra, 2000; Uno, 2018; Wandersee and Schussler, 1999). Plants significantly enrich human lives by purifying air, providing calming aesthetics, and supporting ecosystems crucial to survival, yet they often remain overshadowed by other concerns within modern urban environments. The urgency of plant blindness is particularly evident in contemporary societies prioritising sustainability, ecological responsibility, and mental well-being. Ignoring the integral role of greenery in daily life may hinder efforts aimed at sustainable agriculture, reforestation, and creating green urban spaces. Moreover, by primarily viewing plants as ornamental accessories or commodities, anthropocentric biases preventing deeper human–nature connections can inadvertently be reinforced.

1.2 URBAN CHINESE GENERATION Z

This thesis undertakes a transdisciplinary inquiry into plant blindness among urban Chinese Generation Z—a demographic uniquely affected by digital saturation, intense academic and career pressures, and rapidly shifting social norms. My personal engagement with sustainability and design, alongside a keen interest in indoor plants, inspired me to confront how plants are commonly reduced to mere decoration or afterthoughts. Recognising indoor plants as living beings with significant ecological and social importance motivated an exploration of the foundations of plant blindness, particularly among young Chinese urban dwellers. Misconceptions regarding plants' ecological importance, coupled with misunderstandings about human perceptions and valuations of landscapes, necessitate deeper inquiry (Torres-Porras and Alcantara-Manzanares, 2019:130).

While discussions about plants' ecological contributions typically focus on their provision of food, oxygen, and raw materials, this research extends to examining moral and emotional dimensions influencing human perceptions and treatment of indoor plants. The overarching goal is reframing indoor plants as active co-inhabitants or collaborators, rather than passive commodities.

1.2.1 Factors Contributing to Plant Blindness

Plant blindness among urban Chinese Generation Z has intensified due to rapid urbanisation and digitally mediated lifestyles. This demographic, born between 1997 and 2012 (Beresford Research, 2023), typically experiences limited direct interaction with nature, significantly impacting their recognition of plants' presence and ecological value within urban ecosystems (Wang, 2021:322; Amprazis and Papadopoulou, 2020:1070). Such neglect reduces sensitivity towards environmental issues, undermining their potential contribution to urban sustainability (Amprazis, 2020:1066).

1.3 TOWARDS EMOTIONALLY RESONANT AND ETHICAL DESIGN

Existing literature broadly acknowledges plant blindness as significant; however, prevailing educational and design interventions exhibit clear limitations. Traditional educational strategies typically emphasise factual botanical knowledge or short-term environmental awareness campaigns (Jose et al., 2019:170). These approaches frequently lack emotional engagement or sustained interaction, resulting in inadequate long-term connections between young individuals and plants (Amprazis and Papadopoulou, 2020:1070). Similarly, prior design interventions predominantly prioritise technological functionality or efficiency, neglecting emotional and ethical dimensions in human–plant interactions (Clarke et al., 2018:15).

Accordingly, this thesis proposes an emotionally resonant, ethics-led design framework to address this gap. Such a framework aims to effectively assist urban Chinese Generation Z in overcoming plant blindness by fostering enduring connections with indoor plants.

1.4 CHAPTER OVERVIEW

This thesis unfolds in six chapters, each progressively building the argument that speculative participatory design—grounded in more-than-human ethics and Living Service Design principles— can effectively address plant awareness disparity (PAD) among urban Chinese Generation Z by fostering emotional connection and ethical engagement with indoor plants.

Chapter 1 (Introduction) sets the stage by outlining the problem of plant blindness in the context of rapid urbanisation and environmental disconnection, particularly among young urban populations in China. It introduces the central research questions and theoretical orientation, establishing the rationale for a design-led intervention grounded in multi-species ethics.

Chapter 2 (Literature Review) critically surveys existing definitions of plant blindness and the psychological, educational, and cultural factors contributing to it. It examines conventional and emerging approaches to address the issue—highlighting the limitations of fact-based education and digital tools—and introduces speculative and participatory design as underexplored yet promising alternatives. This sets the foundation for the study's interventionist focus.

Chapter 3 (Methodology) presents the methodological framework, detailing the integration of speculative participatory design with qualitative research techniques. It justifies the choice of methods—including speculative workshops, observational studies, interviews, and digital engagements—and explains how these were used to generate insights into emotional and ethical shifts in participant behaviour. It also addresses ethical considerations and the study's overall rigour.

Chapter 4 (Findings) synthesises data from workshops, interviews, and digital interactions to present the study's key thematic outcomes, such as emerging empathy towards plant agency, emotional bonding through narrative scenarios, and shifts in

ethical responsibility. It highlights both the affordances and limitations of speculative participatory design in achieving lasting engagement.

Chapter 5 (Discussion) interprets the findings in relation to the theoretical frameworks, considering how speculative design reshapes human-plant relations and contributes to more-than-human ethical discourse. It also critically reflects on the practical viability of such methods in broader ecological and educational contexts.

Chapter 6 (Conclusion) summarises the research contributions, outlines implications for design practice and ecological education, and proposes directions for future research—including scaling participatory methods and adapting them to culturally diverse contexts.

2 LITERATURE REVIEW

2.1 ORIGINS AND EVOLUTION OF THE CONSTRUCT: FROM "PLANT BLINDNESS" TO PLANT AWARENESS DISPARITY (PAD)

The phenomenon historically termed "plant blindness"—reframed as plant awareness disparity (PAD) in recent scholarship—was initially defined by Wandersee and Schussler (1999, p.82) as "the inability to see or notice the plants in one's environment; leading to an underappreciation of their significance." It describes a common human tendency to overlook the ecological and biological importance of plants compared to animals, largely due to cognitive and perceptual biases. Despite their ecological significance, plants often remain unnoticed in daily life and education (Amprazis, 2020, pp.1065–1067). The term encompasses perceptual and cultural aspects: humans visually prefer dynamic stimuli, and education systems culturally prioritize animals, causing plants to become less noticeable (Allen, 2003, p.926; Jose et al., 2019, pp.169–172). For instance, textbooks commonly highlight animals prominently while relegating plants to supporting roles (Schussler et al., 2010, pp.123–128).

These scholars identified multiple reasons behind this phenomenon, such as evolutionary biases towards noticing movement, cognitive tendencies to filter static stimuli, and educational frameworks prioritizing animal biology over botany. Their goal was to bring awareness to this perceptual oversight and its implications for education, conservation, and ecological literacy, thus initiating critical discourse around

human-plant interactions. Between 2000 and 2010, research on plant blindness expanded significantly, primarily within educational and ecological psychology fields. Simultaneously, educational studies such as Schussler et al. (2010, p. 125) revealed systematic underrepresentation of plants in textbooks, leading to insufficient botanical literacy. Studies like Balding and Williams (2016, p. 1193) demonstrated the negative impact of plant blindness on conservation efforts, indicating reduced awareness of plants correlates with weaker ecological behaviors and lower support for plant conservation policies. Throughout this decade, the concept solidified as a critical concern for biodiversity education and ecological psychology.

2.1.1 Plant Awareness Disparity

Recognizing the limitations of the original concept, Parsley (2020, p.599) proposed the updated term 'plant awareness disparity' to capture the varying degrees to which individuals notice, value, and emotionally relate to plants. Scholars increasingly criticized the earlier concept of "plant blindness" for its inherent limitations, particularly its visual centrism and problematic implications regarding disability (Amprazis and Papadopoulou, 2020, p.1067; Hershey, 2022, p. 122). Originally introduced by Wandersee and Schussler (1999), plant blindness effectively highlighted humans' general inattentiveness towards plant life but gradually revealed conceptual shortcomings. Specifically, it implied a deficit-based view that individuals universally failed to perceive plants adequately, ignoring nuanced individual differences and cultural contexts.

Amprazis and Papadopoulou (2020) specifically critiqued the original notion for its oversimplified binary framework, arguing that people's recognition and valuation of plants exist along a complex spectrum. They further noted the problematic ableist undertones, suggesting the term inadvertently stigmatized blindness and disability by metaphorically associating it with ignorance or neglect (Amprazis and Papadopoulou, 2020, p.1068). These critical perspectives prompted scholars to reconsider how

ecological engagement with plants should be conceptualized, shifting the focus towards a more inclusive and culturally sensitive framing.

Responding directly to these critiques, Parsley (2020, p.599) explicitly reframed the phenomenon by introducing the term "plant awareness disparity," emphasizing variability rather than universal deficiency. Parsley argued that awareness involves multiple dimensions—perceptual attention, emotional connection, and ethical valuation—that differ significantly across social, cultural, educational, and individual contexts. For instance, educational systems heavily influence young people's ability to emotionally connect with plants, often prioritizing animals or dynamic phenomena in curriculum design and educational resources (Schussler et al., 2010, p.126). This educational bias contributes to distinct disparities in plant awareness among various groups, particularly urban youth who have limited direct interactions with natural environments.

Empirical applications of plant awareness disparity have started appearing in diverse academic contexts. Laffitte, Seyler, and Tang (2022), for example, applied this concept in their environmental education study in urban China, finding significant disparities among students in their ability to emotionally connect with and ethically value local plant life. Their findings highlighted the role of cultural and educational backgrounds in shaping perceptions and suggested educational interventions must consider these disparities to be effective. Similarly, Amprazis (2020) explored how urbanization and digital lifestyles deepen awareness disparities, noting how urban residents often lose sensitivity to plant life compared to rural counterparts, who regularly engage with diverse vegetation in their daily lives.

To better understand the cognitive foundations of plant awareness disparities, researchers have turned to ecological psychology. Heft (2013, p.12) explained that humans typically respond more strongly to movement and dynamic stimuli, leading to inherent perceptual biases against static organisms like plants. These cognitive tendencies explain why many individuals overlook plants despite their ecological significance. Additionally, environmental ethicists argue that ethical frameworks

significantly influence how people emotionally and morally value plants. Leopold's (1949) land ethic, for example, suggests that ethical responsibility towards nature can reshape human awareness and care behaviors. Haraway's (2008) multi-species ethics further emphasizes reciprocal relationships between humans and non-human entities, suggesting that fostering emotional empathy and ethical responsibility is essential to bridging awareness disparities.

Despite these theoretical and practical advancements, implementing the concept of plant awareness disparity faces several challenges. One significant issue is the difficulty of measuring and quantifying emotional and ethical dimensions of plant awareness, complicating its application in empirical research (Amprazis et al., 2019, p.142). Cross-disciplinary communication also remains challenging. Educators, designers, and ecologists frequently encounter difficulties aligning terminology and research goals due to disciplinary boundaries and differing conceptual frameworks (Cotsaftis, 2023, para. 5). Furthermore, critics argue that the complexity inherent in the concept may hinder practical applications in straightforward educational or community settings, potentially limiting its widespread adoption without careful contextual adaptation (Loh, Santo, and Foth, 2023).

2.1.2 PAD among Urban Chinese Generation Z

In recent years, Generation Z (born approximately between 1995 and 2010) has emerged as a significant demographic force in China, particularly in urban areas where rapid modernization, technological advancement, and social transformation converge. This generation, often characterized by its digital nativity, entrepreneurial attitudes, and socio-political awareness, represents a distinct break from previous generations in both lifestyle and worldview. The increasing academic attention toward Chinese urban Gen Z reflects broader efforts to understand the socio-cultural shifts taking place in China's metropolises as they intersect with youth identity, consumer behavior, labor dynamics, and political consciousness.

Urban Chinese Gen Z occupies a unique position in the nation's developmental timeline. Unlike their parents, many of whom experienced China's economic liberalization in the 1980s and 1990s, Gen Z has been raised in an era defined by prosperity, global connectivity, and ubiquitous digital technologies. As such, their values and behaviors are often shaped more by algorithmic curation and globalized cultural flows than by traditional collectivist norms or state-imposed ideologies. According to recent surveys (e.g., Deloitte, 2021), Gen Z in Chinese cities exhibits high levels of individualism, brand consciousness, and desire for self-expression—traits historically less emphasized in Chinese society. Despite their digital immersion and global outlook, Chinese urban Gen Z remains firmly rooted within the specific socio-political context of China. The generation's simultaneous engagement with global pop culture and domestic nationalism poses a paradox: while many embrace Western aesthetics and consumer trends, they also show strong support for national narratives and cultural pride, especially during geopolitical tensions (Fang and Li, 2022). Scholars have referred to this dual orientation as "glocal" identity construction, where global cultural elements are reinterpreted through a distinctly Chinese lens.

Education plays a pivotal role in shaping the urban Gen Z mindset. With intense academic pressures, state-directed patriotic education, and limited political participation, these young citizens are often described as pragmatic and strategically conformist. Yet, digital platforms such as Bilibili, Xiaohongshu, and Douyin have also enabled counter-narratives, micro-celebrities, and subcultural movements that give rise to new forms of agency and resistance (Yang, 2021). Urban Gen Z thus navigates a complex media ecosystem that both empowers and surveils.

Economic participation is another area where the urban Gen Z population stands out. Not only are they primary drivers of the digital economy, particularly in the e-commerce and influencer sectors, but many are also redefining career paths through gig work, creative entrepreneurship, and alternative lifestyles. Unlike previous generations fixated on stable employment within state structures or large corporations, Gen Z exhibits a preference for flexibility, personal fulfillment, and lifestyle alignment.

In urban China, plant blindness is particularly relevant among Generation Z, who have grown up amid intense urbanization and digitalization (Zhang and Barrick, 2022, pp.654–671). The rapid shift from rural to urban environments, coupled with heavy reliance on digital technology, has significantly reduced direct interactions with nature. Addressing plant blindness within this demographic is crucial for promoting environmental sustainability and ecological empathy. Existing research primarily emphasizes transmitting plant biology knowledge or brief, one-off interventions rather than long-term emotional engagement or moral reflection on human–plant interdependence (Amprazis et al., 2019, pp.139–154). Therefore, a comprehensive and emotionally resonant approach is necessary.

T.Q. Le and Sankaran (2022) argue that plant blindness among young adults is aggravated by rapid urbanization and screen-centric lifestyles, which diminish daily contact with biodiverse green spaces. In Chinese megacities such as Shanghai, Beijing, and Shenzhen, vertical development and digitized leisure reduce the time and sensory stimuli required to cultivate familiarity with plants. This trend is mirrored in digital behavior: many Gen Z users on platforms like Xiaohongshu and Douyin engage with pet videos or eco-themed aesthetics, but show little interaction with native plant education or conservation.

Laffitte, Seyler and Tang (2022) conducted an environmental education initiative in Chengdu and found that even among high school and university students, plants were rarely recognized, named, or emotionally valued. The phenomenon of plant blindness, they suggest, stems from both cognitive biases—where moving animals are more perceptually salient—and socio-educational omissions, where botany is de-emphasized in China's test-driven education system. The urban Gen Z participants showed high environmental concern but were significantly less able to identify or explain the ecological roles of local plant species.

This is troubling considering that urban Chinese Gen Z are key decision-makers and influencers in future sustainability efforts. As Zhang et al. (2023) demonstrate in a survey on perceptions of edible plants suitable for urban agriculture, many young

Chinese people express a theoretical interest in eco-friendly living but lack the botanical knowledge to support urban greening initiatives meaningfully. This disconnection from plant life may also hinder public acceptance of sponge city initiatives and ecological urban design, where vegetation plays a critical infrastructural role (Xia et al., 2017).

2.2 CURRENT APPROACHES AND LIMITATIONS

Existing strategies addressing plant blindness frequently employ traditional educational methodologies such as classroom instruction, direct botanical teaching, and short-term environmental awareness campaigns (Schussler and Wandersee, 1999; Amprazis, 2020). These methods predominantly convey factual information about plants' ecological importance, physiological characteristics, and conservation needs (Jelka, 2007). Examples include outdoor educational programs and botanical gardens using direct engagement strategies such as guided tours, plant labeling, and detailed workshops on plant structures and ecosystem benefits (Jana and Pavol, 2011; Burke et al., 2022).

However, despite their widespread use, these educational practices demonstrate limited effectiveness in cultivating lasting emotional bonds or deeper ecological empathy, particularly among urban Generation Z (Amprazis and Papadopoulou, 2020). Research indicates that factual plant knowledge alone does not guarantee sustained interest or habitual care behaviors (Amprazis et al., 2019).

2.2.1 Technological Interventions and Their Constraints

Recent strategies have employed interactive technologies and digital interventions, such as smartphone applications offering plant-care reminders or virtual reality simulations of ecological interactions (Farr-Wharton, 2019). These approaches

temporarily enhance users' attention and plant-related knowledge but often fail to establish ongoing empathetic relationships or routine plant-care practices (Burnusuz et al., 2024). Such technology-driven methods risk reducing plants to mere data points or tasks within digital environments, undermining essential relational empathy required to address plant blindness (Loh, Santo, and Foth, 2023). This functional, efficiency-oriented framing of plant-care technologies often prioritises human convenience over cultivating meaningful interspecies relationships. By structuring plant interaction as a series of reminders, metrics, or gamified achievements, these tools inadvertently reinforce anthropocentric paradigms, treating plants as passive objects to be optimised rather than relational beings with intrinsic value. As Loh, Santo, and Foth (2023) argue, such instrumental engagement may improve surface-level attentiveness but fails to provoke the deeper emotional and ethical reflection necessary for long-term behavioural change. Moreover, the reliance on automated systems can desensitise users to the tacit, embodied aspects of plant care—such as observing subtle physical changes or intuitively responding to a plant's needs—which are critical for developing sustained empathy and responsibility.

Critically, these technological solutions often lack mechanisms for narrative, emotional, or ethical engagement. They rarely invite users to consider the plant's perspective, nor do they challenge dominant human-centred assumptions that sustain ecological disconnection. In response to these limitations, emerging research advocates for approaches that embed care ethics and more-than-human perspectives into everyday design practices. Participatory and speculative methods, for instance, shift the focus from optimising behaviour to transforming perception. Rather than merely instructing users on how to care for plants, such approaches invite users to imagine what it might mean to care with plants—recognising them as co-participants in shared environments.

This shift toward more relational, imaginative forms of engagement suggests the need for design strategies that not only deliver information but also cultivate emotional resonance and ethical sensitivity. By reframing plant care as an ongoing, reciprocal relationship rather than a task to be managed, design has the potential to challenge

plant blindness at its emotional and perceptual roots. The present study builds upon this emerging paradigm, exploring speculative participatory design as a means to cultivate empathy, ethical reflection, and sustained interaction with indoor plant life.

2.2.2 Community-based Initiatives

Community-based initiatives, including urban gardening projects and balcony vegetable cultivation schemes, have become popular among urban Chinese youth. These programs generate initial enthusiasm but often lack continuity, structured emotional support, and educational guidance necessary for sustaining participant engagement and responsibility over extended periods (Kang, 2023; Meng, 2021). The informal nature of these programs frequently leads to diminishing interest due to inconsistent engagement and limited reflective practices, making long-term behavioral and attitudinal shifts difficult to achieve (Shen, 2022).

Current approaches commonly adopt a predominantly anthropocentric perspective, prioritizing human benefits such as health improvements, aesthetics, or economic advantages while inadequately recognizing plant agency or intrinsic value (Balding and Williams, 2016). Consequently, these methods reinforce rather than challenge human-centered views, thus undermining efforts to foster genuine multi-species empathy (Cotsaftis, 2023). To further understand the limitations of current community-based initiatives, it is essential to examine practical cases from major Chinese cities. For example, the urban balcony gardening initiative in Shanghai initially attracted considerable youth participation through social media platforms like Xiaohongshu, where young residents enthusiastically shared gardening experiences and aesthetically pleasing images of their balcony gardens. However, despite initial enthusiasm, subsequent observations revealed a significant decline in engagement due to lack of ongoing educational support and interactive community feedback mechanisms. Participants often reported feeling isolated or unsupported once the novelty wore off, leading to decreased interest and eventual abandonment of gardening practices (Meng, 2021).

Moreover, current community initiatives rarely incorporate participatory or co-design principles that could effectively maintain participants' long-term motivation. According to Sanders and Stappers (2008), genuine participatory design can significantly enhance sustained engagement by actively involving participants in decision-making processes and fostering community ownership. Community-based gardening projects that implemented regular co-design workshops, for instance, saw significantly higher long-term participation rates, as participants felt more emotionally and socially invested in the project's outcomes.

Additionally, existing initiatives frequently overlook implementing multi-species ethical perspectives, emphasizing primarily human-centric values such as economic gains, health, or visual aesthetics (Balding and Williams, 2016). Few initiatives recognize plants as active participants or co-inhabitants, resulting in a limited understanding of ecological interconnectedness and responsibility among participants. Scholars such as Haraway (2008) argue that embedding multi-species ethical considerations—acknowledging plants as collaborative entities with intrinsic value—can deepen emotional connections and ethical responsibility, significantly enhancing long-term ecological engagement in community contexts.

The use of digital platforms also presents both opportunities and limitations for sustaining community engagement. Platforms such as Douyin or Xiaohongshu have effectively popularized gardening through visual and social appeal, yet they rarely provide structured educational content or reflective practices necessary to support participants' long-term involvement. Consequently, initial enthusiasm generated by digital trends often diminishes rapidly without structured digital interactions or personalized feedback loops (Kang, 2023). Designing more integrated digital-community platforms that include interactive tutorials, regular reflective prompts, or adaptive feedback could effectively sustain user interest and deepen emotional and ethical engagement with gardening initiatives.

Furthermore, the challenge of integrating diverse intergenerational and cross-cultural participation in urban community projects remains significant. Young urban

residents typically engage with community gardening initiatives due to aesthetic and social trends, while older generations prioritize practical aspects such as nutritional benefits or health outcomes (Shen, 2022). Effective community gardening projects, therefore, must strategically accommodate these diverse interests, designing activities that bridge generational gaps and enhance cultural understanding to achieve sustained and inclusive community engagement (Laffitte et al., 2022).

Lastly, community-based initiatives frequently face challenges in obtaining adequate support from urban policy frameworks. Urban planners and policymakers often overlook these projects as marginal or decorative rather than integral components of urban ecological sustainability strategies, resulting in insufficient resource allocation or administrative support (Cotsaftis, 2023). The failure of these practical approaches necessitates a deeper examination of the theoretical perspectives that explain the origins of plant blindness.

2.3 THEORETICAL PERSPECTIVES

Plant blindness emphasizes human perceptual and emotional biases towards plants, underscoring the need for interventions enhancing visual and emotional connections (Parsley, 2020; Wandersee and Schussler, 1999). Cognitively, humans prioritize animals' movements and behaviors due to evolutionary biases, causing plants—perceived as static—to remain overlooked. This perceptual neglect is further reinforced by educational systems historically prioritizing animal biology, exacerbating the cognitive undervaluation of plant life (Allen, 2003; Schussler et al., 2010).

Emotionally, plant blindness also results from a lack of empathetic or relational connections toward plants. Unlike animals, plants exhibit fewer behaviors humans interpret as emotional or sentient. Cultural narratives portraying plants merely as decorative objects further reinforce this emotional disengagement (Amprazis and Papadopoulou, 2020; Wandersee and Schussler, 1999). Contemporary urban lifestyles

characterized by digitalization and limited nature interactions exacerbate this cultural indifference (Amprazis, 2020).

Addressing plant blindness thus requires more than factual knowledge; it necessitates fostering visual awareness, emotional empathy, and cultural appreciation of plants as co-inhabitants.

2.3.1 Reframing Human–Plant Relationships

From Objectification to Subjectification

Multi-species ethics argues that humans should recognize plants as active moral agents rather than passive objects, emphasizing empathy, care, and mutual respect toward non-human species (Haraway, 2008; Tsing, 2015; Forlano, 2016). Integrating plant blindness theory with multi-species ethics shifts perceptions from objectification to subjectification, promoting the recognition of plants as co-inhabitants deserving ethical consideration. This shift requires rethinking plants as subjects capable of agency, interaction, and even intentionality, instead of merely passive resources for human use (Hall, 2011, p.13; Wohlleben, 2016, p.9). Such a transformation challenges traditional Western dualistic views, where humans are regarded as active agents and plants as passive recipients of human actions (Plumwood, 2002, pp.49–51). Val Plumwood (2002, p.71), for instance, argues that overcoming objectification involves ethically engaging plants as active members of ecological communities rather than as aesthetic or instrumental elements. Matthew Hall (2011, p.16) similarly suggests that recognizing plants as subjects requires acknowledging plant behaviors—such as growth, adaptation, communication, and responsiveness—as meaningful expressions of agency deserving ethical respect. This shift is part of a wider critique of systems that foster 'self-centred individualism' and the commodification of life and art. Parallel efforts in fields like music curation seek to re-establish creative practice as a 'shared, collective enterprise and practice of human connection' in direct resistance to these alienating forces (Whalley and Waeckerlé, 2024).

In practical educational and design contexts, this perspective translates into methods that intentionally build empathy and relational care towards plants. Educational approaches informed by multi-species ethics emphasize mutual interdependence and ecological responsibility rather than focusing solely on botanical facts or practical functions (Clarke et al., 2018, p.19). Ecological art projects and participatory design initiatives increasingly portray plants as collaborative agents, encouraging participants to reflect ethically on their relationships with non-human species (Rosén and Heitlinger, 2025, pp.12–13). Nevertheless, entrenched cognitive biases remain a challenge, as humans typically favor organisms demonstrating obvious behaviors or responses—usually animals—while overlooking subtler yet significant forms of plant agency (Chamovitz, 2012, p.28; Heft, 2013, p.12). Addressing these biases involves actively teaching recognition of plant agency, fostering observational skills, emotional empathy, and ethical sensitivity towards plants as subjects rather than objects.

Philosophical Foundations of Multi-species Ethics

The conceptual roots of multi-species ethics lie within environmental philosophy, emerging from critiques of anthropocentrism—human-centered thinking that is often held responsible for ecological harm and neglect of non-human entities (Plumwood, 2002, p.22). Plumwood emphasized the necessity of recognizing nature not merely as resources, but as active participants within shared ecosystems, urging reciprocal and respectful interactions. Building upon this, Donna Haraway (2016, p.58) introduced the concept of "sympoiesis," suggesting continuous co-creation between humans and other organisms. Haraway also proposed "kinship ethics," advocating that non-human beings deserve emotional care and ethical consideration similar to extended family members (Haraway, 2016, p.71). Anna Tsing (2015, p.25) described these relationships as "multi-species entanglements," highlighting humans' deep interconnectedness with other species and emphasizing that ignoring these connections directly contributes to environmental crises. Collectively, these perspectives underscore the critical role of ethical and emotional bonds with non-human species, including plants, in addressing ecological challenges.

Addressing Anthropocentrism through Multi-species Ethics

The emotional disconnect underlying plant blindness is directly linked to anthropocentrism, which exacerbates plants' invisibility by prioritizing human interests (Parsley, 2020; Kortenkamp and Moore, 2001, p.262). Anthropocentric urban practices commonly manifest through landscaping methods that prioritize visual appeal, convenience, and recreation over plants' ecological needs, thereby compromising their ecological integrity (Beatley, 2011, pp.34–35). Multi-species ethics counters this by advocating reciprocal moral engagement, promoting recognition of plants' inherent moral significance, independent of their utility to humans (Crist, 2012, p.143). Robert Fletcher (2017, p.229) specifically calls for shifting away from viewing plants merely as passive resources, underscoring their status as living beings deserving ethical respect. Urban initiatives and community-based participatory stewardship projects increasingly attempt to bridge these ethical divides, facilitating inclusive approaches that actively confront anthropocentric assumptions (Beatley, 2011, pp.56–57). Educational interventions incorporating emotional reflection and narrative-driven scenarios similarly promote sustained ecological awareness, fostering balanced, inclusive human–plant relationships (Fletcher, 2017, pp.230–231).

Applying Multi-species Ethics in Design Practices

Translating multi-species ethics into design contexts offers a practical shift from anthropocentric frameworks by actively positioning plants as participants rather than passive decorative elements. Recent urban design projects integrate interactive, participatory methods to foster emotional connections and ethical reflections toward plants. For example, Chen and Pschetz (2024) explored speculative scenarios inviting urban dwellers to reflect on plant agency through digital interactions. Similarly, Forlano (2016) highlighted design approaches explicitly integrating multi-species coexistence principles into urban environments, prompting ethical engagement with plants through daily interactions. Such strategies often employ storytelling and emotional experiences rather than conventional didactic methods, enabling richer emotional

resonance and deeper ecological awareness. However, practical implementation remains challenging due to difficulties in sustaining imaginative and emotional engagement over extended periods. Loh, Santo, and Foth (2023) noted that digital platforms, though initially effective, often encounter participant fatigue and reduced involvement over time. Nevertheless, the ongoing development of design interventions embedding emotional, ethical, and relational dimensions continues to reshape public perceptions, fostering sustainable human–plant interactions.

Critical Reflections on Multi-species Ethics

Despite these promising developments, multi-species ethics faces critical examination regarding its conceptual and practical limitations. Assigning moral agency to plants can appear abstract and challenging due to perceived biological differences and the absence of conventional markers of sentience, such as movement or visible suffering (Hall, 2011, p.385; Gray, Gray, and Wegner, 2007, p.619). Cultural and educational frameworks may find multi-species ethics overly abstract, complicating its integration into conventional contexts that prioritize measurable outcomes over ethical reflection (Kopnina et al., 2018, p.116). Without accessible methodologies for practical application, educators, designers, and policymakers may find incorporating these ethical principles into existing frameworks difficult (Marder, 2013, pp.142–143). Acknowledging these limitations promotes continuous critical dialogue, ensuring that multi-species ethics evolves to effectively address both theoretical complexities and practical ecological challenges.

2.3.2 More-than-Human Ethics

More-than-human ethics, proposed by Donna Haraway, significantly reframes ecological relationships. Haraway's (2008) concept of "becoming-with" highlights continuous mutual shaping between humans and non-human entities, advocating for mutual care, respect, and responsiveness beyond traditional human-centered ethics. Nevertheless, practical integration of more-than-human ethics into design faces

significant challenges, primarily due to design's inherent anthropocentrism (Redström, 2006). Designing spaces often prioritizes human aesthetics and usability over plants' ecological needs, creating tensions in fully integrating multi-species perspectives. These ethical perspectives, although conceptually influential, have begun to inform practical design practices, particularly within urban contexts where the integration of multi-species interactions can significantly reshape ecological consciousness.

This ethical shift increasingly influences urban design, exemplified by Laura Forlano (2016), who treats cities as multi-species communities rather than human-dominated spaces. Her practical applications involve designing urban environments to foster active human–plant interactions, promoting emotional and ethical bonds. Beyond Forlano's (2016) approach, several contemporary ecological design projects have practically embodied more-than-human ethics within urban settings. For example, New York's High Line transformed an abandoned railway into a vibrant ecological corridor, deliberately incorporating native plants and wildlife habitats into urban residents' everyday environments, thus fostering deeper ecological connections and ongoing sensory interactions (Ascher and Uffer, 2015, p. 158). Similarly, Milan's Bosco Verticale, designed by Stefano Boeri, integrated extensive vertical forests directly into residential towers, explicitly prioritizing biodiversity, air purification, and climate regulation alongside human needs. This project actively encouraged residents to perceive plants as integral co-inhabitants rather than passive decorations, promoting continuous mutual care through proximity and daily interaction (Boeri, 2014, pp. 26–28). Additionally, London's proposed Garden Bridge by Heatherwick Studio aimed to incorporate more-than-human ethical principles by combining pedestrian spaces with diverse plantings, intending to create urban environments that inspire ecological contemplation and education, thus embodying Haraway's concepts of mutual respect and interspecies relationality (Heatherwick and Rowe, 2015, p. 82). Collectively, these examples illustrate practical strategies through which urban design can embrace multi-species principles, shifting residents' attitudes from traditional anthropocentric frameworks toward inclusive, ethically responsive interactions with plants as meaningful ecological participants. Such urban design examples illustrate how ethical principles of interdependence and mutual care can be materially realized in human-

plant interactions, resonating strongly with Anna Tsing's (2015) broader ecological argument for interspecies interdependency.

Building upon these practical urban design examples, Anna Tsing's (2015) conceptualization further emphasizes interspecies interdependence as a foundational approach to address broader ecological crises. Tsing's (2015) insights gain particular significance within the context of the Anthropocene—a geological era characterized by profound human-induced transformations of ecosystems worldwide (Crutzen, 2002, p. 23). Human activities such as urban expansion, deforestation, and industrial agriculture have severely disrupted ecological balance, accelerating biodiversity loss and habitat degradation on an unprecedented scale (Lewis and Maslin, 2015, pp. 171–172). Scholars increasingly emphasize that addressing these ecological crises requires moving beyond conventional human-centered approaches, instead recognizing and valuing non-human species as active agents essential for sustaining planetary health (Steffen et al., 2018, p. 824). In urban settings, the urgency of adopting more-than-human ethical perspectives becomes particularly pronounced, as cities significantly contribute to environmental degradation through pollution, resource consumption, and spatial fragmentation, directly threatening ecological resilience (McPhearson et al., 2016, p. 204). Therefore, rethinking urban design from a more-than-human standpoint is not merely an ethical preference but an urgent necessity to mitigate the Anthropocene's detrimental impacts, highlighting the critical importance of fostering deeper human-plant interconnections in urban everyday life.

Despite growing recognition of more-than-human ethics, practical implementation in urban contexts faces significant barriers. Urban governance structures frequently prioritize economic growth over ecological considerations (Bulkeley and Betsill, 2013, p. 138), creating systemic obstacles. Additionally, limited direct engagement with plants among urban residents, especially younger generations, leads to emotional disconnection and reduces willingness to adopt sustained ecological practices (Amprazis and Papadopoulou, 2020, p. 1066). Addressing these perceptual and structural challenges is essential for effectively translating ethical principles into practical urban settings (Beatley, 2011, pp. 52–54).

Implementing multi-species principles within urban planning demands substantial shifts in existing policy and educational frameworks, which can meet significant resistance. Planners frequently face practical conflicts when attempting to prioritize ecological needs over conventional land-use and infrastructure requirements (Cotsaftis, 2023). Moreover, urban residents may perceive plant-centric design as impractical or less critical compared to immediate urban concerns, such as housing, transport, or economic priorities, complicating the integration of more-than-human ethics into everyday urban life. Overcoming these obstacles thus necessitates clearly articulated policy support, targeted educational initiatives, and cultural strategies aimed at reshaping public perceptions toward valuing plants as integral urban stakeholders.

2.4 SPECULATIVE SCENARIOS TO FOSTER EMPATHY

To address these ecological and perceptual challenges, speculative and participatory design approaches have emerged as valuable tools for fostering empathy and deeper ecological awareness. Originating within critical design traditions, speculative design as advocated by Dunne and Raby (2013) aims to provoke critical reflection on prevailing cultural, social, and ethical assumptions by crafting imaginative scenarios and artifacts. Unlike conventional, solution-oriented design, speculative design deliberately challenges existing perspectives, inviting participants to explore alternative ecological relationships and potential futures (Auger, 2013, p. 13). Central to speculative design are interdisciplinary methods inspired by critical theory, discursive design, and narrative storytelling, enabling participants to engage in meaningful dialogues and imaginative reflection rather than merely solving immediate problems (Tharp and Tharp, 2018, p. 5). Donna Haraway (2016) notably employed speculative storytelling techniques to question anthropocentric assumptions, highlighting narrative imagination's power in cultivating empathy toward non-human species. Similarly, Timothy Morton's (2016) "ecological thought" underscores speculative imagination as

a vital means of redefining ecological relationships, supporting speculative design's conceptual and practical significance.

Speculative design effectively fosters cross-species empathy by encouraging participants to reimagine non-human experiences and agency vividly. For instance, Chen and Pschetz (2024) used speculative digital interfaces to prompt participants to envision plants communicating their emotional states and needs. This imaginative interaction reshaped participants' perceptions, transforming plants from passive objects to active participants, significantly enhancing empathy and ethical responsibility. Likewise, Rosén and Heitlinger (2025) demonstrated how participatory urban gardening workshops that prioritized plants' ecological requirements (e.g., sunlight, water access, interspecies interactions) deepened participants' ecological empathy. Participants reported stronger emotional connections and greater ecological responsibility after directly engaging with speculative scenarios emphasizing plants' agency and vulnerabilities.

These speculative approaches effectively combine cognitive imagination with emotional resonance. Dunne and Raby (2013, p. 43) emphasize speculative design's provocative potential, confronting entrenched assumptions by enabling participants to inhabit alternative, non-human perspectives emotionally and cognitively. Morton (2016, p. 82) reinforces that narrative-driven speculative practices vividly illustrate ecological interconnectedness, fostering emotional identification and ethical contemplation far beyond traditional, factual ecological education methods. Thus, speculative scenarios directly counteract perceptual biases underlying plant blindness by providing emotionally rich and imaginative experiences that effectively deepen ecological empathy and ongoing ethical reflection.

The theoretical roots of speculative and participatory methods significantly intersect with broader philosophical debates on ecological ethics and the Anthropocene. Bruno Latour's Actor-Network Theory (ANT) and Rosi Braidotti's posthumanism profoundly influence speculative design's ethical framework. Latour (2005, p. 71) challenges human exceptionalism by proposing shared agency among humans and

non-humans in shaping ecological and social networks. Similarly, Braidotti (2013, p. 67) critiques anthropocentric divisions, advocating mutual dependence among species. Haraway (2016) builds on these perspectives by emphasizing reciprocal relationships and mutual care, directly responding to ecological crises defined by Anthropocene theories. Moore (2015, p. 17) complements this discourse by critiquing capitalism's ecological impacts, reframing the Anthropocene as the "Capitalocene" and underscoring the need for speculative design methods that actively challenge and transform capitalist-driven ecological paradigms. Additionally, Morton's (2013, p. 5) notion of "hyperobjects" reinforces speculative design's value in emotionally engaging individuals with vast, complex ecological phenomena such as climate change.

Speculative design practices increasingly demonstrate practical effectiveness across diverse contexts, including ecological education, urban planning, architecture, and digital interaction. Clarke et al. (2018, p. 21) describe educational workshops that prompt students to imaginatively experience ecological threats from plants' perspectives, significantly enhancing students' emotional empathy and ecological responsibility. Similarly, urban rewilding initiatives employing speculative storytelling successfully engage communities in re-envisioning urban ecological futures, concretely influencing planning decisions (Hinchliffe and Whatmore, 2006, p. 123). Architectural applications like Stefano Boeri's Bosco Verticale explicitly integrate speculative narratives, encouraging residents to form emotional connections and care routines with vertical urban forests (Boeri, 2014, pp. 26–28). Digital interaction design further exemplifies speculative design's potential: Chen and Pschetz's (2024) digital interfaces and Loh, Santo, and Foth's (2023) interactive office environments maintain sustained emotional engagement by embedding speculative, narrative-driven plant interactions within daily digital routines.

Despite these strengths, speculative design encounters significant practical barriers. A central critique concerns its abstract and imaginative nature, often perceived as impractical or disconnected from immediate urban realities, especially in culturally diverse or economically constrained environments (Cotsaftis, 2023). Participant fatigue and declining engagement pose additional challenges, as sustained emotional

involvement requires consistent imaginative effort and dynamic interaction methods. Moreover, speculative methods demand considerable resources, specialized expertise, and dedicated institutional support, complicating their scalability and broad implementation. Institutional resistance further limits adoption, with urban administrators prioritizing immediate concerns such as housing affordability and economic growth over speculative ecological initiatives (Bulkeley and Betsill, 2013, p. 140). Empirical research explicitly evaluating speculative methods' ecological and behavioral impacts across diverse cultural and socio-economic contexts will be essential for validating their practical relevance. Further, interdisciplinary collaboration involving designers, educators, policymakers, and ecologists should aim at integrating speculative participatory methods within formal educational curricula and urban planning policies, facilitating broader cultural shifts towards sustained ecological empathy and responsibility.

2.5 CONSTRUCTING AN INTEGRATED THEORETICAL FRAMEWORK

The theoretical framework of this research integrates three core components: Plant Blindness, Multi-species Ethics, and Living Service Design. Each contributes unique insights and methods for addressing human–plant interactions, specifically among urban Chinese Generation Z.

Plant Blindness serves as the foundational concept, identifying cognitive and emotional biases leading humans to overlook plants, thus revealing why purely informational interventions have limited impact (Parsley, 2020; Wandersee and Schussler, 1999).

Multi-species Ethics builds upon this, highlighting ethical obligations toward non-human species and framing plant blindness as an ethical, not merely perceptual, issue (Haraway, 2008; Forlano, 2016). This perspective emphasizes sustained relational

engagement and responsibility, moving beyond cognitive deficits toward moral imperatives.

Living Service Design operationalizes these ethical principles into actionable, everyday interactions (Knight, 2018; Polaine, Løvlie and Reason, 2013). It employs iterative, emotionally resonant experiences—such as speculative role-playing scenarios ("Plant Hospital") and continuous digital interactions—to translate ethical ideals into practical behavioral changes.

This integrated framework follows a clear logical sequence:

1. **Diagnosis**: Plant Blindness identifies cognitive-cultural biases limiting human perception and emotional engagement with plants.

2. **Ethical Justification**: Multi-species Ethics provides moral and relational justification for addressing plant blindness through sustained ethical interactions.

3. **Practical Intervention**: Living Service Design translates ethical commitments into continuous, tangible, and emotionally engaging interactions.

The framework anticipates and addresses criticisms of speculative design approaches as impractical or overly imaginative. Speculative methods here explicitly complement practical interventions by deepening emotional resonance and ethical engagement, aligning with the principles of Multi-species Ethics (Dunne and Raby, 2013).

2.6 RESEARCH QUESTIONS

The previous section highlighted two critical issues: the widespread occurrence of plant blindness among urban Chinese Generation Z, marked by a lack of emotional and conscious attention to plants (Amprazis, 2020, p.1066), and the limitations of existing educational and design interventions, which typically emphasise factual knowledge or

technological solutions, neglecting emotional and ethical connections with plants (Jose et al., 2019; Clarke et al., 2018).

Addressing these gaps, this research employs a more-than-human ethical perspective (Haraway, 2008) and Living Service Design principles (Knight, 2018) to explore how speculative and participatory design can foster emotional and ethical relationships between urban youth and indoor plants.

Main Research Question:

How can speculative participatory design, guided by a more-than-human ethical perspective and Living Service principles, effectively encourage urban Chinese Generation Z to overcome plant blindness and form lasting emotional connections with indoor plants?

To answer this, three supporting sub-questions are proposed:

1. How does a **speculative participatory scenario** (e.g., "Plant Hospital") influence urban Chinese Generation Z's perceptions of plants, particularly regarding plant agency and emotional value?

2. What role do continuous and cyclical interactions (e.g., repeated check-ins and digital engagement) play in cultivating long-term care behaviours and **emotional bonding** with indoor plants?

3. Which **design tools** or methods effectively embed **more-than-human ethics** and **Living Service principles** into everyday life, shifting participants' attitudes from passive awareness toward active responsibility in plant care?

These sub-questions logically build upon one another: from exploring immediate emotional impacts (Sub-question 1), through investigating sustained relational engagement (Sub-question 2), to identifying practical tools for long-term ethical care (Sub-question 3).

By systematically addressing these questions, the research aims to bridge identified gaps, contributing a practical, ethically informed design framework to encourage emotional empathy and sustained engagement with indoor plants.

3 METHODOLOGY

This study uses speculative participatory design because the research problem is not only whether participants notice plants, but how that moment of relevance can be translated into everyday care. A purely informational approach would not have been enough for this purpose. The speculative element was used to open emotional and ethical reflection. The participatory element was used to keep that reflection culturally meaningful and practically grounded.

The methodological design also follows the logic of the three research questions. Phase 1 focused on whether a speculative scenario could shift how participants understood plant agency and emotional value. Phase 2 moved into participants' homes to examine whether these shifts reached everyday space, practice, and decision-making. Phase 3 extended the study through a light WeChat stream in order to see whether the changes could be maintained, interrupted, and then taken up again over time.

In this sense, the method was designed to capture more than attitudes. It was intended to trace how speculative relevance moved into room-level adjustments, repeatable actions, and participant-owned cadence. This is why the study combines workshops, home observations, interviews, and digital follow-up rather than relying on a single intervention or one moment of reflection.

3.1 RATIONALE FOR SPECULATIVE PARTICIPATORY DESIGN

This study adopts speculative participatory design (SPD) because the central issue is not only whether participants think differently about plants, but whether they can begin to relate to them differently in everyday life. SPD is useful here because it creates a low-risk space for imaginative rehearsal. Participants do not have to arrive with strong ecological knowledge or pre-existing emotional commitment. Instead, they can try out new ways of attending, caring, and speaking about plants through shared activities.

SPD is also well suited to urban Chinese Gen Z because their everyday contact with nature is often limited by digitalised urban living and small domestic spaces. In this context, a workshop alone would not be enough. For this reason, SPD is paired with a living service approach. The speculative opening creates relevance, home-based observation checks whether that relevance reaches daily practice, and the light digital stream tests whether routine can survive interruption and later be resumed.

Taken together, this combination makes it possible to study not only what participants say, but what they actually do over time. That is why SPD was chosen for this thesis. A related example is the "Connected Seeds and Sensors" project (Heitlinger, Bryan-Kinns and Jefferies, 2019), which used digital prompts to keep plant care present in everyday life. In this thesis, that insight is taken further by pairing light digital contact with room-level observation and participant-owned cadence.

Speculative design methodologies have frequently faced criticism regarding practicality, particularly due to their inherently abstract and imaginative scenarios, often perceived as disconnected from participants' daily realities (Tonkinwise, 2016, p. 12; Coulton, Lindley and Sturdee, 2017, p. 94). Critics highlight potential gaps between imaginative speculation and everyday practical feasibility, arguing that speculative methods might alienate participants preferring concrete, actionable outcomes. This

study explicitly addresses these critiques through systematically embedding speculative scenarios into participants' daily practices via structured and continuous interactions. Regular digital engagements using familiar platforms like WeChat encouraged participants to directly link speculative reflections—such as the emotional personification of plants—to practical actions such as watering or repositioning indoor plants, thereby bridging imaginative empathy with tangible everyday behaviours. Additionally, home-based observational visits were conducted to empirically verify whether speculative insights effectively translated into participants' real-life plant-care routines. These observations consistently documented tangible behavioural changes and increased emotional interactions with plants, clearly demonstrating the practical applicability of speculative methods within real-world settings. Furthermore, the participatory co-creation of speculative scenarios ensured alignment with participants' lived experiences and cultural contexts, allowing iterative refinements based on practical feedback. This adaptive, participant-driven approach ensured speculative interventions remained culturally sensitive and directly applicable, effectively addressing speculative design's typical criticisms regarding abstraction and practicality. Together, these methodological strategies—continuous digital interactions, empirical observational verification, and participant-led iterative scenario refinement—comprehensively respond to practical feasibility concerns, ensuring speculative participatory design methods produce sustained, meaningful ecological engagement grounded in everyday contexts.

3.1.1 SPD: Strengths and Limitations

SPD has clear strengths in this study, but it also has limits. Its main strength is that it makes care thinkable and discussable in a low-risk way. Participants can rehearse responsibility without immediately committing themselves to a stable position. This is especially useful when the research topic involves emotion, hesitation, and ethical reflection rather than straightforward task performance.

At the same time, SPD is not enough on its own. Some participants may find speculative scenarios too playful, too abstract, or simply not persuasive. For that reason, the workshop was treated as an opening rather than as the whole intervention. Home observations, interviews, and light digital follow-ups were built into the design in order to see whether speculative engagement actually moved into room-level adjustments, repeatable actions, and everyday routines. In this study, the strength of SPD lies in what it opens; its limitation appears when that opening fails to travel into ordinary practice.

3.1.2 Philosophical Underpinnings

The research aligns philosophically with interpretivism and constructivist epistemology, emphasizing subjective, context-specific experiences and socially constructed knowledge. This stance allows exploration of how speculative participatory methods reshape socially constructed perceptions of plants among urban Chinese Generation Z.

Unlike traditional participatory design focusing solely on human preferences (Sanders and Stappers, 2008), SPD expands the participatory role to include non-human entities, shifting participants from passive recipients to active co-creators in multi-species interactions. Through collaborative ideation and role-playing activities, participants actively speculate on ethical relationships and care dynamics, fostering deeper ecological empathy and ethical consideration. Incorporating Living Service Design, SPD emphasizes iterative, adaptive, and continuous interactions rather than single-event interventions. Cyclical speculative activities, iterative prototyping, and regular digital interactions (e.g., via WeChat) sustain emotional and ethical engagement. Regular check-ins and reflective activities ensure dynamic responsiveness to evolving participant attitudes, embedding multi-species ethics practically and iteratively into participants' everyday lives.

SPD methodology explicitly addresses critiques regarding speculative approaches' practicality (Dunne and Raby, 2013). By incorporating structured iterative feedback loops, home-based observations, digital diaries, and continuous reflective interactions, the speculative activities are grounded in real-world applicability. These iterative mechanisms ensure speculative imagination translates directly into tangible behaviors and sustained emotional transformations.

3.1.3 Qualitative Inquiry

SPD integrates seamlessly with qualitative methods such as semi-structured interviews and observational home visits. Initial speculative scenarios stimulate emotional and imaginative engagement, while qualitative follow-ups capture nuanced emotional and ethical shifts. Qualitative data collection methods thus complement speculative scenarios, providing robust empirical evidence supporting SPD's effectiveness.

Ethical sensitivity guides SPD's application, respecting participant autonomy, comfort, informed consent, and confidentiality. Participants retain full control over their involvement depth, ensuring speculative scenarios remain ethical, respectful, and participant-centred.

3.2 DATA COLLECTION METHODS

Data collection for this study was strategically designed to produce comprehensive, qualitative insights into speculative participatory design's effectiveness in fostering emotional bonds and ethical reflections among urban Chinese Generation Z towards indoor plants. Given the emphasis on capturing nuanced emotional responses, shifting perceptions, and evolving behaviors, multiple complementary qualitative methods were employed. The integration of speculative workshops, participatory observations, semi-structured interviews, and continuous digital engagement formed a layered approach to data collection, allowing for rich, triangulated insights.

Initially, data collection began with speculative participatory workshops (Plant Hospital), conducted with a targeted sample of 24 participants, comprising predominantly Chinese Generation Z residents aged between 18 and 26, recruited primarily from university campuses in urban settings, including London. Among the 24 participants, 20 identified as urban Chinese Generation Z, while 4 participants were non-Chinese urban residents included to provide comparative insights and broader cultural perspectives. The inclusion of non-Chinese participants was methodologically justified by the intention to observe potential cultural variances in emotional and ethical engagements towards plants, enhancing the robustness and depth of analysis (Bryman, 2016, pp. 416–418).

Each workshop session lasted approximately 90–120 minutes and took place over two consecutive weekends in community spaces and university common rooms, facilitating a comfortable and accessible environment. These workshop locations were intentionally selected based on their neutral and inviting atmospheres, crucial for encouraging participants' open emotional expression and creative interaction (Patton, 2015, p. 386). Each of the four conducted sessions hosted six participants, a group size specifically chosen to balance active individual participation with meaningful collective interactions, ensuring each participant had sufficient opportunity to express emotions and contribute creatively (Sanders and Stappers, 2008, pp. 5–8).

Within these speculative workshops, qualitative data were collected through several systematic methods. Firstly, participants engaged in scenario-based activities such as crafting imaginative prototypes and developing narrative storyboards. Approximately 48 distinct prototypes and narrative scenarios were collaboratively created, each documented extensively through photographic records, written notes, and detailed reflective discussions. Capturing these creative outputs through multiple recording formats allowed for comprehensive analytical triangulation, ensuring that subtle emotional shifts and speculative ethical reflections were thoroughly documented and preserved (Charmaz, 2014, pp. 185–187).

Immediately following each speculative workshop, in-depth participatory observations were conducted, with detailed observational notes capturing participant interactions, behaviors, and verbal reflections throughout workshop activities. Approximately 36 pages of handwritten observational notes and more than 6 hours of audio recordings were produced, ensuring thorough documentation of participant behaviors, emotional reactions, and interpersonal dynamics during workshops. These detailed observations were methodologically significant as they provided contextualized insights into participants' spontaneous emotional expressions and emerging speculative reflections—details potentially overlooked by structured interviews alone (Bryman, 2016, p. 479).

3.2.1 Observational Data

Complementing observational data, semi-structured interviews were individually conducted with all 24 participants within two weeks after their respective workshops. Each interview session ranged between 40 and 60 minutes, resulting in approximately 20 hours of recorded audio data, subsequently transcribed verbatim, generating over 200 pages of detailed textual transcripts. These interviews allowed participants to reflect retrospectively on their emotional experiences during the speculative scenarios, discuss any shifts in their attitudes towards plants, and articulate emerging ethical considerations. The semi-structured nature of interviews was specifically chosen for its flexibility, enabling participants to elaborate on topics they found emotionally or ethically significant, thus capturing in-depth qualitative data and enhancing the interpretive richness of subsequent analysis (Patton, 2015, pp. 438–440).

The interview protocol contained open-ended questions such as "Can you describe how you felt during the Plant Hospital scenario?" or "Have your feelings or perceptions about indoor plants changed since participating in the workshop?" allowing respondents considerable freedom to articulate emotions and insights authentically. The interviews were conducted predominantly in Mandarin to accommodate linguistic comfort and nuanced emotional expression among Chinese

participants, although the four non-Chinese participants completed their interviews in English. Conducting interviews in participants' first languages was methodologically important for capturing nuanced emotional expressions and detailed ethical reflections without linguistic barriers potentially hindering emotional authenticity (Riessman, 2008, pp. 23–26).

Following interviews, a subsequent methodological phase involved continuous digital engagement via the WeChat platform, running for approximately eight consecutive weeks. Participants regularly submitted weekly updates about their interactions with indoor plants, including short written reflections, photos, and brief audio messages. Over the digital engagement period, a total of 192 digital messages, including 120 text-based reflections, 48 photographs, and 24 audio messages (each approximately 1–2 minutes), were collected. These continuous digital interactions provided ongoing qualitative data reflecting subtle emotional shifts and incremental behavioral changes, crucial for understanding long-term impacts of speculative design interventions (Polaine, Løvlie and Reason, 2013, p. 47).

3.2.2 Speculative prompts

The continuous digital data collection was further enriched through periodic researcher-initiated speculative prompts, such as short narrative scenarios or reflective questions. For instance, prompts included imaginative scenarios like "Imagine your plant can communicate feelings of thirst or sadness—what would it say to you today?" or reflective questions like "What did your plant teach you emotionally or ethically this week?" Participants' responses to these speculative prompts offered detailed qualitative data capturing evolving emotional empathy, ethical reflections, and behavioral adaptations toward plants in everyday contexts. Such prompts encouraged participants to regularly revisit speculative workshop insights, embedding them deeper within their daily emotional and ethical considerations (Dunne and Raby, 2013, pp. 65–67).

3.2.3 Ethical Considerations in Data Collection

For ethical rigor, all data collection activities strictly followed institutional guidelines for informed consent, confidentiality, and voluntary participation. Participants provided explicit informed consent prior to participation in workshops, interviews, and digital engagements. Detailed consent forms outlined the nature of participation, data usage, and privacy protections clearly, ensuring transparency and participant autonomy throughout the research process. Participants retained the right to withdraw from the study at any point without repercussions, although none chose to do so, suggesting a high level of trust and engagement established during the methodological process (Bryman, 2016, pp. 129–131).

All qualitative data were systematically organized, anonymized, and securely stored following rigorous ethical standards. Each participant was assigned a unique identification code (e.g., P01, P02) for anonymity in transcripts and digital interactions. Transcripts, observational notes, digital submissions, and multimedia records were digitally archived securely on a password-protected platform accessible only to the researcher. This meticulous data management ensured confidentiality and ethical rigor, reinforcing trust and methodological quality (Charmaz, 2014, p. 344).

3.2.4 Data Analysis

Data analysis employed iterative thematic analysis methods, identifying emerging themes and emotional patterns within workshop interactions, observational notes, interview transcripts, and continuous digital reflections. Analytical triangulation across multiple data sources strengthened the methodological validity and interpretive depth, ensuring robust and nuanced qualitative insights into how speculative participatory interventions influenced participants' emotional bonds and ethical perceptions toward indoor plants (Nowell et al., 2017, pp. 1–13). Taken together, these methods generated layered qualitative material across workshops, homes, interviews, and digital interactions. This provided the empirical basis for examining how speculative engagement moved into everyday plant care over time.

3.3 DATA ANALYSIS METHODS

3.3.1 Rationale for Choosing Thematic Analysis

Thematic analysis was chosen because this study needed to identify patterned shifts across different kinds of qualitative material and relate them directly to the research questions. The aim was not simply to list participants' opinions or emotional reactions. It was to trace how speculative engagement moved into room-level adjustments, repeated actions, ethical language, and, in some cases, breakdown or withdrawal. For this reason, thematic analysis offered a flexible but systematic way to work across workshops, observations, interviews, and digital materials while still keeping contextual detail.

The analysis followed Braun and Clarke's six-phase process because it allowed movement from detailed coding to broader interpretive claims in a transparent way. In this thesis, themes were not treated as the final destination of analysis. They functioned as bridges between raw qualitative material and the later discussion of mechanism, pattern grammar, and boundary conditions in Chapter 5.

3.3.2 Familiarization and Coding

The initial phase—familiarization—involved extensive and repeated reading of all data materials collected during workshops, observations, interviews, and digital interactions. Specifically, the researcher reviewed over 200 pages of verbatim transcripts derived from the 24 semi-structured interviews, 36 pages of detailed observational notes, approximately 48 prototypes and narrative scenarios from workshops, and 192 digital engagement messages (120 textual reflections, 48 photographs, and 24 audio messages). This initial immersion phase facilitated a thorough understanding of the dataset's depth and complexity, enabling the researcher to identify preliminary patterns and insights intuitively (Charmaz, 2014, pp. 116–118).

3.3.3 Initial Patterns

Following familiarization, initial coding was systematically conducted across all qualitative materials using NVivo 12 software. Coding involved segmenting textual data into smaller meaningful units (phrases, sentences, or short paragraphs) and assigning descriptive labels that summarized the essence of each segment. The coding process was primarily inductive—codes emerged from the data rather than being predetermined by theoretical assumptions—allowing participant voices and experiential nuances to guide the analysis authentically (Saldana, 2016, pp. 7–9). At this stage, approximately 850 initial codes were generated, reflecting the granular and comprehensive nature of the coding process. These codes captured a wide array of emotional expressions, ethical reflections, speculative insights, and behavioral observations, ensuring analytical sensitivity and data-driven rigor.

Subsequently, the I undertook a detailed process of searching for broader themes from the initial codes. This involved systematically clustering similar codes into preliminary thematic groups based on conceptual similarity and meaningful coherence. Codes such as "feeling responsible for plant care," "empathy triggered by speculative scenarios," "emotional connection through imagination," and "perceiving plants as emotional entities" were grouped under broader thematic categories such as "Emerging Emotional Empathy" and "Ethical Responsibility." At this intermediate stage, approximately 12 initial thematic groups were identified through iterative analytical reflection and constant comparison across coded data segments (Braun and Clarke, 2006, p. 89).

3.3.4 Clustering Codes

The reviewing phase involved critical reassessment and refinement of these initial themes against the entire dataset, ensuring they were representative, distinct, and internally coherent. This step required returning repeatedly to original transcripts, observational records, and digital data, examining whether themes accurately and

comprehensively encapsulated participants' reported experiences and researcher observations. Through this iterative reassessment, themes were condensed and refined into seven core thematic categories: "Shifts in Perception Towards Plant Agency," "Deepened Emotional Empathy," "Ethical Reflection and Moral Responsibility," "Practical Behavior Changes," "Challenges and Barriers to Sustained Engagement," "Cultural Context and Variation," and "Speculative Imagination as Catalyst." Each core theme represented a substantial analytic finding, supported by extensive qualitative data and clearly linked to the research aim and questions (Nowell et al., 2017, p. 4).

Defining and naming these themes involved clearly delineating their boundaries, ensuring analytical distinctiveness, and elaborating the specific insights each offered into speculative participatory design's effectiveness. For example, the theme "Shifts in Perception Towards Plant Agency" specifically captured changes in participants' recognition of plants as active, responsive entities rather than passive decorative objects, evidenced through codes such as "plants expressing emotional needs," "plants as patients requiring care," and "plants as relational partners." Similarly, the theme "Speculative Imagination as Catalyst" was defined explicitly to illustrate how speculative scenarios, like the Plant Hospital metaphor, actively triggered imaginative thinking and emotional engagement, evidenced by detailed participant reflections captured during workshops and interviews (Dunne and Raby, 2013, pp. 45–47).

Measurement and evaluation of thematic significance and prevalence across the data employed the principle of "thematic saturation," a criterion indicating sufficient thematic development once further analysis produced no new substantial insights or patterns (Braun and Clarke, 2006, p. 88). Saturation was considered reached when themes and associated codes repeatedly emerged consistently across multiple participant accounts and data sources without introducing new conceptual dimensions. This methodological benchmark ensured analytical robustness and confidence in the identified themes' representativeness and comprehensiveness.

3.3.5 Theme Descriptions and Boundaries

Additionally, the analytic trustworthiness of thematic analysis was rigorously ensured through triangulation, peer debriefing, and continuous reflexivity. Triangulation involved cross-referencing emergent themes across multiple data sources—workshops, observations, interviews, digital interactions—to verify consistency and reliability of thematic findings. Peer debriefing sessions were periodically held with two experienced qualitative researchers, who critically reviewed preliminary thematic interpretations and provided feedback, reducing potential researcher bias and enhancing analytic objectivity (Patton, 2015, pp. 653–655).

Furthermore, analytical reflexivity—regularly reflecting on the researcher's own positionality, assumptions, and interpretive influences—was integral throughout the analysis process. Reflexive journaling documented personal reflections and analytic decision-making, maintaining transparency regarding how interpretations emerged and evolved (Charmaz, 2014, p. 344). This reflexivity was particularly crucial given the researcher's shared cultural background with the majority of participants, necessitating conscious management of potential biases or interpretive assumptions during thematic interpretation. At this stage, themes were treated as more than descriptive categories. They were used to connect raw qualitative material to later claims about mechanism, design patterns, and limits. This was important because the thesis asks not only what participants felt, but how those feelings did or did not become ordinary care.

3.3.6 Triangulation

Finally, thematic narratives were constructed for each identified theme, integrating representative data extracts—direct participant quotations, detailed observational excerpts, photographic documentation of prototypes—to substantiate analytic claims. These narratives were crafted not merely descriptively but interpretively, explicitly linking back to theoretical frameworks and research questions, clearly articulating how

speculative participatory interventions fostered emotional empathy, ethical reflections, and practical behavior changes toward indoor plants among participants.

Through this rigorous analytical process—encompassing detailed data familiarization, systematic inductive coding, iterative thematic refinement, critical measurement through thematic saturation, and comprehensive triangulation and reflexivity—the thematic analysis produced robust, nuanced qualitative insights into the research phenomenon. By meticulously adhering to established analytical guidelines, transparency, and reflective practice, the thematic analysis successfully captured complex emotional, perceptual, and ethical transformations, providing compelling empirical evidence supporting the theoretical and practical contributions of speculative participatory design in addressing plant blindness among urban Chinese Generation Z.

3.4 ETHICAL CONSIDERATIONS

Given the speculative and participatory nature of this research, ethical considerations were addressed thoroughly to ensure participant safety, comfort, dignity, and privacy. Ethical rigor was maintained throughout the research process, guided by qualitative research ethics guidelines (Silverman, 2020, pp. 90–92; Merriam, 2009, pp. 233–236). A comprehensive ethics application detailing research aims, methods, potential participant risks, and mitigation strategies was submitted and approved by the university's Research Ethics Committee prior to data collection, thereby establishing a foundational ethical framework for the study. This ethical approval ensured that all procedures were systematically reviewed for potential ethical risks and aligned with institutional ethical standards for qualitative research involving human subjects (Bryman, 2016, pp. 130–132). These ethical procedures were not separate from the theoretical position of the thesis. Because this study treats plant care as a relational and more-than-human practice, the research process also had to remain non-coercive, dialogic, and open to hesitation, silence, partial participation, and refusal. Ethical

design, in this sense, was part of the method rather than an external requirement added afterwards.

Informed consent was a central ethical principle throughout the study, reflecting respect for participant autonomy and decision-making rights (Patton, 2015, pp. 496–498). Before participation in any research activity—including speculative workshops, interviews, observational sessions, and digital engagements—each participant received an informed consent form containing explicit and comprehensive information about the study's purpose, methods, expected duration, and potential emotional or psychological impacts. The consent form clearly explained the speculative and imaginative nature of the participatory methods used, emphasizing that participants might engage emotionally or reflectively with plants in unconventional ways. For example, it explicitly stated that the "Plant Hospital" scenario involved metaphorical personification of plants as patients needing emotional care, potentially prompting participants to reconsider their ethical or emotional relationship with plants. The form also indicated that participation was entirely voluntary, and participants could withdraw at any time without penalty or need for justification.

Additionally, the informed consent form specified detailed privacy protections and confidentiality assurances. Participants were informed that all data collected—such as audio recordings, photographs, digital messages, and written reflections—would be securely stored on encrypted drives, accessible only to the primary researcher. Personal identifiers, including participant names, locations, or any identifiable descriptions, were anonymized during analysis and reporting stages. Participants were offered the option of choosing pseudonyms to protect their anonymity and were clearly informed that no identifiable information would be shared in any published materials or research dissemination activities. To enhance participant trust, the consent form explicitly detailed data retention periods (three years after thesis completion) and provided contact information for both the researcher and institutional ethics board, allowing participants to clarify questions or express concerns at any stage.

Sensitivity toward participant emotions and potential vulnerabilities was particularly crucial due to the speculative, emotionally engaging nature of the research interventions. The researcher remained continuously reflective and culturally sensitive throughout interactions, especially considering the urban Chinese Generation Z context, where expressing personal emotions or moral reflections publicly could sometimes evoke feelings of discomfort or embarrassment (Wang, 2021, p. 328). Therefore, the researcher adopted culturally sensitive communication practices, such as using indirect or metaphorical language when discussing emotional experiences, and allowed ample time during interviews and workshops for participants to process and articulate their thoughts comfortably. For instance, during speculative scenarios involving plant care as an ethical responsibility, participants were regularly reminded that sharing deeply personal reflections was optional, and participants could limit their engagement to comfortable levels.

3.4.1 Researcher Bias and Cultural Assumptions

Furthermore, acknowledging the cultural and generational context of participants required heightened ethical awareness. Being a Chinese international researcher conducting research with predominantly Chinese Generation Z participants raised particular considerations around insider-outsider dynamics, cultural expectations, and researcher positionality. Reflective journaling and peer debriefing were regularly employed strategies to address these cultural sensitivities actively. Reflective journals included detailed entries on cultural assumptions, participant-researcher interactions, and emotional responses that occurred during research sessions. For example, the researcher consciously reflected on instances where personal familiarity with Chinese cultural norms might influence data interpretation, such as interpreting emotional restraint or indirect language common in Chinese communication patterns (Yan, 2010, p. 122). Through ongoing reflection, the researcher actively managed potential biases or cultural assumptions, ensuring analytical interpretations remained faithful to participants' authentic expressions and perspectives.

Peer debriefing with two external qualitative researchers experienced in cross-cultural research further strengthened ethical practice. These peers critically reviewed scenarios involving sensitive cultural interpretations, emotional reflections, and ethical dilemmas encountered during speculative interactions, providing objective feedback and suggesting alternative interpretations. This rigorous reflexivity and peer engagement were particularly valuable during analysis phases, ensuring the researcher remained culturally responsive and ethically attuned throughout all research processes.

Additionally, the speculative participatory design methodology itself necessitated careful ethical consideration of the emotional and ethical implications for participants engaging imaginatively with non-human entities. Recognizing potential emotional discomfort or confusion arising from speculative scenarios, the researcher provided explicit verbal reminders at multiple stages, clearly stating that imaginative scenarios (such as treating plants metaphorically as hospital patients) were designed as reflective exercises, not literal instructions or moral obligations. Participants were explicitly reassured that emotional reactions elicited by speculative scenarios were normal, valued, and did not require justification or defense. The researcher's ongoing responsiveness and openness created a supportive environment, mitigating emotional discomfort and fostering trust-based participant interactions (Forlano, 2016, pp. 44–45).

3.4.2 Consent

To illustrate concretely, the consent form explicitly included the following key information sections:

1. Study Title and Research Purpose: Clearly outlined the objective to explore emotional and ethical perceptions towards indoor plants through speculative participatory design methods.

2. Participation Activities: Specified engagement types—workshops, interviews, observations, digital interactions—detailing expected activities and durations

(e.g., "participation in a 2-hour Plant Hospital speculative workshop involving imaginative scenarios and prototype creation; 30-minute post-workshop interviews about your emotional and reflective experiences").

3. Potential Emotional Impact: Explicit acknowledgment that speculative scenarios might evoke unexpected emotions, ethical reflections, or perceptions about plant relationships, reassuring participants that any such reactions are normal and valuable contributions to the research.

4. Privacy and Confidentiality Assurance: Detailed procedures for anonymizing data, secure storage methods (encrypted digital storage), clear guarantees of non-identification in dissemination.

5. Voluntary Participation and Withdrawal Rights: Clearly stated participant rights to withdraw fully or partially at any stage without negative consequences.

6. Researcher and Institutional Contact Information: Provided clear, easily accessible researcher and institutional ethics board contact details to facilitate transparent communication and address any participant concerns or inquiries promptly.

Finally, throughout the study, digital interactions on platforms like WeChat required additional ethical attentiveness due to potential data security and participant privacy concerns. The researcher explicitly advised participants on digital safety and privacy practices, such as using pseudonyms in digital interactions or sending sensitive reflections via encrypted channels. Regular reminders about privacy settings were communicated to participants during continuous digital engagement phases, ensuring participants felt secure sharing personal reflections and emotional experiences digitally. Moreover, digital data were regularly backed up onto secure university-managed servers, ensuring compliance with data protection regulations and participant confidentiality requirements (Silverman, 2020, pp. 91–92).

3.4.3 The Importance of Reflexivity

Researcher positionality and reflexivity were further explored to address potential biases and interpretative influences arising from my cultural identity and personal experiences. Reflexivity requires researchers to critically examine how their own identities, experiences, and assumptions influence data collection and interpretation processes (Charmaz, 2014, pp. 344–346). As a Chinese international student who has experienced both Eastern and Western cultural contexts, I inevitably approached this research with implicit assumptions shaped by my cultural and academic background. These assumptions potentially influenced not only my interpretations of participant behaviors and reflections but also the ways participants perceived and interacted with me during the research activities.

To systematically manage and critically examine these potential biases, I maintained detailed reflexive journals throughout the entire research process, capturing my immediate reactions, feelings, and interpretative dilemmas after each research interaction. For example, I reflected explicitly on moments during interviews and workshops where I perceived participants as hesitant or reserved, considering whether my cultural expectations might have led me to interpret participants' natural emotional restraint or indirect communication styles inaccurately as reluctance or disengagement (Yan, 2010, pp. 120–123). Through ongoing reflexive journaling, I continuously reassessed and clarified these cultural assumptions, striving to ensure analytical interpretations authentically reflected participants' actual experiences rather than my personal biases.

Cultural sensitivity was another critical ethical concern deeply integrated within the methodological approach. Given the urban Chinese Generation Z participants' cultural context, it was essential to respect and accommodate cultural norms regarding emotional expression, indirect communication patterns, and interpersonal dynamics during research interactions (Mertens, 2014, pp. 254–256). Recognizing potential hierarchical dynamics between researcher and participants, particularly in a Chinese cultural context, I consciously adopted a collaborative and egalitarian communication

style throughout interactions. For instance, during speculative workshops and reflective interviews, I deliberately used indirect, respectful language to pose sensitive or emotionally nuanced questions, creating an environment where participants felt comfortable and respected, thus facilitating deeper, culturally appropriate emotional engagement (Guba and Lincoln, 1994, pp. 110–112).

Moreover, to ensure methodological transparency and rigorous ethical reflexivity, I regularly engaged in peer debriefing sessions with two experienced qualitative researchers familiar with cross-cultural contexts. These peers critically reviewed my interpretative frameworks and methodological decisions, especially regarding culturally sensitive interpretations. For instance, peer debriefers questioned initial assumptions I made about participants' indirect emotional expressions, prompting deeper reconsideration and clarification of my interpretations (Patton, 2015, pp. 653–655). These sessions provided valuable opportunities to challenge my implicit assumptions, explore alternative interpretations, and strengthen analytical rigor and cultural sensitivity.

Ethical relationality, a key principle outlined by Lincoln and Guba (1985, pp. 221–224), provided a robust theoretical framework guiding the ethical management of participant interactions. Ethical relationality emphasizes building relationships based on trust, mutual respect, and reciprocal openness between researchers and participants. Throughout data collection phases, I actively cultivated relationships characterized by ethical relationality, ensuring that participants felt genuinely heard, respected, and valued in the research process. For example, during speculative workshops and follow-up interactions, I explicitly reassured participants of the value and authenticity of their emotional reflections, acknowledging their contributions explicitly and appreciatively, thus fostering trusting relationships essential for ethical qualitative research (Lincoln and Guba, 1985, pp. 223–224).

Further enhancing cultural sensitivity, methodological protocols included careful pre-testing of interview guides and speculative workshop scenarios with culturally representative pilot participants. Feedback from pilot tests informed adjustments in

language, emotional phrasing, and scenario contexts to ensure cultural appropriateness and sensitivity, avoiding inadvertent discomfort or misunderstanding among participants. By systematically incorporating pilot feedback, the research approach effectively addressed cultural sensitivities, enhancing participant comfort and methodological rigor (Silverman, 2020, pp. 90–92).

Ultimately, the integration of explicit researcher reflexivity, rigorous cultural sensitivity practices, continuous peer debriefing, and ethical relationality significantly strengthened the overall ethical rigor and methodological trustworthiness of the research. These strategies provided comprehensive measures to systematically manage potential biases, enhance interpretative neutrality, and maintain culturally respectful and ethically sound participant engagements. Such careful attention to positionality, reflexivity, and cultural sensitivity ensured that the qualitative insights generated authentically and ethically reflected participants' genuine experiences, emotional expressions, and ethical reflections. These explicit reflexive and ethical strategies naturally lead into broader considerations of methodological rigor, discussed comprehensively in the following section.

3.4.4 Methodological Rigor and Trustworthiness

Ensuring methodological rigor and trustworthiness is crucial in qualitative research, particularly within speculative participatory approaches that involve imaginative and reflective participant engagements. To achieve this, the current study systematically employed established qualitative rigor criteria—credibility, transferability, dependability, and confirmability—following Lincoln and Guba's (1985, pp. 289–331) foundational guidance. Each criterion was carefully considered through deliberate analytical strategies, reflexive practices, and methodical documentation to enhance the trustworthiness and authenticity of findings.

Credibility—the extent to which findings accurately represent participant experiences and perspectives—was achieved through multiple verification processes

and comprehensive engagement strategies. Prolonged engagement with participants played a central role, as the research involved sustained interactions across speculative workshops, participatory observations, interviews, and ongoing digital dialogues spanning over eight weeks. This extended timeframe allowed for deeper rapport-building and provided ample opportunities for participants to reflect meaningfully and authentically on their evolving emotional connections with plants. The iterative nature of speculative participatory methods, especially through cyclical digital interactions via WeChat, ensured repeated opportunities for participants to revisit, revise, or elaborate their reflections, enhancing the accuracy and depth of collected data (Nowell et al., 2017, pp. 3–4).

Member checking further strengthened the credibility of the study. After each speculative workshop and interview session, preliminary thematic interpretations were shared directly with participants through personalized follow-up messages. Participants were encouraged to verify, clarify, or expand upon their initial responses, reflections, or interpretations offered during the speculative sessions. For example, after the "Plant Hospital" workshops, brief summaries of emergent themes such as "emotional empathy," "plant agency," or "ethical reflection" were presented to participants individually via digital messages, inviting immediate participant feedback on these preliminary findings. Such iterative member checking provided direct validation of analytic interpretations, ensuring alignment with participants' lived experiences and emotional insights (Merriam, 2009, pp. 217–219).

Additionally, methodological triangulation significantly enhanced credibility. By combining multiple qualitative data collection methods—speculative workshops, observational field notes, semi-structured interviews, and digital textual interactions—triangulation allowed for cross-validation of emergent themes and patterns. For instance, observational data collected during home visits were systematically compared and corroborated with participant reflections articulated in digital interactions and follow-up interviews. When observational notes indicated a change in participants' daily plant care behaviors, these findings were cross-checked with digital messages, ensuring a comprehensive and multifaceted understanding of the phenomenon. Such

triangulation minimized potential biases or interpretive inaccuracies, strengthening the robustness and internal consistency of qualitative findings (Patton, 2015, pp. 661–663).

Transferability—the degree to which findings might be meaningfully applied to other contexts or populations—was thoughtfully addressed through rich, thick description and detailed contextual documentation. The study explicitly provided comprehensive descriptions of participant demographics, urban contexts, generational characteristics, and cultural backgrounds, particularly highlighting the nuanced urban experiences and digital lifestyles specific to Chinese Generation Z. Detailed portrayals of speculative workshop scenarios, participant emotional reactions, and ethical reflections were carefully documented, enabling future researchers or practitioners to assess applicability and relevance of findings in similar urban ecological education contexts. Moreover, the explicit documentation of methods, speculative interventions, and participatory techniques facilitated transparent communication of research processes, allowing external readers to evaluate potential applicability or resonance with other demographic groups or cultural settings (Bryman, 2016, pp. 384–386).

Dependability—reflecting the consistency and stability of the research process over time—was systematically ensured through detailed methodological documentation, transparent reflexivity, and external auditing practices. A comprehensive audit trail was consistently maintained, meticulously documenting every stage of research activities, methodological decisions, analytical procedures, and reflexive considerations. Detailed logs included the timing, duration, and content summaries of all interactions—from initial speculative scenarios to concluding digital feedback loops—creating a transparent, accessible record of research progression and analytical choices. Reflexive journaling was employed extensively, capturing not only procedural decisions but also reflections on researcher positionality, cultural assumptions, and evolving emotional sensitivities throughout the research process (Charmaz, 2014, pp. 344–346). External auditing was additionally conducted by two qualitative researchers unaffiliated with the study, who reviewed the audit trail and

research documentation regularly, providing critical, objective feedback on procedural consistency, analytical coherence, and interpretive validity. This practice significantly enhanced dependability by introducing external, independent oversight to verify methodological consistency and transparency.

Confirmability—addressing the extent to which findings genuinely represent participants' experiences rather than researcher biases—was rigorously maintained through ongoing researcher reflexivity, critical peer debriefing, and explicit documentation of researcher decisions and interpretations. Reflexivity involved continuous reflection on the researcher's role as a Chinese international student conducting research among urban Chinese Generation Z, proactively identifying potential biases, cultural assumptions, or interpretive influences arising from shared cultural backgrounds or generational experiences. For instance, reflective journal entries explicitly discussed potential biases in interpreting participant expressions of emotional restraint, recognizing cultural norms around indirect communication patterns prevalent within the Chinese cultural context (Yan, 2010, pp. 120–123). By systematically acknowledging and openly discussing these positionalities, the researcher actively mitigated interpretive bias, enhancing the neutrality and authenticity of analytical findings.

3.5 PEER DEBRIEFING AND TRANSPARENCY

Peer debriefing helped me test my interpretations rather than work through the analysis alone. Two qualitative researchers with experience in speculative and cross-cultural research reviewed emerging themes, coding decisions, and methodological choices. They questioned weak categories, asked for counter-examples, and prompted clearer theme boundaries when my early interpretations were too broad.

To strengthen confirmability, analytical decisions, coding criteria, and interpretive rationales were clearly documented, with thematic codes (e.g., "plant emotional

agency," "ethical reflections") defined and justified to support analytical transparency (Nowell et al., 2017). Verbatim participant reflections were meticulously archived and cross-referenced during analysis to preserve authenticity, while bilingual peers reviewed translated excerpts to ensure linguistic accuracy.

Analytical interpretations were consistently aligned with the study's theoretical foundations—such as relational reciprocity and multi-species ethics—ensuring conceptual coherence and minimising researcher bias. These strategies, combined with prolonged engagement, member checking, triangulation, reflexivity, and peer auditing, established robust methodological rigour and trustworthiness.

3.6 METHODOLOGICAL LIMITATIONS AND REFLECTIONS

Throughout the implementation of this speculative participatory research project, several methodological limitations emerged, reflecting both the inherent complexities of speculative design approaches and the practical constraints associated with participatory methodologies. Identifying and critically reflecting on these limitations is integral to enhancing methodological rigor, providing transparent insights into the interpretive boundaries of the study, and guiding future research within similar speculative participatory contexts.

One of the most significant limitations of this study relates to its relatively small and culturally homogeneous participant sample, comprising primarily young Chinese urban residents aged between 18 and 25, located within major urban centers such as international settings including London. Although purposeful sampling effectively captured detailed, culturally specific insights into the phenomenon of plant blindness within this particular demographic, the narrow participant scope raises challenges regarding the broader transferability and generalizability of findings. The speculative design methods employed—particularly scenarios involving the personification of plants and metaphorical narratives—might resonate uniquely within specific cultural

and generational contexts. As participants were predominantly young urban Chinese, their emotional responses, interpretive frameworks, and receptivity to speculative engagements may differ significantly from other cultural or generational groups. Consequently, while this methodological choice provided rich, culturally relevant data, it inherently limits the extent to which the research findings can be confidently extrapolated to other populations or urban settings without careful contextual adaptation (Merriam, 2009, pp. 223–224).

Another critical limitation was the relatively short duration of the participatory interventions, with speculative workshops and ongoing digital engagements extending cumulatively over approximately two months. Although this duration was sufficient to observe preliminary changes in participants' emotional connections and everyday plant-care behaviors, the brief intervention period raises questions regarding the longevity and sustainability of observed effects. Speculative participatory methods inherently emphasize transformative experiences, imaginative scenarios, and emotional empathy, which participants readily embraced during the initial stages of intervention. Nevertheless, genuine behavioral and attitudinal shifts towards plants may require prolonged, sustained engagement extending beyond a few months to become deeply internalized and enduringly embedded within everyday routines. Consequently, the methodological timeframe of this study represents an inherent constraint, necessitating caution when interpreting the long-term significance and durability of emergent emotional and ethical transformations among participants (Amprazis and Papadopoulou, 2020, pp. 1066–1067).

The speculative design methods used, particularly the "Plant Hospital" scenarios and imaginative role-playing activities, introduced another methodological limitation—participants' potential perceptions of speculative scenarios as overly imaginative, playful, or detached from practical reality. While the speculative nature of the workshops successfully fostered emotional engagement, ethical reflection, and imaginative empathy, it also risked creating a sense of artificiality or novelty among some participants. During reflective interviews and digital follow-ups, several participants initially described the speculative scenarios as engaging yet acknowledged

difficulty transferring imaginative empathy developed during the workshops into consistent daily practices. Thus, while speculative design effectively activated participants' emotional and ethical imagination, the method's inherent abstraction sometimes created practical barriers, limiting the seamless integration of speculative insights into everyday routines and plant-care behaviors (Dunne and Raby, 2013, pp. 66–68). Reflecting upon this limitation, future speculative participatory research might consider more explicit bridging strategies—such as integrating tangible, practical follow-up tasks—to strengthen connections between imaginative speculative experiences and real-world applications.

The methodological reliance on digital engagement platforms, particularly WeChat, also posed specific limitations relating to data collection consistency, participant responsiveness, and technological accessibility. While digital platforms provided flexible, convenient, and culturally familiar channels for ongoing participant interactions, some participants demonstrated varying levels of responsiveness and engagement over time, resulting in uneven data completeness and occasionally fragmented textual interactions. Factors such as participant fatigue, competing daily priorities, or digital saturation potentially influenced responsiveness, leading to periodic lapses or incomplete reflections during digital check-ins. Furthermore, while WeChat was culturally appropriate and widely accessible within the targeted participant demographic, reliance on digital interactions inherently excluded potential participants with limited technological access or less affinity for sustained digital communication, introducing an unintended selection bias toward digitally savvy participants (Polaine, Løvlie and Reason, 2013, pp. 21–23). Future methodological refinements might involve diversifying interaction modalities—such as incorporating periodic face-to-face interactions or structured group reflections—to ensure comprehensive data collection, enhanced participant engagement, and broader accessibility.

The complexity of qualitative thematic analysis represented an additional methodological challenge. While thematic analysis effectively facilitated in-depth exploration of participants' emotional experiences and ethical reflections, the interpretive nature of qualitative analysis inherently involves subjective researcher

judgments and thematic categorization decisions. Despite rigorous efforts to maintain analytical transparency through member checking, reflexive journaling, and peer debriefing, qualitative thematic interpretation inevitably involves subjective interpretation of textual and observational data, influenced by the researcher's own cultural background and interpretive frameworks. While explicit documentation and reflexivity effectively minimized interpretive bias, complete neutrality remains methodologically unattainable within qualitative thematic analysis processes. Therefore, transparency about interpretive decisions and clear articulation of thematic categories become essential to enabling external readers to critically evaluate analytical credibility (Nowell et al., 2017, pp. 5–6).

3.6.1 Practical constraints

Practical constraints associated with conducting participatory observations in participants' homes emerged as an inherent methodological limitation. While home visits provided rich contextual data and valuable observational insights into participants' real-life plant-care behaviors, practical considerations such as scheduling availability, spatial limitations within small urban apartments, and participant privacy preferences occasionally limited observational depth and consistency. Several participants expressed initial reservations about home-based observational visits, necessitating sensitive negotiation, flexible scheduling, and clear communication of privacy protections to reassure participants. Despite these measures, occasional observational constraints—such as limited visibility of plant-care practices due to spatial layout—restricted comprehensive observational data, requiring careful triangulation with interview and digital interaction data to achieve holistic understanding (Patton, 2015, pp. 662–664).

Finally, the speculative participatory methodology demands considerable facilitation expertise and specialized training. Successfully implementing speculative scenarios and participatory exercises involves skilled facilitators who can effectively guide emotional reflections, imaginative storytelling, ethical dialogues, and adaptive

interactions. This skill set may not readily be available in conventional educational or community settings, highlighting the need for specialized training programs, facilitator skill development, and additional institutional support. Without adequate facilitator training and experience, the quality and effectiveness of speculative engagements could be significantly compromised, further challenging the practical implementation and widespread scalability of these methods. These limitations do not cancel the findings. Rather, they indicate the conditions under which the method can reasonably travel, and they explain why the claims made later in the thesis remain conditional rather than universal.

4 FINDINGS

This chapter presents the empirical findings from the three phases of the study. It reports what participants said, did, and changed across the workshops, home observations and interviews, and the eight-week WeChat follow-up. The aim here is to show the evidence that later supports the discussion in Chapter 5. Interpretation is therefore kept relatively light, with emphasis placed on participant accounts, observed actions, and room-level changes.

4.1 PLANT HOSPITAL WORKSHOPS (PHASE 1)

The first phase of the study consisted of a series of speculative participatory workshops titled Plant Hospital. These workshops invited participants to engage with plants through role-play, narrative exercises, and speculative prototyping. Across the sessions, participants began to describe plants less as background decoration and more as beings that required attention, care, and interpretation. This phase therefore produced the first evidence of a shift in how participants framed indoor plants in emotional and ethical terms.



Figure 1. Speculative Workshop Setting: Plant Hospital Scenario (Leng, 2023)

The "Plant Hospital" scenario drew on familiar experiences of care, illness, and recovery. In practice, this gave participants an immediate frame for imagining plants as vulnerable and responsive rather than passive. Several participants entered the exercise cautiously, but the scenario helped many of them speak about plants in more relational terms than they had before the workshop.

Participants were invited to take on various imaginative roles within the "Plant Hospital," such as caregivers, nurses, or doctors. These role-playing exercises were not merely recreational; instead, they strategically served the purpose of situating participants directly within speculative scenarios that required active ethical reflection and emotional responsiveness.



Figure 2. Participants Engaging in Role-Playing Activities as Caregivers (Leng, 2023)

During the workshop sessions, participants engaged in carefully structured creative activities designed to stimulate emotional empathy and imaginative engagement. One central activity involved participants collaboratively creating fictional "patient histories" for indoor plants, including symptoms, emotional states, and detailed narratives about the plants' conditions and needs. These narrative-driven activities not only encouraged imaginative storytelling but also strategically prompted participants to articulate and reflect on plants' emotional and physical experiences in human-like terms. According to Loh, Santo and Foth (2023, Introduction), speculative narratives effectively foster empathy by providing concrete yet imaginative scenarios that encourage reflection on otherwise overlooked ethical responsibilities. By assigning human-like emotional qualities and conditions to plants, participants were encouraged to consider and respond emotionally to plants' "health," thus cultivating a deeper emotional empathy that conventional botanical education methods typically fail to achieve.



Figure 3. Participant Creating Fictional "Patient Histories" for Plants in the Plant Hospital Workshop (Leng, 2023)

Further, participants engaged in speculative prototyping exercises designed explicitly to materialize their emotional reflections and ethical commitments toward plant care. These exercises included activities such as creating mock "intravenous drips" symbolizing plant watering, crafting emotional diaries to represent plant moods, and constructing imaginative devices intended to communicate plants' needs and conditions. Speculative prototyping was integral to the workshops because it transformed abstract emotional and ethical considerations into tangible, visible, and manipulable artifacts. According to Sanders and Stappers (2008, pp.7–8), materializing speculative ideas through prototyping enables participants to better grasp complex ethical concepts by engaging physically and emotionally with their creations. Thus, speculative prototyping not only provided practical experiences but also helped

concretize participants' moral imaginations into physical forms, significantly enhancing their emotional investment and ethical understanding.

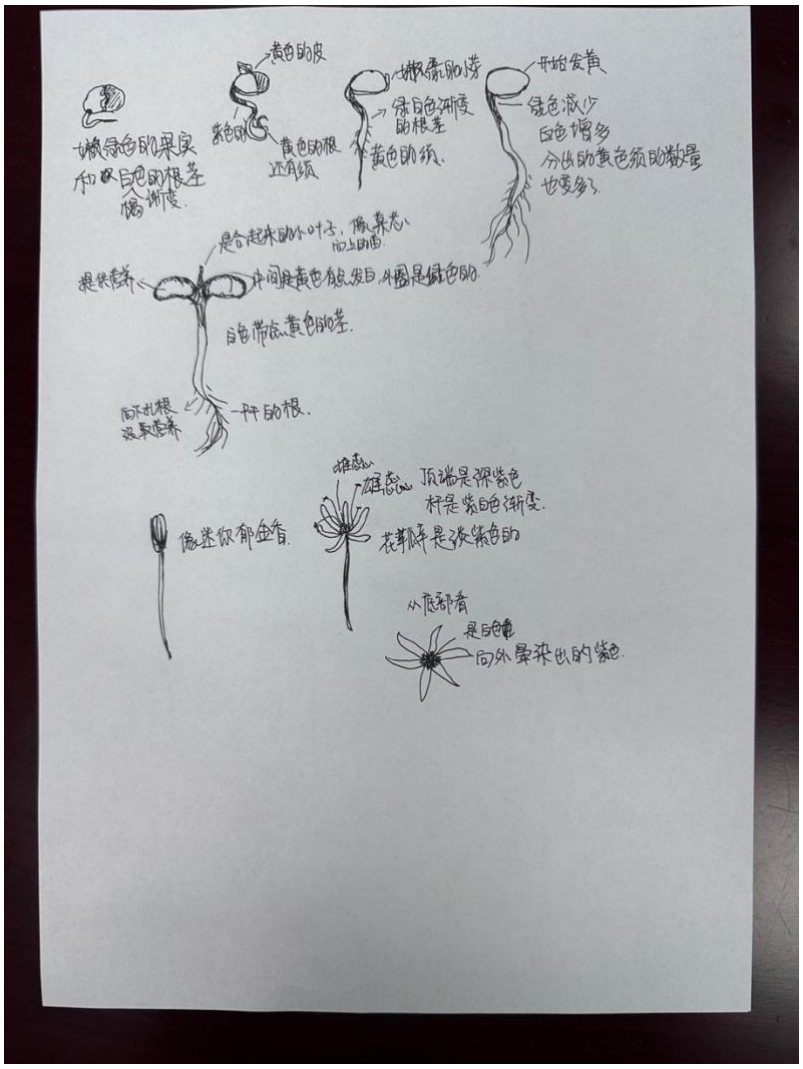


Figure 4. Example of Speculative Prototyping: Participant's Illustrative Representation of Plant Conditions and Emotional States (Leng, 2023)

Participants were also encouraged to interact collaboratively, exchanging their emotional reflections, speculative ideas, and prototypes within group discussions. These participatory dialogues played a crucial role in reinforcing ethical considerations through collective reflection and mutual emotional reinforcement. Engaging

participants in collaborative dialogue allowed individuals to share personal emotional insights, speculate on ethical dilemmas, and reflect collectively on their relational responsibilities towards plants. The group discussions thus functioned as reflective and collective exercises, enabling participants to articulate, negotiate, and deepen their speculative reflections and ethical engagements in a supportive environment (Bryman, 2016, p.466). According to French et al. (2016), collaborative participation fosters deeper individual commitment by validating and enriching participants' emotional and speculative insights through collective interaction, reinforcing the workshop's impact on emotional empathy and ethical reflection.



Figure 5. Participants Engaging in Collaborative Group Discussions During the Plant Hospital Workshop (Leng, 2023)

A significant aspect of the speculative workshops was the deliberate use of familiar digital technologies to facilitate ongoing engagement and continuity. After initial speculative exercises and prototyping activities, participants were introduced to digital communication tools, primarily utilizing the WeChat platform for regular speculative

interactions and reflective check-ins. Integrating digital communication into speculative workshops was strategically chosen to align with participants' existing digital lifestyles, ensuring continuous emotional and ethical engagement beyond the immediate workshop environment. Polaine, Løvlie and Reason (2013, pp.19–20) argue that the continuity and relational nature of digital interactions within speculative living services facilitate sustained behavioral changes by integrating new routines into participants' existing digital habits. Thus, digital engagement mechanisms in the workshops provided essential continuity, reinforcing speculative emotional experiences and ethical commitments as part of participants' daily lives.

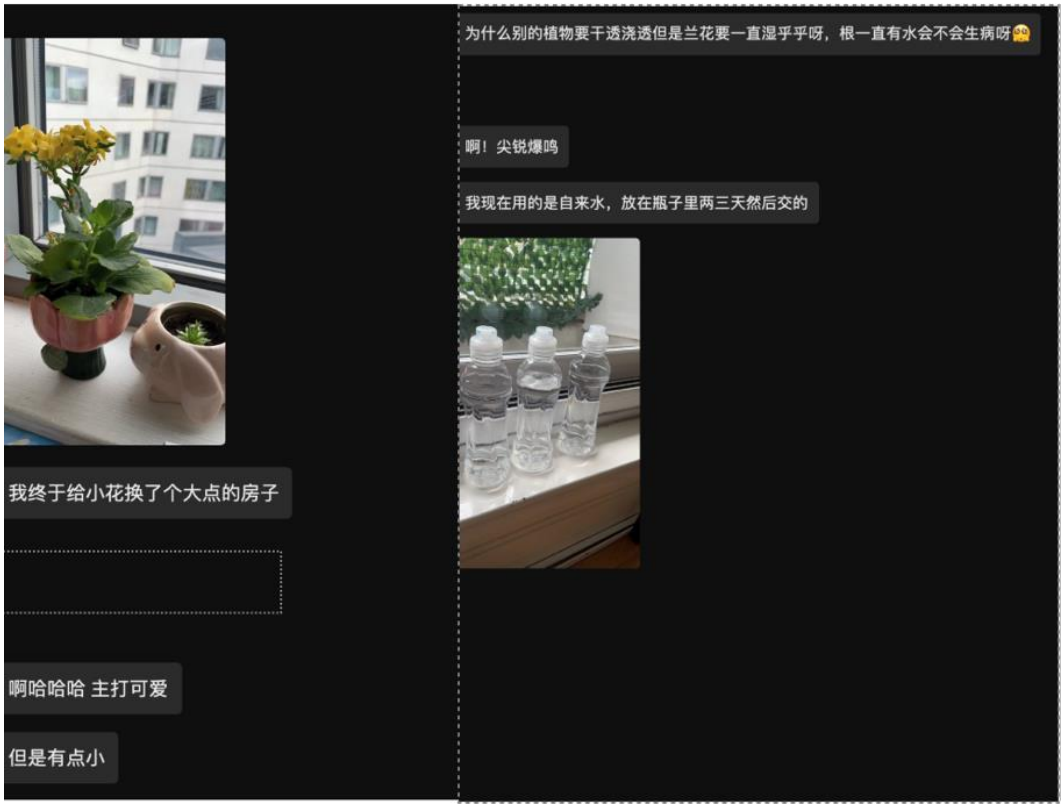


Figure 6. Participants Engaging in Collaborative Digital Group Discussions on Plant Care via WeChat (Leng, 2023)

Throughout the speculative workshops, the researcher adopted a facilitative role, guiding imaginative activities and maintaining ethical attentiveness to participants' comfort and autonomy. Participants were continuously reminded of their voluntary engagement and encouraged to personalize speculative activities according to their

own comfort levels and emotional boundaries. Ethical considerations were paramount, ensuring speculative exercises remained inclusive, respectful, and adaptable. According to Patton (2015, p.343), maintaining participant autonomy and comfort within speculative methods is crucial for preserving ethical integrity and methodological rigor. This careful facilitation ensured participants felt emotionally secure and ethically respected, enabling deeper engagement without discomfort or ethical conflicts. Taken together, the workshops show how speculative scenarios can open plant relevance in a low-risk social setting. At this stage, the most visible change was not yet stable routine, but a shift in language, attention, and willingness to treat plants as relational rather than purely decorative.

4.2 PARTICIPATORY OBSERVATIONS AND INTERVIEWS (PHASE 2)

Following the workshop phase, the study moved into participants' everyday domestic settings through home observations and semi-structured interviews. The purpose of this phase was to examine whether the shifts seen in speculative activities were visible in ordinary plant-care practice, room arrangement, and participant language. This stage therefore focused on what had moved from workshop reflection into everyday action.



Figure 7. Participatory Home Observation: Participant Demonstrating Plant-Care Activities in Domestic Context (Leng, 2023)

The decision to use participatory observation in this phase was strategically rooted in the research philosophy underpinning this study, which advocates for empathetic engagement and relational understanding between researchers and participants. According to Guba and Lincoln (1994, p.107), participatory methods allow researchers to gather richer, context-sensitive data through direct involvement in participants' daily lives, experiences, and interactions. Given that speculative workshops had introduced imaginative scenarios and emotional reflections, it was essential to see how participants integrated these experiences into their ordinary domestic routines, making

participatory observation particularly appropriate. Observations occurred during planned home visits, where participants demonstrated their plant-care activities, discussed their routines, and reflected on changes since their speculative workshop experience. This method enabled the researcher to capture subtle behavioral adjustments, emotional nuances, and even challenges participants faced in integrating speculative ideas into everyday realities.

The home visits served as an essential methodological element because they provided access to the authentic contexts where plant interactions naturally occurred, rather than relying solely on reported behaviors. Observing participants in their home environments facilitated a deeper comprehension of the tangible barriers or enabling factors influencing plant-care behaviors. For example, the spatial arrangement of indoor plants within participants' homes, frequency of watering, or even subtle adjustments in the placement and visibility of plants became important observational data points. Thus, home observations complemented speculative workshop data by contextualizing how participants practically enacted speculative ideas and ethical reflections within real-life scenarios.



Figure 8. Interactive Dialogues During Participatory Home Observations on Plant-Care Practices (Leng, 2023)

Additionally, the observations were intentionally designed to be dialogical and interactive, frequently interspersed with informal conversations. Rather than silently observing, the researcher engaged in active dialogue, asking participants reflective questions or prompting discussions around their plant-care strategies and emotional connections. This interactive dimension was crucial in facilitating a richer, reflexive dialogue between participants and the researcher, allowing immediate clarification, deeper exploration of observed behaviors, and joint interpretation of the experiences. Such interactive dialogues provided immediate context and rationale behind observed actions, enhancing the depth and interpretative richness of observational data.

In parallel to participatory observations, semi-structured interviews were employed as a complementary method to elicit deeper insights into participants' subjective experiences, emotional responses, and ethical reflections arising from their speculative engagements. Semi-structured interviews were specifically selected due to their flexibility, allowing participants sufficient freedom to articulate their personal experiences while maintaining thematic coherence aligned with the research objectives. These interviews explored participants' perceptions of plant agency, the emotional bonds they had developed, and the extent to which speculative activities had influenced their moral reasoning toward indoor plant care.



Figure 9. Semi-Structured Interviews Integrated with Practical Demonstrations of Plant-Care Techniques (Leng, 2023)

The interview protocols were carefully constructed to reflect the key theoretical concerns of multi-species ethics and emotional empathy introduced in earlier stages. Questions were deliberately open-ended, inviting participants to reflect on how their perceptions of plants had evolved following the speculative workshops. For example, participants were asked to narrate specific incidents or emotional experiences related to their plant-care routines since the workshop, revealing deeper levels of personal transformation and ethical contemplation. By encouraging narrative-rich responses, the interviews facilitated rich qualitative data, capturing detailed emotional experiences and ethical reflections that quantitative measures would likely overlook (Riessman, 2008, p.23).

Furthermore, the interviews strategically integrated speculative reflections from workshop activities as reference points to anchor conversations. Participants were asked to recall their speculative prototypes or scenarios and discuss how these imaginative exercises influenced their subsequent behaviors and attitudes. This methodological decision was logically consistent with the overall speculative

participatory approach of the study, ensuring continuity between speculative activities and practical reflections. Thus, interviews actively leveraged speculative workshop artifacts as reflective tools, reinforcing the methodological continuity and coherence of the research process.

To enhance methodological rigor and analytical depth, interviews were audio-recorded and transcribed verbatim, ensuring accurate capture of participants' expressions, emotional tones, and detailed narrative accounts. These transcripts provided a foundational corpus of qualitative data, which was later analyzed through thematic analysis to identify recurring patterns, emotional shifts, and ethical developments (Nowell et al., 2017, p.3). Audio recordings also allowed the researcher to revisit nuanced emotional expressions and subtle verbal cues that might otherwise be lost, further enriching data interpretation and analytical depth.

An additional innovative component in Phase 2 was the ongoing use of digital communication via the WeChat platform, initially introduced in speculative workshops, to maintain continuous participant engagement and reflection. Regular digital check-ins via WeChat allowed participants to document and communicate their daily plant-care routines, emotional reflections, and evolving thoughts. This method was strategically included because it provided an unobtrusive yet effective means of maintaining ongoing observational engagement, particularly important given the dispersed geographical locations of some participants. Digital observation complemented in-person visits, ensuring continuous data collection and allowing the researcher to monitor evolving behaviors and reflections dynamically and longitudinally (Polaine, Løvlie and Reason, 2013, p.47). This phase showed that the strongest changes were not abstract shifts in opinion, but small material and behavioural adjustments in participants' rooms. It is here that speculative relevance began to appear as repeatable practice. This early digital contact also created the bridge into the more sustained follow-up examined in Phase 3.

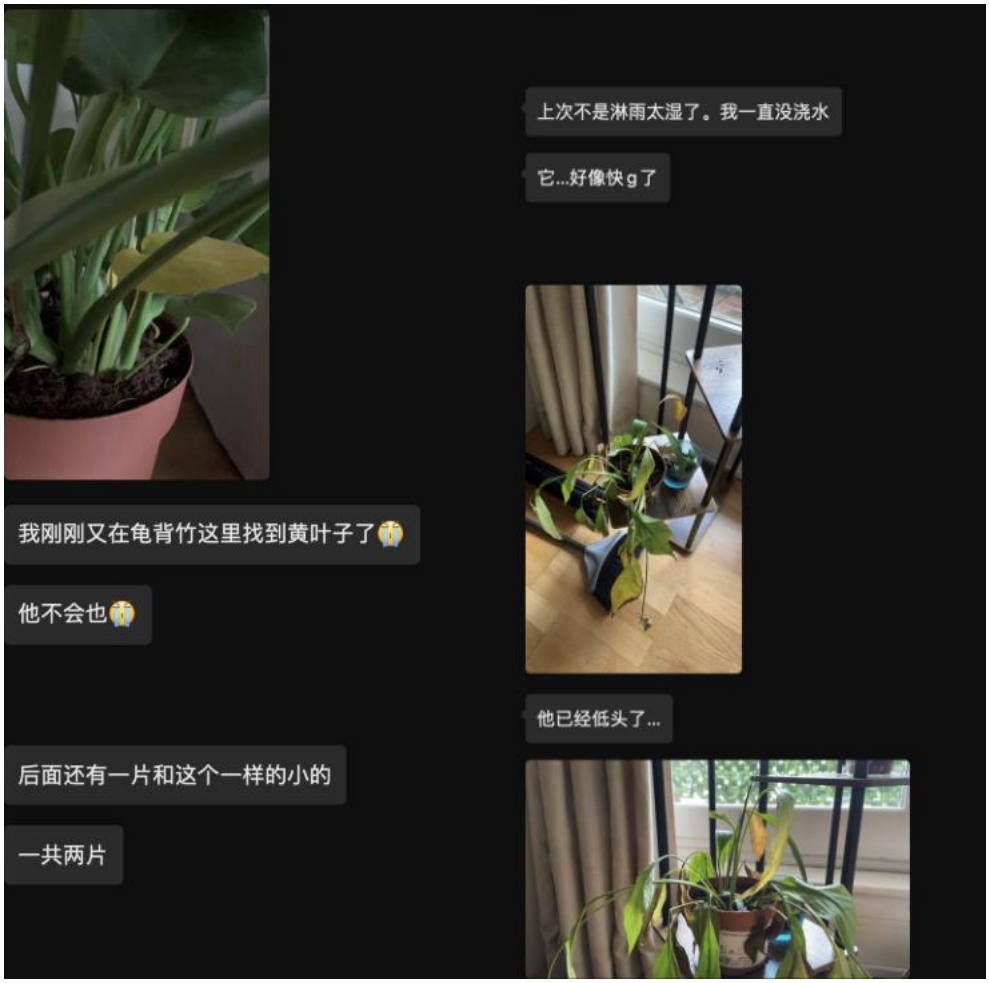


Figure 10. Participants' Digital Interactions and Reflections on Plant Health Shared via WeChat (Leng, 2023)

4.3 DIGITAL ENGAGEMENT (PHASE 3)

The third phase of this research was specifically structured around ongoing digital engagement, utilizing continuous feedback loops between participants and the researcher to maintain sustained interactions and deepen emotional and ethical connections with indoor plants. Building upon the participatory workshops and observational interviews conducted in earlier phases, Phase 3 aimed to provide a structured yet flexible mechanism through which speculative participatory insights could evolve into lasting routines and behavioral changes. This methodological choice

was particularly significant because previous research has frequently highlighted the transient nature of traditional interventions, noting that single, isolated educational sessions typically fail to produce enduring impacts or lasting emotional relationships with plants (Amprazis, Papadopoulou and Malandrakis, 2019, pp. 139–142). Thus, a critical analytical reasoning behind adopting continuous digital engagement was to address this very limitation by embedding ongoing, iterative interactions within participants' daily lives, thereby reinforcing speculative emotional and ethical engagements consistently over time.



Figure 11. Continuous Digital Engagement and Reflective Interaction via Social Media Platforms (Instagram) (Leng, 2023)

Central to this methodological phase was the strategic use of WeChat as the primary digital platform for continuous engagement. WeChat was specifically selected for its widespread adoption among urban Chinese Generation Z, integrating seamlessly into their daily communication routines, thereby minimizing the intrusion of the research into their daily lives. According to Wang (2021, p. 325), digital social media platforms like WeChat have become integral to the social and communicative practices of young urban populations, offering a familiar, convenient channel for maintaining ongoing dialogues and interactions.



Figure 12. Participant's Multimedia Submission: Protective Setup for Outdoor Plant Care Experiments (Leng, 2023)



Figure 13. Participant's Multimedia Submission: Indoor Seedling Cultivation and Speculative Prototyping Activities (Leng, 2023)

At this stage, the digital phase provided the clearest evidence of how earlier workshop insights were either sustained or lost over time. Rather than functioning simply as a channel for information, WeChat became a site where reminders, reflections, and participant-led updates could be observed longitudinally. The paragraphs that follow therefore focus on what participants did with this digital layer in practice, and how it shaped everyday plant-care routines.

The continuous digital engagement via WeChat not only provided practical reminders for plant care but significantly reinforced participants' emotional bonds and ethical responsibilities toward their indoor plants. Specifically, the digital check-ins employed personalized messages and reflective prompts, asking participants to share narratives or brief reflections on their plant's condition, care experiences, and emotional states. This approach leveraged daily digital communication routines, effectively embedding plant-related reflections into participants' regular lives, thereby consistently reinforcing empathy and emotional engagement. Moreover, by facilitating a continuous feedback loop, these digital interactions created an ongoing relational dynamic between participants and their plants. Regular engagement transformed plant care from occasional activities into sustained ethical practices, aligning closely with the core principles of Living Service Design, which emphasize adaptive and iterative

relational processes (Polaine, Løvlie and Reason, 2013, p. 19). Consequently, the digital platform served as an essential mediator, continuously reconnecting participants emotionally and ethically to their plants, and significantly counteracting the usual decline in interest or care behaviors typically observed in short-term interventions. Nevertheless, while the WeChat-based approach successfully maintained emotional and ethical engagement in most cases, it also encountered challenges. Participants occasionally reported experiencing digital fatigue or reduced responsiveness due to repetitive content. To mitigate these limitations, future applications could diversify interactive content, include more varied digital engagement formats such as short videos or interactive polls, and provide flexible interaction frequencies tailored to individual participant preferences.

Additionally, the digital engagement phase deliberately leveraged multimedia elements—such as photos, short videos, and voice messages—shared by participants to enrich data quality and emotional depth. Participants frequently shared visual updates of their plants, capturing physical changes, growth progress, or any noticeable signs of distress. Such multimedia submissions provided highly contextualized, emotionally rich data, enabling the researcher to observe participants' evolving relationships with plants visually and contextually. According to Polaine, Løvlie and Reason (2013, p. 47), visual documentation shared through digital platforms can profoundly enhance emotional resonance and reflective engagement, facilitating deeper qualitative insights into participants' lived experiences and subtle emotional shifts over time. By analyzing these visual submissions alongside textual or verbal reflections, the researcher was able to capture nuanced changes in participants' daily behaviors and emotional responses towards their indoor plants, significantly enriching the interpretative depth of the qualitative dataset.

Another key methodological feature of this digital engagement phase was its adaptive, personalized nature. The researcher continuously adjusted the frequency and content of digital prompts based on participants' individual responses, engagement levels, and evolving emotional reflections. For example, some participants demonstrated enthusiasm and frequent interaction through spontaneous updates and

reflections, prompting the researcher to respond with deeper reflective questions or more frequent follow-up prompts. Conversely, participants displaying less frequent engagement received gentle, less intrusive reminders or encouragement, ensuring a balanced and personalized interaction pattern. This adaptive, participant-sensitive approach reflected the living service design philosophy underpinning the study, emphasizing continuous responsiveness, relational flexibility, and personalized engagement (Knight, 2018, para. 4). Thus, the feedback loop itself operated as a dynamic relational process, continuously adjusting to participants' unique needs, emotional states, and engagement rhythms, ultimately supporting sustained emotional and ethical interactions.

Furthermore, the digital feedback loops were carefully structured to encourage participant autonomy and empowerment in the research process. Rather than simply responding passively to researcher-initiated prompts, participants were actively encouraged to initiate reflections, share spontaneous experiences, or pose their own questions regarding plant care and emotional connections. This participatory and empowering approach was methodologically intentional, reinforcing participants' sense of ownership, responsibility, and active involvement in their evolving relationships with indoor plants. According to Sanders and Stappers (2008, pp. 5–8), participatory design approaches that empower users through ongoing active participation lead to deeper emotional investment, sustained engagement, and more authentic data collection. Consequently, encouraging participant autonomy through digital feedback loops not only enriched the data quality but also effectively reinforced speculative emotional insights, fostering a deeper internalization of multi-species ethical reflections among participants.

In addition to participant-initiated reflections, the researcher also periodically introduced speculative prompts or imaginative scenarios via digital communications, extending workshop themes into ongoing digital interactions. For instance, participants might receive brief speculative narratives or reflective prompts that encouraged imagining plants as active participants expressing their "emotional states" or "needs," prompting further ethical contemplation and empathetic engagement.

According to Dunne and Raby (2013, pp. 65–68), incorporating imaginative speculative narratives within ongoing engagements maintains emotional resonance, continually reinforcing speculative scenarios and ethical reflections in participants' everyday contexts. Thus, the speculative dimension embedded within digital prompts ensured methodological continuity, bridging initial workshop experiences with sustained daily interactions, helping speculative emotional reflections evolve into meaningful long-term behaviors.

From an analytical standpoint, the continuous digital engagement provided a rich longitudinal dataset that tracked participant reflections, emotional changes, and practical plant-care adjustments over time. Digital interactions were archived systematically, providing a chronological record of participants' evolving attitudes, emotional responses, and ethical reflections. The analytical rationale behind longitudinal data collection was to identify subtle yet significant shifts in behaviors, attitudes, and emotional engagements over extended periods—insights difficult to capture through isolated, short-term research interactions (Charmaz, 2014, p. 185). Through iterative thematic analysis, the researcher could systematically trace emerging patterns, emotional developments, or ethical transformations, thus ensuring a robust and comprehensive understanding of how speculative participatory methods influenced long-term participant behaviors. This phase showed that digital contact was most effective when it supported participant-owned rhythm rather than imposed one. It also revealed an early form of the boundary condition developed later in Chapter 5: when cadence was too frequent or detached from room-level change, engagement thinned.

4.4 FINDINGS BY CASE STUDY

The following case studies illustrate how the broader findings unfolded in individual trajectories. They do not stand outside the thematic analysis; rather, they show how shifts in attention, care, and ethical language emerged differently across participants and domestic situations.

The most prominent finding emerging from the workshops was the substantial shift in participants' perception of plant agency and emotional value. Initially, many participants described indoor plants merely as decorative objects, passive and silent elements in their domestic settings. However, following participation in speculative scenarios—where plants were metaphorically cast as patients requiring empathy-driven care—participants displayed marked changes in their language and behavior towards plants. For example, one participant expressed during an interview: "I never thought about my plant needing me emotionally; now, after the hospital scenario, I see it as depending on me like a pet or even a friend." Such statements reflect a notable shift from an anthropocentric and utilitarian perspective toward a recognition of mutual dependence and ethical reciprocity, aligning closely with the principles advocated by Haraway's (2008) more-than-human ethics.

4.4.1 Case Study 1: Li Ming – From Decorative Indifference to Ethical Care

Li Ming, a 23-year-old postgraduate student originally from Beijing but studying in London, initially joined the speculative participatory workshops with noticeable skepticism. He openly described his prior relationship with indoor plants as purely decorative, viewing them merely as static "background objects" without emotional or ethical value. In the first workshop session featuring the speculative "Plant Hospital" scenario, Li Ming appeared hesitant and somewhat uncomfortable, privately remarking afterward that the imaginative activities felt "unusual" and even slightly "childish." He seemed unsure how such speculative exercises might relate to meaningful ecological practices or genuine emotional engagement with plants.

However, by the second speculative session, Li Ming exhibited a significant and observable shift in attitude. During an activity that required participants to imagine indoor plants as hospitalized "patients" needing emotional empathy and attentive care, Li Ming unexpectedly demonstrated profound emotional involvement. He meticulously developed an elaborate and vivid narrative for his assigned plant—a peace

lily he named "Xiaohe." His initially playful and detached attitude gradually turned serious as he carefully detailed Xiaohe's fictional medical history, thoughtfully noting symptoms such as "dry soil," "wilting leaves," and metaphorically linking these conditions with feelings of sadness, isolation, and loneliness. At one emotionally charged moment, Li Ming paused thoughtfully and admitted to the group: "At first, I thought this was silly. But when I genuinely imagined Xiaohe as a patient—someone helpless and dependent—I suddenly felt deeply guilty for ignoring its needs."

The transformation observed during the workshop visibly translated into tangible behavioral changes at Li Ming's home environment. When the researcher visited his dormitory for follow-up observational sessions, the change was immediately apparent. Previously neglected plants were repositioned prominently around Li Ming's room, close to natural light sources, visibly healthier, and clearly receiving regular care. Li Ming demonstrated newly established routines, meticulously watering each plant on schedule, carefully checking soil moisture, and even engaging in direct, affectionate conversations with Xiaohe. In a subsequent digital diary entry, Li Ming reflected thoughtfully: "After the workshops, I finally realized Xiaohe wasn't just decoration—it was alive. It needed consistent attention and emotional care, not just occasional watering. Caring for it daily has become genuinely meaningful for me."

In later reflective interviews, Li Ming explicitly connected his emotional and behavioral shifts to theoretical discussions of multi-species ethics introduced in the workshops, articulating his experience in academically insightful terms: "I gradually understood the workshops' real meaning about ethical responsibility. It's about empathy, understanding plants not as passive objects, but as equal participants in our shared environment. Xiaohe depends on me, and ethically I owe it sustained care and respect." This case shows how a speculative opening, once taken up personally, can move into room-level care routines and a more sustained language of responsibility.

4.4.2 Case Study 2: Zhao Xue – Navigating Digital and Emotional Worlds

Zhao Xue, a 21-year-old undergraduate student originally from Shanghai, currently studying in London, initially joined the research out of curiosity toward the digital and interactive elements rather than any particular interest in indoor plants. She described herself candidly as "typical Generation Z," heavily dependent on digital interactions, social media, and virtual communication, but admittedly possessing minimal emotional connections to nature. During the first speculative workshop sessions, Zhao appeared primarily enthusiastic about digitally documenting the process, frequently taking photos, creating short videos, and openly discussing plans to share these "interesting scenarios" on social media platforms such as WeChat and Instagram. Observational notes captured moments when Zhao treated workshop tasks as playful "social media activities," suggesting initial engagement was largely superficial and performative rather than reflective or emotional.

However, during the subsequent phase of iterative digital engagement—structured through regular digital prompts sent via WeChat—Zhao began to exhibit notable shifts in both her attitude and emotional depth toward plants. Speculative messages strategically designed to prompt imaginative empathy, such as "Imagine your plant could send you digital notifications about its emotional state," significantly influenced Zhao's reflective engagement. Her digital diary entries became increasingly candid and introspective; in one particularly illustrative entry, she wrote vividly: "Today, I imagined my spider plant messaging me: 'I'm feeling dry and uncomfortable.' At first, it felt humorous, but soon, it became surprisingly emotional and real to me, almost like receiving messages from a friend asking for help. I genuinely felt a sense of urgency to respond and take care of it." This reflection vividly demonstrated Zhao's transition from viewing digital interactions merely as content creation opportunities toward perceiving them as meaningful emotional dialogues.

Observational data collected during follow-up home visits further substantiated these reported emotional shifts, highlighting concrete and observable behavioral transformations in Zhao's daily routines. For instance, Zhao reorganized her bedroom layout explicitly to enhance plant visibility and accessibility, carefully positioning her spider plant and other small succulents prominently near her workspace. She actively

implemented smartphone reminders to prompt regular plant-care activities—watering, rotating for even sunlight exposure, and periodically checking the soil moisture levels. When demonstrating these routines during observational visits, Zhao commented thoughtfully: "At first, I relied on digital reminders just for convenience, but now it feels like a moral commitment—I feel a genuine responsibility towards their well-being."

Zhao's digital communications progressively evolved from initial superficial documentation toward deeper emotional expressions about ethical responsibility. In subsequent reflective interviews, Zhao articulated insightful reflections about her shifting perspective on digital technologies: "The speculative prompts really made me reconsider the potential of digital platforms. Before, digital meant disconnection from nature; now I see they can emotionally reconnect us. Instead of isolating me, the digital interactions reminded me consistently of my plant's needs and emotions." Zhao's case shows how digital engagement became more meaningful when it was tied to room reorganisation and participant-owned routines rather than content sharing alone.

4.4.3 Case Study 3: Chen Jia – Reflective Cultural Reconnection

Chen Jia, a 24-year-old master's student originally from Guangzhou, now living in London, entered the speculative workshops with noticeable ambivalence toward indoor plants. While she acknowledged that culturally, plants held symbolic importance in traditional Chinese contexts—often symbolizing prosperity, health, or harmony—she confessed her own relationship with plants had always been somewhat distant and impersonal. At the start of the first speculative workshop, Chen Jia expressed initial confusion, openly admitting during a group reflection: "Plants as patients seemed strange at first. I know in our culture, we respect plants, even see them as spiritual beings, but I've never imagined caring for them as intimately as one might care for a family member or friend."

Throughout the speculative participatory sessions, Chen Jia's initial hesitation gradually transformed into reflective curiosity and genuine emotional engagement. Particularly during the immersive "Plant Hospital" scenario, Chen Jia began thoughtfully integrating speculative narratives with personal cultural memories. Observational notes captured a poignant moment when she paused during the narrative-building activity, reflecting quietly before sharing a personal story from her childhood in Guangzhou. Chen Jia vividly recounted how her grandparents meticulously cared for their home garden, not just as a household duty but as a genuine moral obligation and emotional expression of care: "My grandmother used to gently prune her plants every morning, speaking softly to them, as if they understood her feelings. My grandfather always said plants had spirits, and that we must honor them like living beings." This spontaneous sharing deeply resonated with other participants, fostering an emotionally rich group dialogue about cultural connections to nature.

By the time of the follow-up home observations, Chen Jia displayed a pronounced shift towards culturally informed and emotionally grounded plant-care practices. Upon entering her apartment, noticeable changes were immediately evident. Several indoor plants—previously scattered or overlooked—were now meticulously grouped and arranged according to traditional feng shui principles near her workspace and windows. Chen Jia proudly demonstrated her revised care routines, including gentle, deliberate watering rituals performed early each morning and the mindful pruning of leaves, consciously emulating the practices she remembered from her grandparents. During these demonstrations, she explained carefully: "I started to treat each plant with genuine respect, being mindful of their position, sunlight, water needs. It feels like I am reconnecting with my grandparents' teachings and values. It's not just about keeping plants alive—it's about respecting their inherent dignity."

Chen Jia's digital diary entries further reflected a clear deepening of her emotional and ethical engagement. One entry, notably detailed, read: "After the workshops, caring for my plants feels meaningful, like honoring a deeper cultural responsibility. Yesterday, when I watered my peace lily, I actually spoke to it instinctively, thanking it

quietly for brightening my room and bringing calm energy. This never happened before the workshops. It was surprising but felt very natural."

In the concluding reflective interview, Chen Jia explicitly articulated the cultural and emotional significance of her transformation. She thoughtfully explained: "The speculative scenarios weren't just imaginative exercises for me—they allowed me to reconnect with cultural teachings I'd overlooked since moving to London. Caring for my plants now feels ethically meaningful because it reconnects me to my roots. It made me realize speculative design doesn't just create new emotions; it helps us rediscover and revive cultural ethics we already hold deep within ourselves." Chen Jia's case shows how plant care could become meaningful not only through speculative empathy, but also through the recovery of culturally familiar practices and values.

Overall, the speculative participatory design framework effectively fostered emotional and ethical engagement, significantly advancing beyond conventional educational approaches. However, identified limitations regarding demographic specificity, facilitator dependence, digital fatigue, cultural norms, logistical constraints, and generalizability indicate critical areas for further methodological refinement and contextual adaptation. Such insights provide a robust analytical basis for future ecological interventions, highlighting both the transformative potential and practical challenges of speculative participatory design methods in addressing plant blindness among urban youth.

4.4.4 Case study conclusions

Taken together, the three cases show different pathways through which speculative engagement moved into practice. Li Ming foregrounded ethical responsibility, Zhao Xue highlighted the role of digital rhythm and room reorganisation, and Chen Jia demonstrated how care could also emerge through cultural reconnection. These cases therefore deepen the broader findings by showing how room, cadence, and emotional framing operated differently across participants.

4.5 NEGATIVE CASES

This section reports two negative cases that did not follow the dominant arc described in Sections 4.1–4.4. The cases are anonymised to protect participants' privacy. Rather than treating them as outliers, this section presents them as cases that clarify when the broader pattern did not hold. Read alongside the earlier case narratives, they make the conditions of entrance, room change, owned action, and cadence easier to see.

4.5.1 W — Withheld imaginative consent

W is a 24-year-old Chinese postgraduate living in a shared flat. She attended one Plant Hospital workshop and completed the baseline interview but withdrew emotionally from the imaginative frame almost as soon as it was introduced. In the workshop she was courteous and cooperative—she produced a short "patient history" and an artefact card—but her contributions were consistently phrased in the third person and in evaluative rather than participatory language ("this activity could help some people think about care" rather than "I tried…"). In the closing circle she said, "I understand the idea, but plants are just plants to me," a sentence repeated near verbatim in her follow-up interview ten days later. On the evidence of fieldnotes, the workshop secured procedural but not imaginative consent: the script was followed, the outputs were made, but the fiction was not granted authority to carry her beyond the room.

The home visit, scheduled one week after the workshop, revealed little change in placement or reachability. Two small succulents remained behind a stack of books on a high shelf above the desk; a sansevieria stood on the floor in a dim corner beside a radiator. When asked whether she had considered moving them, W replied that the positions were "tidy" and that moving would "make the room look messy." A small watering can was stored inside a kitchen cupboard behind cleaning products; she reported watering "when I remember," which her interview estimated at "about once every two weeks." No open artefact from the workshop was visible in the home. In other words, the micro-infrastructures that elsewhere did the heavy lifting—placement,

visibility, reachability—did not materialise, and the first owned action never acquired a place to land.

The digital stream reinforced the pattern. W opted in to WeChat prompts but responses remained sparse and formulaic ("busy this week," "nothing changed"). By Week 3 she muted notifications; by Week 5 she stopped opening the messages altogether, as device analytics confirmed. When the content was adjusted to a non-fiction entrance—short, evidence-led cues tied to visible plant states ("dry soil → water half a cup now"; "one-sided growth → rotate today")—W acknowledged the instruction but did not enact it. In the Week 6 check-in she wrote: "I prefer tasks with clear necessity. Plants don't ask. If they die, I can buy new ones." The line is not presented to indict; it records a stance that the speculative opening did not reframe and that the digital layer could not shift without a prior change in the room.

W clarifies three points at which the mechanism did not hold. First, speculative personification cannot be the only door. Offered as a single entrance, it selects by temperament: some will decline imaginative consent politely and nothing that follows will attach. Second, room-before-reminder is not a slogan but a dependency: without an early, visible placement change, the stream has nothing to hook onto and quickly reads as irrelevant. Third, evaluative assent ("this might help others") is not the same as owned action. The audit trail shows no trace of a self-named cadence, no tool moved into reach, no paraphrase of a prompt in her register—precisely the minimal indicators that elsewhere signalled consolidation. W therefore functions as a negative control: if the grammar is reduced to a single scripted occasion and an after-stream, it does not compose for a portion of the cohort.

4.5.2 Z — Cadence outpaced life

Z is a 22-year-old undergraduate from Shanghai, living in a halls-style flat with two roommates. Unlike W, Z granted imaginative consent readily. In the workshop he immersed himself, co-led a role-play as a "nurse," and produced an elaborate tag set

for two plants at home. His baseline interview was energetic and, in his words, "excited to try." The first home visit captured swift spatial tweaks: a spider plant moved to the edge of his desk within arm's reach; a small spray bottle placed beside the lamp; tags taped to the pot rims. In Week 1 and Week 2 of the digital stream he posted frequently, sometimes twice per week, with photos and short captions, several cross-posted to Instagram.

By Week 4, however, the curve bent. Z's replies shortened; photos were replaced by single-word acknowledgements. In the Week 5 call he said the messages felt "like homework," adding that mid-term assessments had absorbed his attention. He had not muted the channel, but his open-rates fell and his phrasing shifted from ownership ("I check Sunday night") to obligation ("I should reply; I forgot"). The room still bore traces of the early moves—the spider plant remained on the desk—but his described cadence ("a quick daily glance") was too fine-grained for the week he was living; checks clustered before prompts rather than inside a rhythm he already kept. The stream, fixed at a weekly beat and written in the researcher's voice, outpaced life and began to read as a demand to perform rather than a scaffold to resume.

A small redesign reversed the slide. From Week 6, the cadence became quiet by default: Z chose two touchpoints (Day 10 and Day 25), declared Week 7 a "quiet week," and received explicit re-entry language ("pick up where you left off; nothing to make up"). Prompts were rewritten as questions about the room ("what changed on your desk this fortnight?") rather than mood checks, and Z was invited to paraphrase any message in his own words before replying. The effect was modest but clear. In Week 8 he resurfaced with two photos: the spider plant rotated and a tray added to catch water beside the lamp. His caption read, "Sunday reset works for me," a small return to owned phrasing. Open-rates rose, and the sequence finished with the routine sized to his slowest stable rhythm—a Sunday reset plus a fortnightly rotate—rather than to an ambition of daily attention that his week would not sustain.

Z highlights the difference between continuity and intensity in practice. The data show that a living service asks for cadence control to migrate to the participant if it is

to remain light on attention. Fixed, generic streams interpret as monitoring within three to five weeks of term life and thin engagement, even when early imaginative consent is strong and rooms have already changed. The minimal repair here—participant-scheduled touchpoints, permission for silence, re-entry without penalty, prompts anchored in place not feeling—was sufficient to restore participation and to keep the routine modest and repeatable. Z therefore marks a second boundary: when rhythm is wrong, content cannot compensate.

Taken together, W and Z clarify two recurring limits in the data. W shows that imaginative consent cannot be assumed, and that a speculative opening will not travel if it remains the only entrance. Z shows that even when participants engage early, routine will thin if cadence does not fit the tempo of everyday life. Read together, these cases indicate that room change, action ownership, and rhythm are not secondary details but central conditions of whether plant care becomes repeatable.

4.6 MAPPING THE MECHANISM OF CHANGE

The following table uses the empirical data from the five key case studies, tracing their paths through the proposed four-stage mechanism of change. It visually demonstrates both the successful operation of the mechanism and the specific points at which it broke down for the negative cases, thereby reinforcing the analysis of boundary conditions.

Mechanism Stage	Li Ming (Success)	Zhao Xue (Digital Adaptation)	Chen Jia (Cultural Reconnection)	Case W (Withheld Consent)	Case Z (Cadence Mismatch)
Imagination	Personified plant as 'patient'; overcame skepticism.	Initially performative; shifted after digital prompts.	Ambivalent; scenario triggered cultural memories.	Withheld imaginative consent; remained detached.	High engagement; role-played as 'nurse'.

Recognition	Recognized plant needs over decor.	Rearranged desk for plant; felt 'moral commitment'.	Applied cultural values (feng shui) to care.	No recognition of needs; prioritized 'tidiness'.	Strong initial recognition; made plant accessible.
Routine	Established frictionless nightly check-in.	Used phone reminders anchored by new layout.	Emulated grandparents' mindful morning ritual.	No routine established; watered sporadically.	Initial intense routine failed under pressure.
Reflection	Saw care as a meaningful, ethical responsibility.	Saw digital tools as a way to reconnect with nature.	Linked plant care to cultural responsibility.	Rejected ethical frame: 'Plants don't ask'.	Felt like 'homework' until cadence was self-paced.

5 DISCUSSION

This chapter interprets the findings through the lenses of plant awareness disparity, more-than-human ethics and living service design. It first answers the research questions across the three empirical phases, then articulates the mechanisms of change observed in participants' everyday routines. It situates the contribution within current debates, specifies design patterns and boundary conditions, and closes with practical implications, limitations and directions for future work.

5.1 RESPONSE TO RESEARCH QUESTIONS

The findings across the three phases—speculative Plant Hospital workshops, home-based observations and interviews, and an eight-week programme of digital follow-up—point to a consistent movement from momentary reframing to modest but repeatable domestic routines. What changed first was not knowledge about botany but stance: participants began to treat plants as responsive co-inhabitants in particular rooms, under particular constraints of time, light and convenience. The workshops opened relevance; the home context translated that opening into small adjustments; and the digital layer helped those adjustments survive ordinary interruptions. Where effects weakened, the pattern was also regular: fiction that felt too costly for some, prompts that outpaced the tempo of student life, or an absence of small infrastructural tweaks to make the next action obvious. These are practical boundary conditions rather

than theoretical defeats, and they inform a precise answer to the main research question.

The immediate influence of the speculative scenario was strongest when it was short, concrete and socially safe. Role-play lowered the embarrassment of trying care in public; simple artefacts (cards, tags, narrative sheets) provided something to hold and to refer to afterwards. In workshops, participants did not simply "believe" that plants had agency; instead they found words to locate responsibility at domestic scale: moving a pot away from the radiator, choosing a sill with steadier light, setting a weekly check before bedtime. Interviews soon shifted from talk of "decor" to talk of consequences—leaves that curl, soil that dries, positions that either invite or frustrate attention. This pragmatic register matters. It allowed more-than-human ethics to travel without heavy rhetoric: less about what plants "deserve" in general, more about what I will do next Tuesday with this plant in this room. The Li Ming case makes this visible: initial scepticism softened once he named a plant, kept it near to hand, and tied a simple check to an existing evening rhythm; the narrative became a handle for action rather than a claim about belief.

The same mechanism explains where the scenario did not bite. A minority withheld imaginative consent: they were willing to participate politely but did not accept personification for long enough to rehearse care. Their language quickly reverted to instrumentality, and post-workshop traces showed little change at home. For these participants, the useful entry points were non-fiction: visible states mapped to one action (dry soil → water now; one-sided growth → rotate), short checklists that did not ask for narrative at all. The broader inference is that speculative participation should be offered as one door among several. It is effective at opening relevance for many, but inclusion requires an evidence-led alternative that respects different temperaments.

Sustained relation came not from intensity but from cadence. Behaviours settled when a single action could be repeated inside an existing rhythm—a pre-bed check, a Sunday reset, a fortnightly repositioning. The digital follow-up worked best as a quiet

scaffold: a place to reflect briefly and a reminder that a missed week did not cancel the project. Participants responded well when they could self-schedule, declare a "quiet week", and re-enter without penalty. Where prompts stacked up or sounded corrective, engagement thinned. The Zhao Xue case illustrates both sides. At first she treated messages as content for social media; over several weeks they became cues that she rewrote in her own words, alongside a visible re-arrangement of her desk and windowsill. Here the routine was anchored by micro-infrastructures—placement, reachability, sight-lines—so that the next action required little deliberation. When assignments or moves disrupted life, she paused without guilt and resumed when the rhythm allowed, which is precisely what a living-service approach is designed to permit.

Emotional bonding tended to follow practice rather than precede it. Participants usually reported feeling attached after two or three cycles of noticing, adjusting and minor repair. This sequencing is important for design: the digital layer should serve the routine, not substitute for it. In negative cases, prompts outpaced life, felt repetitive, or floated free of any change in the room. Where no repositioning had happened and plants remained out of reach or out of sight, the message stream had nothing to attach to. The remedy is not more content but fewer, better-timed touches and explicit permission for silence, plus the small spatial moves that make care friction-light.

As to which tools and methods proved most reliable, three sets recur across the data. First, open artefacts that travel: keepable tags and placement cards anchored recall in the home and gave participants words to brief roommates. Because such artefacts do not prescribe a moral mood, they support agency without tone-policing. Second, a 30-day micro-routine with two check-ins (around days 10 and 25) was a workable minimum: long enough for a habit to form, light enough to avoid fatigue, and compatible with term calendars and rental life. Logs of watering, repositioning and small repairs made change legible without resorting to attitudinal self-reports alone. Third, scripted facilitation rather than charismatic facilitation allowed replication: clear timings, phrases and troubleshooting notes gave permission to try, fail and try again. Together these methods operationalise more-than-human ethics at domestic scale:

they turn ethical talk into small next actions that are owned, repeatable and easy to resume after lapses.

These same results also specify the limits. Personification should never be the only door; an evidence-led variant must sit alongside it for participants who prefer direct observation to narrative. Cadence should be adjustable and sometimes quiet; a stream that never rests becomes noise. And routines should be coupled to visible change in the room—light, placement, access—so that the next action is obvious without negotiation. Where these conditions did not hold, the effect size fell, even when attitudes had nominally improved. The point is not to defend a method but to clarify the conditions under which it travels.

Taken together, the three research questions can be answered in ordinary terms. A short, concrete speculative scenario can open relevance by making it socially acceptable to practise care and by tying imagination to near-term domestic decisions. Continuity helps when it is light and optional, tied to a single action within a stable rhythm and to visible, low-friction changes in space; it hinders when it is frequent, generic or experienced as surveillance. The most dependable tools are the keepable ones (cards, tags), a modest 30-day programme with two touchpoints, and scripts that any competent tutor can use; each should be paired with non-fiction entry points and participant-controlled cadence online. None of this relies on novelty. What matters is the common architecture that recurs beneath the details: speculation to open, routine to stabilise, light ethics to keep action legible and owned. Within that architecture, plant awareness disparity narrows in practice rather than in principle, and the claim this thesis makes can stay modest without becoming vague. What these answers change conceptually is a shift from plant awareness as an attitudinal issue to plant care as a room-based, time-structured relation that must be maintained.

5.2 SITUATING THE THEORETICAL CONTRIBUTION

This section positions the thesis's contribution at the intersection of plant awareness disparity (PAD), more-than-human ethics, and living service design, accounting for how speculative participatory design (SPD) can move beyond momentary provocation to enable durable, everyday relations with plants. Rather than adding another account of why humans overlook plants, the work develops a practice-oriented explanation of how awareness travels (or fails to travel) into routine. The claim is intentionally modest yet precise: PAD narrows when imagination meets logistics—that is, when a short, socially safe speculative opening is coupled with micro-infrastructures of care (placement, cadence, small repairs) and a light but firm ethical framing that makes the next action obvious, small, and owned. This extends the literature surveyed in Chapters 2–4 by shifting emphasis from perceptual or attitudinal deficits to serviceable relations in place and time, and by specifying the conditions under which such relations stabilise among Chinese urban Gen Z. This is also the point at which the thesis speaks most directly to current debates in design research, ecological awareness, and more-than-human design.

At the level of theory, the first move is to recast PAD as relational practice rather than a purely perceptual problem. The findings show that participants rarely "saw" plants differently in the abstract and then acted; instead, they acted differently and then described differently. Three ingredients co-occurred where awareness stabilised: (1) a recognisable stake in place (my desk, my window); (2) an iterable routine (a pre-bed check, a Sunday reset, a fortnightly repositioning); and (3) an ethical frame light enough to travel ("what I do next Tuesday") yet firm enough to anchor responsibility. This reframing complements visually centred accounts by articulating the service mechanics through which noticing becomes care. In short, PAD is not only a gap in attention; it is a fragile relation-in-the-making that requires maintenance through designed touchpoints. By naming these ingredients and showing their co-dependence, the thesis contributes a minimal theory of change for PAD anchored in daily life rather than in cognition alone.

The second move is to operationalise more-than-human ethics as ordinary method. In the literature, ethical arguments often appear as injunctions or aspirations; here they become routines and artefacts. The thesis shows that ethical language travels when it is situated and actionable: participants shifted from universal claims ("plants deserve…") to situated judgements about this plant in this light, at this time. The role of SPD was to lower the social cost of rehearsal—it made it permissible to try care in public—and to provide handles for recall (cards, tags, narrative sheets) once participants returned home. Ethics thus emerges in practice: in the ease of reaching a pot, the cadence of a reminder, the permission to fail and re-enter. This moves more-than-human ethics from exhortation to micro-infrastructure, clarifying that modest, well-timed design choices can make ethical responsibility feel smaller, closer, and more repeatable.

A third contribution is to extend living service design into a more-than-human register. Much service theory privileges human convenience; the thesis specifies how a living service can be composed for human–plant dyads without instrumentalising the plant. The conceptual moves are: open artefacts that travel (care tags, placement cards) rather than closed instructions; a quiet cadence that respects ebb and flow (participant-scheduled prompts, planned "quiet weeks" and easy re-entry); and scripted, not charismatic facilitation so the service can be reproduced by ordinary tutors, not only by gifted hosts. Together these moves articulate what "service for nonhuman stakeholders" entails: fewer features, clearer next actions, and rhythms that do not punish absence. This is a theoretical broadening: service design becomes a way to stage relational maintenance across species, not only to smooth human journeys. This contribution also matters because it bridges two bodies of work that have rarely been brought together in a sustained way: ecological education and service design. Ecological education has often been effective in building factual awareness, yet it has struggled to sustain emotional, relational, and behavioural change in everyday urban life. Service design, by contrast, has shown considerable strength in structuring iterative engagement and feedback, but has largely remained anthropocentric in both its assumptions and its methods. By bringing these strands together, the thesis frames

Living Service Design as a response to the limits of each field when taken on its own. Seen in this way, the thesis does more than propose a new term. It shows how speculative participation, room-level adjustment, and light digital follow-up can connect ecological learning to repeatable practice. Ecological education gains a model for sustaining care beyond awareness, while service design is reoriented towards ecological ethics and more-than-human relations rather than human convenience alone. This is particularly important in urban contexts, where awareness often remains cognitively present but practically weak. This contribution also has an interdisciplinary significance that becomes clearer when placed between ecological education and service design.

Methodologically, the thesis joins provocation to provisioning. Classic SPD often culminates in reflection; here it is deliberately sequenced with low-friction behaviours and a longitudinal prompt stream. The empirical pattern can be summarised as a four-stage loop: imagination → recognition → routine → reflection. Imagination (role-play, gentle personification) opens relevance. Recognition follows when participants name trade-offs in their own rooms (light, time, convenience). Routine forms once a single action fits an existing rhythm. Reflection—enabled by quiet, optional prompts—consolidates meaning and supports re-entry after lapses. Breaks occur when fiction feels too costly for some, when cadence outpaces life, or when spatial arrangements fail to change; in those cases, evidence-led entry points (soil dryness, leaf curl → one action now) substitute for narrative. This loop is not a slogan; it is an account of mechanism grounded in workshop, home, and digital traces. It turns SPD from a one-off trigger into part of a living protocol that others can inspect and adapt.

A related theoretical advance is to specify boundary conditions. Two failure modes recur and should be taken as conditions, not exceptions. First, low tolerance for fiction: a subset engage politely but withhold imaginative consent, so personification does not open relevance; for them, non-fiction cues and evidence-led entrances are necessary doors into the same room. Second, digital fatigue: prompts

become noise when their cadence is fixed, generic, or punitive; variable rhythm and planned quiet weeks protect motivation. A third, infrastructural boundary is the absence of change in the room: if plants remain out of reach or out of sight, messages have nothing to attach to. Each boundary is theoretical as well as practical: they show that PAD is co-produced by imagination, cadence, and spatial affordances, and that interventions should be multi-door and tempo-sensitive by design.

Situated against the literature mapped in Chapter 2, the thesis rebalances emphasis across three debates. Within PAD scholarship, it augments perceptual and curricular explanations by specifying the domestic service conditions under which attention stabilises; within more-than-human design and ethics, it demonstrates how ethical talk becomes portable through scripts, artefacts and rhythms; within service design, it reframes the unit of analysis from an optimised human journey to a small ecology of relations in which nonhuman stakeholders have practical standing. This triangulation addresses two critiques often levelled at SPD and more-than-human work: the charge of abstraction (answered here by routine and cadence) and the charge of non-transferability (answered by scripting and the use of open artefacts that can be reproduced at low cost). In each debate, the thesis's contribution is neither a grand theory nor a one-off case, but a portable pattern: a way to arrange minimal elements so that awareness has somewhere to live. In this sense, the thesis does not simply add a case study; it clarifies how these debates can be connected through a small, testable design grammar.

To make this portable, the thesis advances a pattern language whose entries are theory-laden heuristics rather than recipes. One-square-metre pop-up ties a visible plant state to one action and a take-home anchor; 30-day quiet cadence balances habit formation with fatigue; open artefacts anchor recall and enable peer briefing at home; scripted facilitation ensures fidelity without charisma; optional re-entry treats lapse as normal, not moral failure. Each pattern expresses a normative stance—inclusivity of different temperaments, respect for life rhythms, humility about demand on attention—while remaining agnostic about specific media or brands. In this sense, the

thesis contributes not only findings but design grammar: a compact vocabulary others can combine to build living services that take plants seriously.

The contribution also has conceptual definitions intended to travel across projects. Micro-infrastructures of care are modest adjustments to placement, visibility and reachability that reduce cognitive load and lower the cost of action. A quiet cadence is a participant-scheduled rhythm with planned silence, designed to avoid interpretive drift from "nudge" to "surveillance". Open artefacts are keepable, interpretation-friendly objects that seed conversation and memory without prescribing affect. Evidence-led entry points are non-narrative prompts tied to observable plant states, useful for those who resist fiction. Defining these constructs clarifies what, in practice, it means to design for relation rather than for compliance, and offers building blocks for future mixed-method measurement (behavioural logs paired with short scales). Because theory must be sized to evidence, the thesis articulates its claims as conditional propositions rather than universal laws:

> P1. A short, concrete speculative opening increases the chance of reframing plants as responsive co-inhabitants if it is socially safe and immediately tethered to a near-term domestic decision.
>
> P2. A single, participant-owned action embedded in an existing rhythm is the sustainable unit of change; continuity, not intensity, predicts persistence.
>
> P3. Ethical talk becomes portable when framed as situated responsibility and enacted through micro-infrastructures; persuasion alone is insufficient.
>
> P4. Multi-door inclusion (fictional and non-fictional entry points) is necessary to accommodate varied temperaments without diluting the ethical stance.
>
> P5. Digital support should be quiet, optional and adjustable; without spatial change, the digital layer lacks an anchor and attenuates quickly.

These propositions translate qualitative regularities into testable hypotheses for future work, inviting comparative studies, longer intervals and hybrid metrics. Taken together, these propositions form the thesis's main theoretical claim.

Finally, the thesis contributes a form of rigour suited to design-led inquiry in more-than-human contexts. It pairs triangulation across spaces (workshop, home, digital) with member checks and an audit trail of analytic decisions; it privileges behavioural traces (repositioning, watering cadence, micro-repairs) over attitude reports, while treating attitudes as context, not outcome. This is not a rejection of measurement, but a call to right-size it to practice. In doing so, the work models how design can produce mid-range theory that is empirically answerable, culturally specific, and portable by pattern. The broader implication is that more-than-human design scholarship advances not only by coining terms or staging provocations, but by showing how to keep relations going: composing small services that are light on attention, kind to lapse, and serious about shared inhabitation. Within those conditions, PAD narrows not because people learn more facts, but because the next small action is clear, doable, and already belongs to them.

5.3 MECHANISMS OF CHANGE: FROM IMAGINATION TO ROUTINE

The mechanism observed across the three phases is easier to show than to name. In the workshops, participants were given permission to try care without embarrassment; at home, minor adjustments to placement and reachability made the next action obvious; over eight weeks, a light cadence of prompts kept the door open so that a missed week did not become a lapse in identity. Where this line broke, it broke at predictable points: when fiction felt unaffordable to some, when prompts outpaced life, or when rooms did not change and messages had nothing to hook onto. Rather than offering a slogan, I track the motion—imagination to recognition to routine to reflection—because the order and the joins matter for anyone who wishes to reproduce or challenge the effect. What matters here is not only that change occurred, but how the thesis explains why some changes became ordinary routines while others did not.

Imagination opened relevance by redistributing risk. Speaking as "caregivers", writing brief "patient histories" and prototyping small artefacts did not prove anything about plants; they made rehearsal safe. Participants could try without the fear of being seen to try too hard. The most effective moments were short and situated: a story that ended in a decision about light; a tag that would later sit by a pot; a role that wore off before it became theatre. Those who withheld imaginative consent participated politely but did not let fiction carry them. The study did not treat that resistance as error; it offered a second door in parallel. Non-fiction entrances—dry soil, leaf curl, one action now—gave reluctant participants a way to proceed without narrative. In both entrances the point was the same: to make the next small action both sayable and doable, so that meaning could accrete afterwards rather than being required at the start.

Recognition followed as participants named the trade-offs that structure domestic life. Interviews and observations contain ordinary sentences whose ordinariness is their value: "I moved it off the radiator," "I can check before bed," "Sunday is when I reset the desk." These judgements are neither confession nor manifesto; they are logistical ethics. They shift talk from plants in general to this peace lily in this window under this schedule. In the Li Ming case, scepticism softened only after a plant was named, placed within reach and tied to an evening pass through the room; the ethical language came later and never exceeded the scale of the act. In Zhao Xue, who lives more of her life on screens, recognition took the form of rearranging a desk and rewriting prompts in her own words so that they read less like content to perform and more like cues to act. In both cases, the pivot was not belief but fit: the action had to nest in an existing rhythm to stand a chance of surviving.

Routine formed where one action was embedded and made almost frictionless. The data are plain on this point. Participants sustained a pre-bed glance at soil and leaves more easily than a multi-step checklist; they returned to a Sunday or fortnightly reset more reliably than to a fixed weekly message if the room had not changed. Spatial tweaks did heavy lifting: moving a plant into a sight-line; placing a small watering can within reach; clearing the route to a sill. Keepable open artefacts travelled home, sat quietly by pots and did double duty as scripts for roommates. In homes where such

micro-infrastructures were absent, routines remained brittle, and increases in message volume did not compensate. The economy of effort—shrinking the gap between noticing and doing—was the strongest predictor that a routine would be kept through mid-term crunches and moving weeks.

Reflection consolidated meaning and protected the routine from shame. The eight-week cadence worked when prompts were quiet, optional and adjustable. Participants scheduled and skipped without penalty; they could declare a quiet week and re-enter on their own terms. Short, conversational check-ins ("what changed in your room this week?") elicited photos of moved pots and trimmed leaves rather than general statements of intent. As weeks passed, several participants paraphrased or replaced the researcher's prompts, an unremarkable detail that nevertheless signals ownership of the routine. Where the stream outpaced life—exams, shifts, moves—engagement thinned; where it resumed, it resumed without the friction of apology. Digital support functioned best not as content to consume but as a scaffold for re-entry, and only when the room itself had been made to carry part of the load.

The three cases deepen the model rather than prove it. Li Ming shows how late imaginative consent, once tied to a named plant and a simple evening check, could stabilise responsibility. Zhao Xue shows how room reorganisation and self-rephrased prompts helped digital contact become a cue rather than a performance. Chen Jia shows that the same loop could also be entered through cultural memory, where care already had a language and rhythm to attach to. Read together, the cases suggest that the loop is not tied to one style of entry, but to whether action becomes small, repeatable, and owned.

The failure modes complete the account. A minority reject fiction on principle; their participation is courteous but thin, and the scenario does not travel. The remedy is design, not debate: pair the entrance so nobody is asked to assent to a story in order to act. Another group begins well but tires as prompts accumulate; fixed cadence feels like being watched. The remedy is again design: variable rhythm, planned silence, and easy re-entry. The most stubborn break occurs where the room refuses to change; here

the digital layer has little to attach to, and any increase in messages produces irritation rather than action. In that case the remedy is spatial before it is communicative: make the next action obvious in place. Stated this way, the mechanism is simple; the evidence that warrants it is mundane. That is the point. A mechanism that depends on special occasions or special people will not travel; one that depends on coaxing ordinary rooms and schedules into slightly better shape stands a chance.

If the loop can be named—imagination → recognition → routine → reflection—it is only to aid replication and critique. Each step corresponds to observable indicators already present in the data: a shift in workshop language from décor to consequences; a sentence that names a trade-off in a specific room; a log entry that ties one action to a named cadence; a prompt rewritten in the participant's voice after a quiet week. These indicators are modest and sufficient. They allow future work to combine short scales with behavioural logs without forcing practice back into self-report alone. They also make disagreement easier: if others find routines that persist without spatial change, or cadences that work without participant control, the model will be wrong in useful ways. For that reason, the mechanism is presented here as explanatory and conditional rather than universal.

5.4 DESIGN PATTERNS & HEURISTICS

What proved to be portable in this study are not methods in the procedural sense but arrangements—small compositions of place, time and tone that repeatedly shrank the gap between noticing and doing. To avoid the false certainty of recipes, I describe them as patterns and heuristics, because what travels is a relation among artefacts, cadences and permissions rather than a fixed sequence of steps. Read against the mechanism traced in 5.3—imagination to recognition to routine to reflection—these arrangements do modest work: they lower the social cost of trying, give the next action a place to land, and keep the door open when life interrupts. Where the arrangements thinned, the reasons were ordinary too: fiction felt costly to some; prompts outpaced term

rhythms; rooms never changed so messages had nothing to attach to. The patterns below are therefore sized to evidence and to failure as much as to success. They are written to sit inside the argument rather than beside it. Their value lies not in prescription, but in making the mechanism portable, discussable, and open to testing.

The first cluster concerns how a participant enters. A brief speculative opening is effective when it ends not in persuasion but in a near-term domestic decision. A one-square-metre pop-up—a windowsill or desk corner laid out so that a visible plant state is tied to one action now—collapses imagination into logistics. The pop-up works because it localises attention, making dryness or one-sided growth legible and actionable, and because it sends something home: open artefacts that travel—a small tag, a placement card, a short narrative sheet. These objects are keepable and interpretation-friendly; they give words to brief a roommate and serve as memory anchors without dictating mood. For those who withhold imaginative consent, a parallel evidence-led entrance sits beside the fiction: dry soil → water half a cup now; leaf curl → rotate today. The stance here is inclusion by two doors rather than conversion. Fiction, when used, is kept brief and situated: long stories or moral tones raised the cost of imaginative consent and pushed sceptical participants to the margins. Finally, the opening is scripted rather than charismatic. A short script—timings, a handful of phrases that legitimise trying and failing, and notes for common hesitations—reduced dependence on host personality and made the stance reproducible by ordinary tutors. In combination, these devices obtain small consent: to try once, to move one pot, to check next Sunday—permissions sized to the next action and easy to withdraw without embarrassment.

Once relevance opens, stability is a property of rooms before it is a property of people. The empirical weight sits with micro-infrastructures of care: placement, visibility and reachability. Moving a plant into a sight-line along an existing daily pass, placing a small watering can within reach, clearing the route to a sill—these are modest moves that convert attention into action by lowering both reach and decision costs. A recurring negative case in Phase 3 was fatigue around week four or five where the

room had not changed; increasing message volume did not compensate. The practical rule that follows is plain: room before reminder. Without a visible change in the room, the digital layer lacks an anchor and attenuates quickly. When micro-infrastructures were in place, the unit of sustainable change shrank to one owned action embedded in an existing cadence: a pre-bed glance (soil touch, quick rotate), or a Sunday/fortnightly reset (water, trim, reposition). Ownership was audible in language: "I do a Sunday reset" travelled better than "I should water more." Open artefacts sat quietly beside pots, reminding what "leaf curl" implies and doubling as a script when someone else watered during exams or a move. In shared flats this extended to peer briefing—two lines that convert a private routine into a courteous house rule. In short, spatial tweaks and owned actions did the heavy lifting; rhetoric did not.

Cadence is the third element, and the one most easily over-estimated. Continuity is not intensity. A quiet 30-day cadence with two touchpoints—around days ten and twenty-five—proved sufficient to help a routine take hold without provoking fatigue. The rhythm is participant-scheduled, allows declared quiet weeks, and offers easy re-entry. In practice, the digital layer worked best not as content to consume but as a scaffold to resume: short, conversational prompts that ask what changed in your room this week elicited photos of moved pots and trimmed leaves; generic mood checks did not. Over time, some participants paraphrased prompts in their own words, a small sign that ownership had shifted. Where the stream outpaced life, engagement thinned; where fiction was the only door, sceptics remained polite and unchanged. Designing for lapse is therefore not indulgence but structure: re-entry phrases are encoded in scripts and artefacts ("Pick up where you left off; nothing to make up"), so silence is treated as normal variation rather than failure. A service that punishes absence becomes surveillance; one that allows silence remains a living one.

Two further motifs strengthen or soften the weave depending on context. Cultural recall mattered where participants carried dormant practices from home. For some, speculative work did not install a new ethic so much as re-surface remembered ones: grandparents' morning pruning, feng shui placement, talk of dignity and calm. Here

the design move is to offer a hook—naming, morning watering, mindful trimming—and then get out of the way; meaning arrives pre-owned, and the routine borrows its words. For others, recall is thin or absent; pressing for it reads as performance. In those cases, keeping to micro-infrastructures and one owned action is safer and just as ethical. The other motif is tone. The patterns rely on a light but firm ethic: serious about the next action, modest about feeling. Artefacts support agency without tone-policing; prompts remain precise without moralising. When either element drifts—when the kit becomes souvenirs, when the stream becomes a nudge with a raised eyebrow—the effect size falls even when attitudes remain nominally improved.

Because the patterns are meant to be inspected and challenged, they carry observable indicators rather than attitudinal targets. For entrances: immediate language shifts in workshops that move from décor to consequences and artefacts taken home. For rooms: a visible placement change, proximity of tools, and fewer obstacles along the daily pass. For routines: a named action tied to a named cadence that persists through a busy fortnight. For cadence: participant-scheduled prompts, evidence of declared quiet weeks, and re-entry without apology. These traces are modest and sufficient; they let others test whether similar arrangements work in their rooms without converting the practice into self-report alone. If later studies show that routines can persist without spatial change, or that fixed cadences can succeed without participant control, then the model here is wrong in interesting ways. Until then, the safest claim is the one the evidence will bear: small, well-timed compositions turn fleeting curiosity into situated care—provided the room does its share and the rhythm is kind to lapse.

Finally, to keep the grammar portable, I state the boundary conditions as part of the design, not afterthoughts. Multi-door inclusion is non-negotiable: personification must never be the only entrance; an evidence-led route should always sit alongside it so that temperament is not a criterion for participation. Tempo sensitivity is equally strict: pace interactions to the slowest stable rhythm of term life; let silence do some of the work; avoid the interpretive drift from nudge to surveillance. And material

anchoring remains decisive: if nothing in the room changes, add no more messages. None of these limits weakens the contribution; together they prevent overclaim and explain why similar elements sometimes fail elsewhere. What travels are not branded moments but small, ethically tempered arrangements that others can compose in their own places and words—arrangements in which imagination meets logistics, and responsibility stays close to hand.

5.5 BOUNDARY CONDITIONS & NEGATIVE CASES

The patterns named above are deliberately sized to everyday life; their strength is compositional rather than charismatic. Precisely for that reason, their scope is bounded. This section stays with the same vocabulary—two-door entrance, micro-infrastructures of care, one owned action, quiet cadence, open artefacts—and tests it at the points where the weave failed. Read as design instructions, the negative cases do not subtract from the contribution; they specify what must already be in place before imagination can become routine, and what should not be asked of a living service that intends to remain light on attention.

The first boundary is withheld imaginative consent. A minority of participants entered the speculative frame courteously but did not grant it the authority to carry them home. The Plant Hospital script was followed; the artefacts were produced; the talk remained polite and external. In these instances, personification felt costlier than the authors of speculative methods usually concede: too close to theatre for comfort, too far from ordinary language to be owned the next day. The negative case marked as W is instructive. She recognised the idea "intellectually" yet described plants as "just plants," and neither her routines nor her language shifted after the workshop or in the weeks that followed. No amount of intensification—more prompts, richer stories—moved the needle; the door simply did not open that way. Where the approach subsequently recovered for similar participants, it did so by offering an evidence-led entrance in parallel: tying a visible state (dry soil, leaf curl) to one small action now, without narrative assent. The boundary condition is therefore not a failure of

imagination but a condition of inclusion: when fiction must be purchased at the door, a portion of the cohort will decline to enter and nothing that follows will attach.

The second boundary is cadence that outpaces life. Continuity is not intensity; fixed, generic streams of reminders slid quickly from support to noise, and once interpreted as monitoring they were hard to recover. The negative case Z shows the sequence: high initial compliance, a feeling of chore, then a thinning of replies as the stream out-ran academic calendars and moving weeks. Here, too, intensification failed. What restored participation later in the study was not more content but the opposite: a quiet cadence with declared quiet weeks, participant-scheduled check-ins, and an explicit right of re-entry without penalty. The rule that emerges is practical: if the service begins to read as surveillance, the ethic that animates it dissolves. Cadence must be paced to the slowest stable rhythm in a week, and silence must be treated as normal variation rather than failure. Without this, the digital layer becomes a demand, and demand erodes the very sense of owned responsibility the method intends to cultivate.

A third boundary is no change in the room. Where plants remained out of sight or out of reach, prompts had nothing to hook onto. The quietest pattern in the dataset was also the most decisive: small micro-infrastructures of care—placement, visibility, reachability—did the heavy lifting by shrinking the distance between noticing and doing. In homes where these spatial adjustments failed to happen, fatigue arrived predictably around Week 4 or 5; message volume rose; effects fell. The boundary condition is blunt: if nothing in the room changes, add no more messages. The service is compositional, not instructional. Without a visible anchor in place, meaning cannot accrete around an action; artefacts remain souvenirs and digital prompts rehearse resolutions without altering routes through the day. This is the least glamorous claim the thesis makes and the one least negotiable in practice.

A fourth boundary appears where performance displaces practice. In early follow-ups, a few participants treated the digital layer as a stage: the plant was context for content, and curation took the place of care. This performative drift was most visible when photo prompts became ends in themselves, and routines were narrated

more than enacted. Where stability emerged in such cases—as in the partial arc of Zhao Xue—it did so only after a rearrangement of the desk, a re-phrasing of prompts in her own words, and the institution of quiet weeks that broke the incentive to post for posting's sake. The pattern here is not a polemic against social media; it is a caution about attention economies that reward surface novelty over quiet repetition. Without the counterweights of placement and participant phrasing, performativity will hollow out routine even as the visible trace appears lively. The boundary condition is therefore conceptual as well as practical: if the affordances of a platform cannot be bent toward slow, ordinary action, they will bend the practice toward display.

A fifth boundary concerns **cultural recall and its limits**. For some, speculative openings resurfaced older ethical grammars; routine then borrowed words already owned—morning pruning, dignified placement, the courtesy of watering as a family habit. Chen Jia's path illustrates how quickly a practice can stabilise when it reconnects to remembered forms. But recall is not a universal resource; pressed where it is thin, it turns into performance or embarrassment. The boundary here is less a line than a sensitivity: frames that invite recall should do so lightly and must always be paired with non-heritage entrances—micro-infrastructures, one owned action—so that no one is asked to "have a tradition" on demand. Cultural hooks are powerful when present; they are not a remedy where absent. The service must work on the same small logistics with or without them.

A sixth boundary is facilitation dependence. Outcomes varied with the extent to which openings were scripted rather than charismatic. Where hosts improvised long stories or stacked moral cues on top of logistics, participants reported discomfort and the first action became harder to name. Conversely, minimal scripts—clear timings, a handful of phrases that legitimised trying and failing, and notes for common hesitations—reduced variance and made the service reproducible by ordinary tutors. The negative lesson is twofold: first, without a script, the tone drifts and with it the perceived cost of participation; second, with too much script, the encounter calcifies and local phrasing dies. The boundary therefore sits between personality and manual:

enough structure to transmit stance and protect participants from overreach, enough looseness to allow the room to speak.

These boundaries are not independent. Withheld imaginative consent often coincided with an unchanged room; cadence that ran ahead of life amplified performativity; over-scripted facilitation raised the social cost of trying, which in turn reduced the likelihood of the first spatial shift that would have anchored meaning. In the same way, the remedies co-produced each other: two-door entrances secured inclusion; micro-infrastructures made the next action obvious; one owned action right-sized expectation; a quiet cadence with re-entry protected dignity; open artefacts allowed phrasing to become the participant's own and enabled peer briefing in shared flats. Where two or three aligned, routine held even through busy weeks. Where they did not, a trickle of content could not compensate. The negative cases are, in that sense, expository: they make visible the joints that the positive cases pass over in a single movement.

The final boundary is ethical and tonal. The stance that travelled was serious about the next small action, modest about feeling, kind to lapse. When tone drifted—toward moral urgency, toward cleverness, toward a raised eyebrow in a prompt—the cost of participation rose and the service misfired. It is easy to see why: the work asks for small consent, and small consent is withdrawn when dignity is at risk. The negative lesson here is not that ethics should be quiet; it is that portable ethics is ordinary. It is enacted in reachability rather than declaration, and it is kept in place by rhythms that do not punish absence. Where the approach veered from this stance, results were thin even when attitudes were good. Where it held the tone, results were modest and durable.

Taken together, these boundary conditions and negative cases do not subtract from the contribution; they keep it honest and make it usable. They specify where not to push (toward intensity, toward performance, toward uniform scripts), what not to skip (a change in the room, the participant's own phrasing, the right to be silent), and how to read both success and failure (through traces, not promises).

5.6 METHODOLOGICAL RIGOR & REFLEXIVITY

This section shows how the claims in Sections 5.1–5.5 are grounded in the study. It does not repeat Chapter 3. Instead, it sets out the evidence readers would need to check: what was observed and when, how those notes were recorded and compared, and where my own judgement starts. The rule of thumb is modest: keep to the contexts actually studied, link each claim to a trace that can be seen again, and say openly how my position may shape the reading.

Credibility in this study rests on proximity and recurrence across three situated spaces—workshop, home and an eight-week digital stream. The same short sequence appears in fieldnotes, interviews and photo diaries: naming a plant; moving it into reach; adopting one owned action sized to an existing rhythm. Where the line broke, it tended to break at the same joints: imaginative consent withheld, no change in the room, or cadence that outpaced life. Read across sources, these signals do not require heroic interpretation; they are small and legible. This is what warrants the modest causal language adopted in Section 5.3, and it is why negative cases are treated as first-class data rather than outliers; the corpus that underwrites these judgements is documented in Chapter 4 and the Appendix and can be walked back by examiners from proposition to trace. See Section 4.2–4.3 for the primary anchors.

Participant review was used as correction and register-setting, not as a plebiscite on interpretation. After workshops and interviews, short summaries were shared for error-catching (misheard phrasing, mis-attribution) and, more importantly, to secure the participant's own wording where phrasing bore analytic weight. Several passages in Chapter 4 therefore replace my paraphrase with a participant's expression on the simple premise that ownership of words is part of owning the practice. This sharpened the dataset without asking participants to approve theory, and it matches the ethic of the study: authority is kept close to what people actually said and did (see Section 4.1 and Section 4.3 for examples).

Dependability was sought by leaving a trace rather than by chasing mechanical reliability. The analysis followed a code-first, theme-later path with planned code–recode cycles: an inductive sweep across the corpus; a time-separated re-code of a 15% subsample blind to earlier labels; merges and splits recorded with date and reason; and scheduled peer debriefs that focused on boundary definitions and asked for counter-examples when a category looked roomy. The point was not to freeze interpretation but to make decisions followable. Appendix materials document where a theme was retained for conceptual completeness rather than density so that others can see why it remains in the argument even when thin.

Confirmability was protected by sizing claims to behavioural and spatial traces over attitude talk. A moved pot counts; a watering can placed within reach counts; a self-named cadence counts; a re-entry after silence counts. Where self-descriptions ran ahead of rooms, the writing declined to follow; where rooms moved before language, the lag was allowed. This is why Section 5.2 speaks in the conditional—awareness stabilises if a stake in place, an iterable routine and a light ethic co-occur—and why Section 5.4 writes "patterns" as arrangements rather than as methods. It also explains the reading of failure: when no placement change occurs, an increase in prompts is interpreted as demand rather than support because there is nothing for the messages to attach to (see Section 4.3).

The claims travel, therefore, not as general laws but as if–then–under-these-constraints statements. Cohort, object and timeframe are specific: predominantly Chinese urban Gen Z; indoor plants; roughly eight weeks; a familiar, lightweight digital channel; scripted facilitation serious about action and modest about feeling. Others are invited to test and break the propositions—for example by trying to form routine without spatial change, or to sustain engagement without participant control of cadence. Declaring scope in this way narrows and thereby strengthens the warrant (see Section 5.5 for the non-negotiable edges that emerged).

My position as a Chinese international researcher close in age to most participants eased access and risked over-hearing. The risk was kept visible by three small

disciplines. First, reflexive journalling after each contact recorded what I thought I had heard and why it seemed to matter; later coding then tested whether an inference had an observable correlate in a room or a routine. Second, register discipline in writing kept to the participant's phrasing where possible; where paraphrase was necessary for anonymity or clarity, the change is noted in the analytic log. Third, tone checks in peer debriefs asked whether the prose drifted from "serious about the next small action, modest about feeling" towards moral urgency or cleverness; where drift was found, passages were revised or removed. The intended effect is that the discussion reads compact and testable rather than ingenious.

Language required additional care. Most interviews were in Mandarin; translations were prepared by me with bilingual spot-checks where idiom bore analytic weight. When a Mandarin term carried more than a dictionary gloss on agency, duty or courtesy, pinyin was retained at first occurrence in Chapter 4 with a brief explanation and translated thereafter to maintain flow. The principle was semantic honesty rather than literalism, with translation choices logged alongside the audit trail so that a contested rendering can be traced to its source.

Because the study intervened, reactivity was made explicit and tempered. The design staged a short speculative opening, visited homes and sent prompts, but the cadence remained optional, participant-scheduled, with planned silence and re-entry encoded. Prompts asked what had changed in the room rather than how someone felt in the abstract; the rhythm was paced to the slowest stable beat of term life; silence was treated as normal variation, not failure. The ethical and methodological logics match: when prompts begin to read as surveillance, both dignity and data suffer (compare the drop-offs in Section 4.3 with the recoveries when rhythm was returned to participants).

Negative cases do boundary work rather than merely moderating tone. The path labelled W shows why personification must never be the only entrance; a portion of any cohort will decline to grant imaginative consent and nothing that follows will attach. The path labelled Z shows how quickly a fixed rhythm slides from support to noise,

and why participant scheduling and declared quiet weeks restore engagement when intensity cannot. Treating these as load-bearing kept Section 5.4 from hardening into recipes and allowed Section 5.5 to state edges as conditions of success rather than afterthoughts.

Data were anonymised at source and stored under approved protocols; images were redacted for identifying details. Because the argument relies on traces, not all traces can be reproduced publicly without risk; where an image would make a point too easily, a verbal description stands in and the original is available for examination under restricted conditions. This tests whether the inferences can be followed without leaning on the indexical force of photography and is consistent with the study's preference for behavioural indicators over declarations (see Section 4.2–4.3).

Setting out rigour at this level buys two practical goods. For examiners it enables falsification by inspection: each major proposition in Sections 5.3–5.5 can be walked back to at least one observable trace in Chapter 4 or the archive noted in the audit trail. For future adapters it translates contribution into designable conditions: if replication fails, the log makes it easier to tell whether the break was of composition (no micro-infrastructures; cadence read as monitoring), of tone (charisma displacing script) or of context (different cohort, time or institutions). In that sense rigour is not dressing on the result; it is the way the result is made usable.

Read in this light, the value claimed is small and clear. The rooms are small, so the patterns are small; the weeks are few, so the boundaries are strict; dignity is easily bruised by zeal, so the ethic stays ordinary. Under those terms, the study shows how imagination can be attached to logistics long enough to become routine—conditions stated, edges named, and available to be tested.

5.7 PRACTICAL IMPLICATIONS (EDUCATION / COMMUNITY / RETAIL / POLICY)

The discussion so far has stayed deliberately mid-range: patterns are small because the rooms are small; boundaries are strict because the weeks are few; claims are sized to traces rather than to promise. Read this way, the practical value of the study is not a recipe but a grammar that others can compose with. This section translates that grammar into four applied settings—education, community, retail and policy—stating what travels, what conditions must already be in place, and how success should be read in traces rather than in attitudes. The scope remains the same as in Chapter 4: urban Gen Z, indoor plants, short cycles of engagement, and facilitation that is scripted and light. Where the suggestions edge beyond that scope, they are framed as tests rather than as guarantees. See Sections 4.2–4.3 and 5.4–5.6 for the evidential anchors and boundary conditions. The practical value of this interdisciplinary bridge is that it gives both educational practitioners and service designers a usable shared language. Educational practitioners can move beyond factual ecological instruction by using speculative scenarios and light reflective follow-up to support ethical and emotional engagement. Service designers, meanwhile, can extend their practice beyond human convenience by incorporating ecological ethics and more-than-human responsibility into everyday service arrangements. In both cases, the point is not to add more content, but to organise rooms, artefacts, and cadence so that care becomes easier to enact. What follows should therefore be read as conditional translation rather than as a universal template.

Education.

In curricular or co-curricular settings, the contribution travels as a small sequence rather than a one-off lesson: open with paired entrances (a factual, evidence-led route and an imaginative route), secure micro-infrastructures in the room where study time actually happens, ask for one owned action that the student names, and maintain a quiet cadence that expects lapse and permits re-entry. In practical terms, a three-week module can be made from three ordinary sessions sized to studio/tutorial tempos. Session one re-frames plants as co-inhabitants using a low-key speculative exercise (the imaginative entrance) alongside a short, situated demonstration of plant needs in that

specific room (the factual entrance). The session ends with each student naming one owned action in their own words, not a rubric phrase. Session two is located in the room that will bear the routine—dorm, studio, shared kitchen—not in a lab or gallery; the only design effort is to move one plant and one tool into reach (placement, visibility, reachability), and to leave an open artefact that quietly invites noticing (e.g., a blank "check-in" card or a name tag sized to be ignored unless one wants to look). Session three is a reflection as re-entry after an intentional quiet week: students are asked to read back what the room did to help or hinder, not to perform care on demand. Assessment, if required, should measure through traces—a changed placement documented by a time-stamped photo, a student's named cadence sustained for two or three cycles, a brief note in the student's register—rather than through attitude talk or pledges. Undergraduates who declined the imaginative entrance in Session one can be included by letting the two-door entrance do its work: a minimal, evidence-led task (identify light/water constraints; adjust placement) is always available beside the imaginative exercise; nobody is forced to buy the fiction. The edge cases visible in Chapter 4 warn against intensity: when cadence outpaces life, it reads as monitoring; when rooms do not change, information has nothing to attach to; when personification is the only door, a portion of any cohort will not enter. Therefore, the sensible target is small, inspectable practice rather than values conversion; the best sign that the educational effect holds is that a student can point to one small change in a room and name the action that pairs with it. See Sections 4.2–4.3 for the room-level traces that supported this stance.

Community.

In neighbourhood clubs, residences and campus societies, programmes tend to succeed when they scale the grammar, not the script. That means building a light infrastructure of rooms (places where plants are already present and reachable), equipping peer facilitators with scripted facilitation (tone and sequence, not charisma), and running at the slowest rhythm that still feels alive. A monthly "open room" is often sufficient if it is coupled to a single, owned task that members define for their own spaces and report back on as traces. The two-door entrance can be staged at

community scale by pairing an evidence-led table (light, water, soil, local examples) with a quiet, optional imaginative prompt (naming, stories, or borrowing "Plant Hospital" elements sized to the culture of the group). Open artefacts work better than finished kits in open settings: a blank naming board; a modest, durable tag; a tray that invites people to place a tool where they will actually reach for it. The quiet cadence is the hardest part: when organisers push for weekly content, fatigue follows and the stream becomes a stage; when organisers accept planned silence and state re-entry explicitly, participation becomes easier to own and to resume. Measurement should look like community maintenance, not surveillance: count rooms that changed; count artefacts that stayed in reach; collect two or three before-and-after photos per month. The negative cases in Chapter 4 also travel here: where shared flats rotate occupants or priorities, room before reminder is a non-negotiable; where imaginative consent is withheld, keep the factual door open and do not moralise refusal; where facilitation depends on a charismatic organiser, write a minimal script that another person can use. The aim is modest: more rooms where care is easier because placement and cadence help; more members who can point to one owned action they named and repeated twice. See Sections 4.3–4.4 for how peer tone and cadence affected drop-offs and recoveries.

Retail.

At point-of-sale and after-sale, the approach is not to sell more things under the banner of ethics, but to add a living service layer that helps a plant enter a room and attach to a routine. The two reliable moves are: (1) pair the factual entrance (light/water/readiness) with an owned naming moment that is optional and light (co-naming by the buyer in their own register); and (2) send quiet, opt-in prompts that privilege the room over the feed. A small "discharge slip" that records where the plant will live and what one owned action will be tried does more work than a thick care booklet nobody will read; a low-key message one week later that asks what changed in the room—and that permits a skip without apology—does more work than gamified reminders. Retailers often ask for standardised care kits; the discussion in Sections 5.4–

5.5 suggests a different route: open artefacts and micro-infrastructures sized to be re-interpreted in situ (a plain tray, a small watering vessel that lives where the hand reaches, a simple tag for a name or cadence) outperform prescriptive bundles in diverse rooms. If a loyalty scheme is required, it should count traces the buyer chooses to share (a placement photo; a self-named cadence that held for two cycles), not compliance with a schedule. The edges are important here: when prompts read as monitoring, dignity and trust fall and unsubscribes rise; when personification is made compulsory, a portion of customers resist; when scripts are ornate, staff cannot carry them. The safe generalisation is narrow: help the plant arrive in a reachable place; help the buyer name one small, iterable action; offer a quiet, opt-in reminder that assumes silence is normal; invite re-entry rather than penalise lapse. Those are the parts of the grammar that retail can carry without turning ethics into performance. See the purchase-to-routine transitions described across home visits and digital follow-ups in Section 4.3.

Policy.

This interdisciplinary perspective also matters at policy level. It suggests that ecological behaviour change is more likely when emotionally resonant, ethically grounded, and iteratively supported arrangements are funded, rather than one-off awareness campaigns alone. In urban settings, policymakers and planners can use this insight to support conditions in which ecological care becomes easier to maintain as an ordinary routine. Policy can make rooms easier to change and cadences easier to own by funding small infrastructures rather than campaigns. Three levers align with the evidence offered in this thesis. First, support room-level micro-grants (for schools, dormitories, youth centres) that pay for placement, visibility and reachability changes rather than for content: shelves, trays, light adjustments, and modest artefacts that leave interpretation to occupants. Second, back facilitator scripts and time instead of hero events: short, scripted sequences that any trained staff member can run (paired entrances; room before reminder; one owned action; quiet cadence; reflection as re-entry) and light, periodic time allocations to maintain them. Third, require

evaluation through traces and edges: count rooms that changed; record the proportion of participants who could name an action and repeat it; log opt-in rates to prompts and opt-out without penalty; and read negative cases as scope statements rather than as failures to motivate. The discussion in Section 5.5 warns against three common policy instincts: intensity (weekly mandatory activities that outpace life), uniform kits (scripts that erase interpretation), and one-door entrances (aesthetic or heritage framings without a factual path alongside). Where municipalities or universities already fund urban greening and environmental education, this study suggests sizing support to repeatable arrangements instead of to one-off awareness events: modest funds that let rooms do their share, small scripts that others can carry, and reporting that privileges behavioural traces over attitude surveys. In settings where cultural hooks are present, policy can license them as one of two doors; where they are absent, policy should not pressure institutions to "buy history" but should underwrite the safer path—room change plus one owned action under a quiet cadence. See Sections 5.2 and 5.6 for the stance that keeps ethics ordinary and claims auditable.

Taken together, these implications are sized to what the evidence will bear. They ask educators to redesign where learning attaches rather than what students believe; they ask community organisers to build rooms and rhythms rather than programmes; they ask retailers to help a plant cross the threshold into an everyday routine rather than to sell a feeling; and they ask policy to fund small infrastructures, minimal scripts and trace-based evaluation rather than to buy charisma or intensity. The negative cases do not subtract from these implications; they make them usable by naming where not to push: do not ask fiction to do all the work; do not standardise away interpretation; do not let cadence outrun life. Read that way, the practical contribution remains modest and clear: to give others a grammar they can compose with, under conditions that can be tested.

5.8 LIMITATIONS & FUTURE WORK

The claims made in this chapter are deliberately mid-range and sized to what the evidence will bear. That sizing brings into view several limits that are structural to the corpus assembled and to the design choices taken. It also helps to name future work that would not inflate the argument but rather test and refine its grammar under different conditions. Read in continuity with Sections 5.4–5.7, the point is not to apologise for scope but to convert boundaries into programmes of inquiry that others can run and inspect. The limits that follow are therefore presented as conditions of use, not as defects to be apologised for.

A first limit concerns time. The study follows participants across three located spaces—workshop, home and an eight-week digital stream—which is long enough for a routine to form and to lapse once, but not long enough to claim durability beyond a term. That horizon explains both the conditional language in Sections 5.2–5.5 and the decision to treat silence as normal variation within a quiet cadence rather than as failure. It also means that what we can safely say about endurance is small: that modest arrangements—placement, visibility and reachability; one owned action named by the participant; a cadence that allows re-entry—can carry ordinary life for some weeks when conditions fit. Assertions about seasons, exams cycles or domestic moves lie beyond the present archive and should be treated as open tests. The evidence base for this limit is straightforward: date-stamped notes, interviews and digital submissions across roughly two months of follow-up, with drop-offs and recoveries patterned in ways reported in Chapter 4.

A second limit is cohort. The participants are predominantly Chinese urban Gen Z, many studying away from home, fluent in the digital channels used for the stream, and familiar with the tones and permissions of campus life. This cohort affords access, a shared idiom (Mandarin or bilingual), and a tempo that suits light service rhythms. It also narrows transfer: what travels is an if–then–under-these-constraints grammar, not a guarantee that the same arrangements will hold for other ages, family arrangements or labour rhythms. This is why the discussion keeps to conditions rather than to universals, and why two-door entrances are argued as inclusion devices rather than as identity work: in any mixed cohort some will withhold imaginative consent; the design

must keep an evidence-led door open beside the speculative door or the intervention narrows by temperament rather than by need. The sample composition and recruitment settings that ground this limit are described in Chapter 3 and traced again in Chapter 4's cases.

A third limit is design dependence. Outcomes here depended less on charisma than on scripted facilitation, but even minimal scripts carry tone. They encode permissions (to skip, to be quiet, to restart) and insistences (to place one object within reach; to name a cadence), and they do so in a register that keeps ambition small. If that register thickens into performance or thins into mere information, the same steps may not compose. The negative cases labelled W and Z are instructive: in W, speculative personification as a single entrance simply did not travel; in Z, a fixed rhythm read as monitoring and participation drained away until control of cadence was returned and planned silence was stated. These breaks do boundary work for the patterns in Section 5.4, but they also reveal where the patterns are hostage to tone. The dependence is not hidden in the record; it is part of what makes the approach workable and bounded.

A fourth limit lies in instrument sensitivity. The study consciously privileges behavioural and spatial traces—a moved pot, a watering vessel placed within reach, a participant-named routine sustained for two or three cycles—over attitude talk. That stance keeps claims falsifiable at room scale, but it restricts the view to phenomena that leave a visible mark. It means that changes in ethical imagination that are not yet anchored in logistics may be under-counted, and that some kinds of care (for instance, noticing and not acting) can be missed when the instrumentation is tuned to movement and placement. The choice is consistent with the ethic of keeping language close to what rooms will bear, but it is still a choice, and future work should test whether other kinds of traces—micro-narrative traces, consent-phrasing traces, peer-to-peer briefings—can be made inspectable without collapsing back into attitude surveys. The present archive shows why this is not a trivial extension: photographs and short notes were sufficient to follow placement and cadence; they were less good at catching shifts in duty language beyond the phrases directly quoted.

A fifth limit is infrastructural. The stream used familiar, low-key digital channels to keep the service alive between encounters; it asked little, travelled lightly, and allowed exit without penalty. Even so, drop-offs occurred, novelty faded, and message cadence needed active tempering to avoid reading as surveillance. This is not merely a finding about messaging; it is a limit on what any "living" service can demand before it stops being light on attention. In other institutions, or where notifications sit within different platform cultures, the same content and tempo may read differently. The study did not vary the channel architecture in a way that would allow confident causal attributions here; the inference is mid-range and should be tested under other digital and institutional grammars. The WeChat-centred set-up and the pattern of early enthusiasm followed by thinning are recorded in the digital corpus described in Chapter 4.

A final design limit is the room. Several sequences failed not because people were unwilling, but because nothing in the room changed to carry the next action. The argument "room before reminder" held across cases; where placement and reachability did not shift, prompts had nothing to attach to and thinned by week four or five. That is as much a constraint on housing and shared-flat governance as it is on design; rooms with limited natural light, shared access or social rules against visible objects narrow what a light service can ask. The present study did not include institutional levers to alter those constraints; policy and estates instruments lie outside its scope. The constraint shows up plainly in the home-visit notes and in participants' own accounts of what the room would and would not allow.

Against those limits, the future work that follows is intentionally specific and testable. The aim is not to grow the claim, but to tighten its edges and to separate what the grammar does from what context and tone are doing around it.

One track is longitudinal and light. Repeat the same grammar with the same cohort over a longer arc—twelve months rather than eight weeks—while keeping the service small. The test is not whether values intensify, but whether the small arrangements can ride life's cycles without a handler. A minimal design would extend

the cadence to term rhythms (exam periods declared quiet by default; re-entry articulated in the participant's own register), ask for a photographable trace once per month (placement, reachability, or the named action occurring after a lapse), and retain the two-door entrance at each re-start. The falsifier is clear: if, over a year, rooms that satisfied the initial conditions do not show repeatable traces without external pressure, then the present grammar does not travel through time as claimed. The digital instrumentation required for such a study already exists in the present archive and would not need to become heavier to be inspectable.

A second track is comparative and cultural. Run the same sequence with cohorts that differ along one axis at a time: older students or early-career workers with less schedule control; residents living with extended family; non-Chinese urban cohorts in the same cities; Chinese cohorts in second-tier cities with different domestic architectures. The proposition under test is not identity-based efficacy, but condition-based transfer: do paired entrances, room-before-reminder, one owned action and quiet cadence with declared re-entry still compose when the idiom, the housing stock or the labour rhythm changes? Such a programme would keep the content of prompts and artefacts open to translation while holding constant the grammar that makes them workable. It would allow the negative cases in the present cohort to be read again as edges or as artefacts of tone. The present thesis already states where personification must not be made compulsory and where cadence becomes surveillance; comparative work can show whether those edges are universal or cohort-specific.

A third track is experimental at pattern level. Instead of changing setting or time, vary one element of the grammar at a time while keeping everything else constant. Pair an imaginative entrance alone against a two-door condition; compare "reminder first" to room-before-reminder; hold cadence constant in one arm and allow participant scheduling with planned silence in the other; swap open artefacts for finished kits. The read-outs should be traces not attitudes: attachment rates to the next action; survival of placement changes at four and eight weeks; re-entry rates after a declared quiet

period. This kind of A/B work is small enough to run inside course modules or community programmes and would let future authors say with more precision which joints are load-bearing. The present discussion implies answers to these questions; experiments would replace implication with inspection.

A fourth track concerns facilitation as a variable rather than as an invisible competence. The thesis argues that scripted facilitation—tone, sequence, permissions—carried the work better than charisma. Future work should make that claim breakable. Write two or three micro-scripts with the same grammar and different voices (more formal; plainer; more narrative), and rotate them across facilitators with varying familiarity with plants. The question is twofold: how much voice can the script absorb before tone undoes the permission structure, and how little domain knowledge can a facilitator have before the factual door ceases to be credible? The present corpus contains enough facilitator notes and peer debriefs to specify what the critical cues were in practice; a next study can treat those cues as design elements, not as serendipity.

A fifth track is instrumentation for traces beyond movement. If the worry is that the current camera-and-note regime over-privileges spatial shifts, then the test is to add instruments that can catch micro-consents and refusals without drifting into attitude surveying. Two candidates are promising. One is the wording log: a short practice of asking participants, at the moment of naming, to write the action in their own words and, after a lapse, to write the re-entry in their words again; the analysis looks not for declared commitment but for the stability of phrasing over time. The second is the peer briefing: a minimal, once-only practice in which participants tell a peer "what the room will do to help me" in a sentence; the trace is whether that sentence changes when rooms change. Both instruments keep evidence close to what rooms will bear and could be appended to the existing archive without thickening surveillance.

A sixth track belongs to policy and estates and sits just beyond the present study's reach. Where institutions can change rooms at scale—shelves, light, reachability—small grants tied to trace-based evaluation could make the patterns less fragile: fund

"room-before-reminder" rather than campaigns; ask for before–after photographs and the proportion of participants who can name an owned action and repeat it after a quiet week; require opt-in streams that state re-entry and protect silence. That work is not hypothesis-free; it directly tests whether the micro-infrastructures that proved necessary in homes can be made normal in studios, dorms or shared kitchens without sliding into performance. The present findings already show where the drag is; the future task is to change the denominator and track what changes.

There are also conceptual refinements to make. Throughout, the writing has preferred small consent over pledges, and has treated personification as one door among two. Future work can name more precisely when the imaginative door helps and when it harms. The present negative case W is one such edge: a courteous refusal of imaginative consent should not be read as deficit; it shows that making fiction compulsory narrows inclusion. A formal programme could therefore test a "fact-first, fiction-optional" entrance against an "interleaved" entrance and watch where each admits or excludes. Similarly, tempo sensitivity deserves sharper description: is the right cadence simply the one the participant names, or are there characteristic beats in academic and service life—weeks three and seven, the fortnight before assessment—at which silence should be declared by default? Those are empirical questions masked as style.

Finally, future work should make the archive more usable to others while protecting participants. The present study already anonymises at source and reproduces traces selectively; the next step is to produce a small, de-identified method pack—scripts, artefact recipes, prompt calendars, evidence sheets—licensed for adaptation under conditions that preserve participant control of cadence and opt-out without penalty. The test of such a pack is not adoption rates but interpretability: whether another team, reading the pack and the small audit trail, can reproduce the process and break, confirm or extend the mid-range propositions stated here. If they cannot, the grammar is not yet tight enough; if they can, the claims remain small but become more generally useful. The scaffolding for such a pack is already present in the

Chapter 3 methods, the facilitator notes, and the date-stamped traces collated in Chapter 4.

6 CONCLUSION

This thesis asked a simple but stubborn question: how can a short, speculative opening, framed by more-than-human ethics and supported as a living service, help Chinese urban Gen Z convert fleeting attention to plants into situated, repeatable care? Read across the three phases—workshops, homes, and an eight-week digital stream—the answer is ordinary and durable when kept small. Speculation opened relevance by making it socially safe to try care in public; recognition followed as participants named the real trade-offs of light, reachability and time in their own rooms; routine formed when one owned action was docked into an existing cadence; reflection consolidated meaning through a quiet digital scaffold that permitted silence and re-entry. Where the line held, rooms changed before reminders; where it broke, it broke at predictable joints: withheld imaginative consent, cadence that read as monitoring, and an absence of visible change in place. Taken together, these findings support a modest but clear claim: plant care becomes durable when relevance is anchored in rooms, routines, and a cadence participants can own.

Conceptually, the work recentres plant awareness disparity (PAD) as a relation-in-the-making rather than a merely perceptual deficit. Participants did not first

"see differently" in the abstract and then act; they acted differently in specific rooms and then found words to describe what the action now meant. Three ingredients co-occurred where awareness stabilised: a recognisable stake in place (my desk, my window), an iterable routine (a pre-bed check, a Sunday or fortnightly reset), and a light but firm ethic that located responsibility very near to the next small action ("what I will do next Tuesday"). Under those conditions, more-than-human ethics travelled as method rather than exhortation: open artefacts that participants took home, scripts that legitimised trying and failing, and modest micro-infrastructures of care—placement, visibility, reachability—did the heavy lifting. The study also extends living service design into a more-than-human register. The service unit here is not a feature or a feed, but a composition of place, cadence and permission that shrinks the gap between noticing and doing for human–plant dyads. The grammar is deliberately spare: pair entrances (fictional and evidence-led), change the room before adding messages, ask for one owned action, keep cadence quiet and kind to lapse, and script facilitation so tone can be carried by ordinary tutors rather than by charisma. In this form, speculative participatory design (SPD) is not a one-off provocation but a first stage in a modest protocol—imagination → recognition → routine → reflection—that others can inspect, challenge and recombine.

This places the thesis within several current debates in design research. It shifts PAD away from a mainly perceptual account and towards relational practice; it treats more-than-human ethics as ordinary method rather than abstract exhortation; and it shows how speculative design can move beyond one-off provocation into sustained, service-like maintenance. In this sense, the study does not simply add another case. It clarifies how these debates can be connected through a small, testable design grammar.

Methodologically, the thesis shows how a design-led qualitative study can remain auditable without reducing change to attitude scores. By reading change through room-level and behavioural traces, and by treating negative cases as evidence rather than exception, the study keeps its claims modest and testable. What matters here is not methodological novelty for its own sake, but fit between method and problem: if

PAD is relational and time-based, then it must be studied across workshops, homes, and a sustained but light digital stream. Sized this way, the thesis offers mid-range propositions rather than universal laws: a short, socially safe speculative opening increases the chance of reframing if it lands on a near-term domestic decision; one owned action embedded in an existing rhythm is the sustainable unit of change; ethical talk becomes portable when enacted through micro-infrastructures; inclusion requires multi-door entrances; the digital layer must remain quiet, optional, and anchored in visible change in place.

The scope is deliberately narrow. The cohort is predominantly urban Chinese Gen-Z; the object is indoor plants; the follow-up lasts roughly eight weeks; and the cadence remains light and participant-set. The claims therefore travel as conditional propositions rather than general laws. They hold under specific conditions and should be tested, rather than assumed, elsewhere.

Practically, the contribution travels as a small grammar others can compose with in education, community, retail and policy. In teaching and studio life, pair entrances at the outset; make the change in the room where study actually happens; ask each student to name one action in their own words; run a light cadence that expects lapse and encodes re-entry; assess through traces (placement moved, cadence named and repeated) rather than through pledges. In community settings, scale the grammar, not the script: equip rooms and peer hosts, let rhythm fall to the slowest beat that still feels alive, count rooms that changed and routines that survived a busy fortnight. In retail and after-sale care, help a plant cross the threshold into a routine without buying a mood: a small discharge slip that records where the plant will live and what one owned action will be tried, an opt-in message a week later that asks what changed in the room and permits a skip without apology. In policy, fund shelves, reachability and light before campaigns; back facilitator time and minimal scripts over hero events; require trace-based evaluation and read negative cases as scope statements rather than as failures to motivate. Future work remains precise and testable rather than grand. One track is longitudinal and light—carry the same grammar across a year paced to term

rhythms and watch whether routines survive without handlers. A second is comparative and cultural—hold the grammar constant and vary cohort, housing stock or labour rhythms to see where the edges move. A third is experimental at pattern level—vary one element at a time (entrances paired vs fiction-only; room-before-reminder vs reminder-first; participant-scheduled vs fixed cadence; open artefacts vs prescriptive kits) and read outcomes through traces. A fourth treats facilitation voice as a design variable rather than as an invisible competence. A fifth extends instrumentation to capture micro-consents and re-entries without drifting back to attitude surveys—for example, by logging the stability of participant-authored phrasing across lapses. Each programme keeps the ethic ordinary and the claim falsifiable: rooms change before reminders; one owned action before plans; cadence kind to lapse; artefacts open to interpretation; scale the grammar, not the script.

Read in the round, the value claimed is modest and clear. The rooms in this study are small, so the patterns are small; the weeks are few, so the boundaries are strict; dignity is easily bruised by zeal, so the tone stays light but firm. Under these conditions, a short, socially safe speculative opening, coupled to micro-infrastructures of care and a quiet, participant-owned cadence, can convert curiosity into routine for a cohort whose lives are dense, digital and mobile. The thesis does not argue that people will come to love plants because they know more facts or because they are asked more often; it shows that when imagination meets logistics and responsibility stays close at hand, the next small action becomes obvious, doable and increasingly owned. What the thesis offers, then, is not a promise of large-scale ecological transformation, but a grounded account of how such transformation may begin in ordinary rooms.

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8 APPENDIX

Interview Protocol

Interview Structure: Semi-structured Interviews (45–60 minutes)

Participants: urban Chinese Generation Z (aged 18–26)

Interviewer: Researcher (myself)

Format: Face-to-face / Online (via Zoom/WeChat)

Recording: Audio-recorded and transcribed verbatim

Part 1: Introductory Questions (5–10 mins)

Could you briefly introduce yourself, including your age, educational background, and typical daily interactions with plants?

Before participating in this project, how would you describe your relationship with indoor plants?

Theoretical rationale:
These initial questions follow Charmaz's (2014) guidance on establishing a comfortable and open environment, allowing participants to reflect openly and situating their previous emotional and cognitive stance toward plants (Parsley, 2020).

Part 2: Experiences from Speculative Participatory Workshops (15–20 mins)

Could you describe your emotional reactions when participating in the "Plant Hospital" scenario?

Why do you think you felt this way?

How did imagining plants as patients influence your understanding of their needs?

Were there particular scenarios or tasks that significantly changed your perception of plant agency? Please elaborate.

Theoretical rationale:
These questions integrate speculative participatory design theory (Dunne and Raby, 2013) and Haraway's (2008) multi-species ethics, specifically probing how imaginative empathy can alter participants' perceptual frameworks and emotional responsiveness.

Part 3: Post-intervention Behavioral Changes (10–15 mins)

Have your daily routines involving plants changed since participating in the workshops?

If so, could you give specific examples?

Can you recall moments after the workshop when you deliberately altered your behavior towards plants? What triggered these changes?

Did you notice any emotional or attitudinal shifts that persisted long-term?

Theoretical rationale:
Aligned with Polaine, Løvlie and Reason's (2013) Living Service Design framework, these questions aim to track participants' emotional and behavioral continuity,

explicitly examining the sustained effects of speculative design interventions on everyday practices.

Part 4: Critical Reflection and Suggestions (10–15 mins)

Did you experience any challenges or discomfort with the speculative participatory methods used in this study?

If yes, could you describe these experiences and why they might have arisen?

Do you have suggestions for improving the workshop or engagement methods in future iterations?

Considering cultural factors, how effective do you think these methods would be for different groups or contexts?

Theoretical rationale:
This critical reflection section directly responds to Tonkinwise's (2016) critique about the practicality of speculative methods, incorporating cultural sensitivity perspectives (Amprazis et al., 2019), and ensuring methodological improvements informed by participant feedback.

Part 5: Closing (5 mins)

Is there anything else you would like to share regarding your experience or thoughts on this project?

Logical Design and Iterative Adjustments (Detailed Record)

The original interview questions were first developed based on theoretical frameworks from speculative participatory design (Dunne and Raby, 2013), multi-species ethics (Haraway, 2008), and Living Service Design (Polaine, Løvlie and Reason, 2013). Initial drafts were pilot-tested with three participants, who provided critical feedback indicating the need for clearer phrasing of speculative scenarios, specifically noting that abstract terminology (e.g., "plant agency") required more relatable explanations.

Consequently, the questions were revised for increased clarity, incorporating simpler language and relatable examples (e.g., "imagining plants as patients" instead of "plant agency"). Additional follow-up probes were included to capture deeper reflections and provide participants sufficient flexibility to elaborate. During data collection, ongoing iterative adjustments continued based on participant reactions, documented carefully in reflective memos. For example, after initial interviews revealed participants had difficulty recalling specific behavioral changes, a prompt ("Can you recall a recent interaction with your plants that was influenced by the workshop?") was explicitly added to subsequent interviews to facilitate deeper reflective discussions.

Overall, this systematic iterative process, informed by participant feedback and theoretical grounding, ensured methodological rigor, cultural sensitivity, and enhanced the depth and quality of qualitative data collection.