

Acculturation through Food Design: Playful Small-Talk Interactions in Shared Kitchens

Master Graduation Project
Msc. Strategic Product Design

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Acknowledgements

As a designer, it is an incredibly difficult challenge to remain resilient and creative amidst emotional exhaustion. When I found myself in hardship, yet had to press on to create the joy and playfulness that should be innate for users, I deeply felt the contradiction and hardship within: we design for a “better life,” yet often struggle in our own.

This experience allowed me to see a broader group: international students. In a foreign land, facing a new society, system, and language, the sense of loneliness from lacking a stable support system is so similar to a creator's predicament. It is from this empathy that I hope my design, a shared kitchen space, can bring a small yet tangible moment of comfort as you settle into your new life.

Food has always been my final harbor in the face of hardship. When my father told me to “eat more meat for protein,” I was reminded of this once again. Food is the medium through which we converse with our ancestors, our parents, and friends from home who share the same tastes. It carries a wealth of sensory memories and emotional weight, which is why I chose food design.

I was once captivated by the ideals of social design, only to feel powerless against its limitations. Facing the pandemic, societal issues, and even the personal grief of losing my father against the backdrop of a grand national narrative—these intricately woven “Wicked Problems” once left me adrift. As a designer expected to be a “problem solver,” I felt my own insignificance.

However, it was this sense of helplessness that brought me back to the heart of design. Through my work, I hope to create a moment of self-acceptance for you—for those who are hesitant to speak during “small talk” in a foreign land due to cultural and linguistic barriers, for those who are misunderstood in their silence. I want to tell you: it is not your fault, nor is it your differences that are wrong.

May this small design offer you a moment of comfortable silence when you don't want to, don't know how to, or feel unable to make small talk. And may it also be a small reward for you when you gather the courage to break through anxiety and truly enjoy the act of communication.

Here, I would like to express my heartfelt gratitude to my supervisors, [Rick and Zhuochao](#). Thank you for embracing my proposal and for pushing me to constantly refine it, which led to significant growth in my design practice, presentation skills, and project planning. My deepest thanks also go to my mother, my father, my family, and all the friends and participants who took part in my graduation project. Your support has been my strength to move forward. Solving a massive social problem may be difficult, but I hope we can start small: by discovering the beauty of food, and by using beautiful things and a positive heart to face each day's challenges.

Finally, I wish to end with the most simple and heartfelt of Chinese blessings for everyone reading this: [May you be blessed with good health and happiness every day.](#) (愿你身体健康，天天开心！)

Abstract

This design project addresses the social anxiety of 'small talk'—a key manifestation of acculturative stress—experienced by Chinese international students in multicultural shared kitchens. Using a Double Diamond framework, the study employed mixed methods to define the core challenge as fostering connection during task-focused "parallel work."

An initial "content-driven" prototype, a TV app providing conversational topics, failed in usability testing, proving that demanding active attention creates cognitive burden rather than easing social pressure. This failure prompted a crucial pivot to an "atmosphere-driven" design philosophy. The final design, "Fruit & Veggie Fireworks," is an ambient installation that transforms cooking sounds into visual "seeds" and vocal interactions into blooming "fireworks." The evaluation confirmed its effectiveness in lowering the barrier to conversation and reframing shared silence from awkward to anticipatory.

The study's primary contribution is the "atmosphere-driven" design strategy, which posits that for social challenges in "parallel work" contexts, the most effective intervention is not to directly stimulate conversation, but to first reshape the environment's ambient qualities to create fertile ground from which low-pressure interaction can naturally emerge.

0. Introduction

0.1 Background

As globalization deepens, transnational education has become increasingly common. Each year, millions of international students leave their home countries to enter entirely new cultural environments. This process marks not only the beginning of an academic journey but also a profound experience of cultural adaptation and self-reconstruction. However, this cross-cultural transition is not always seamless. Extensive research indicates that international students commonly face significant "Acculturative Stress," which stems from a combination of factors including language barriers, social isolation, and conflicting values. This stress profoundly impacts their mental health and overall study-abroad experience. Consequently, exploring how to alleviate the AS of international students through effective design interventions has become a significant topic at the intersection of human-centered care and design innovation.

0.2 Problem Statement

Acculturative stress manifests in all aspects of daily life, and "food," as a central vessel of culture, often becomes a focal point for these challenges. For Chinese international students, who come from a culture where cuisine is deeply valued, food is not merely for sustenance; it is a vital medium for cultural identity, emotional comfort, and social activity.

Upon entering a new environment like the Netherlands, where the food culture is markedly different, the challenges related to food become prominent. These challenges are dramatically amplified within the micro-context of the "shared kitchen." A shared kitchen is more than a physical space for cooking; it is a "social theater" where different cultural backgrounds, living habits, and social protocols collide.

Through in-depth user research, this thesis finds that for Chinese students in the Netherlands, one of the most central conflicts in this "theater" manifests in the seemingly trivial act of "small talk." For students accustomed to high-context, relationship-oriented social norms, the type of prevalent, impromptu small talk common in Western cultures—often aimed at creating brief, transient connections—can generate significant cognitive load and social anxiety.

To engage or to remain silent? How to gracefully initiate and conclude a conversation? These questions transform the otherwise relaxing process of cooking into a social performance fraught with uncertainty and potential awkwardness. Therefore, the core problem this research addresses is: How can a design intervention alleviate the social pressure and cultural tension that Chinese international students experience around small talk within the specific context of a shared kitchen?

0.3 Project Goal and Design Approach

The core objective of this project is to design a **feasible, playful, and non-intrusive interactive experience** for Chinese international students in the Netherlands. The goal is to ease their social anxiety in shared kitchens and foster more relaxed, natural cross-cultural communication.

To achieve this, the project adopts a design process modeled on the Double **Diamond framework**, characterized by a continuous cycle of exploration and focus.

First Diamond (Problem Space): The research began with a broad exploration of Acculturative Stress, utilizing methods like introspection and online ethnography to discover the diverse challenges faced by students. This divergent phase was followed by a convergent phase of analysis, which progressively narrowed the focus to the specific, high-frequency pain point of "small talk" in shared kitchens.

Second Diamond (Solution Space): With a clearly defined problem, the project again diverged to explore a wide range of design concepts through a co-creation workshop. This exploration was then systematically narrowed, leading to the selection of sound as the core interaction medium. The final design was achieved through three iterative cycles of refinement on this focused concept.

It was precisely through this process of user co-creation and analysis that an **"ambient interaction"**—one that is subtly integrated into the environment and driven by users' unconscious behaviors—was identified as the most suitable approach to address the challenges of this context. This project aims to transform the shared kitchen from a potential "pressure zone" into a positive space filled with a sense of "play" and "connection."

1. Literature Review

This chapter provides a comprehensive review of the existing literature across three key domains: the psychological concept of acculturative stress, the role of food as a critical medium for cultural identity and adaptation among Chinese students, and the socio-cultural nuances of 'small talk'. By synthesizing these fields, the chapter identifies a critical research gap: the absence of context-aware design interventions that address the micro-social pressures manifesting in everyday scenarios. This gap establishes the theoretical foundation and justification for the user-centered research that follows.

1.1 Acculturative Stress

1.1.1 Definition and Prevalence among International Students

Acculturative stress represents a specific type of psychological stress that emerges when individuals attempt to adjust to life in a new cultural environment (Berry, 1997; Berry, 2006). This stress occurs as a direct consequence of the acculturation process, manifesting when cultural adaptation experiences create significant problems for the individual (Berry, 2006). For international students, acculturative stress has become a prevalent and concerning phenomenon, with research revealing high rates of psychological distress within this population.

Recent studies demonstrate that international students experience significantly higher rates of depression and mental health challenges compared to domestic students, with acculturative stress identified as one of the major contributing factors (Jackson et al., 2013; Shadowen et al., 2019). The manifestation of acculturative stress stems from the fundamental challenges inherent in cross-cultural transition, where students encounter new environments and navigate cultural differences between their home culture and host culture.

1.1.2 Contributing Factors

Research on acculturative stress has identified multiple interconnected factors that contribute to its development and intensity. Key factors include language ability and comfort using the host language, length of stay in the host culture, social support networks, and the degree of cultural distance between home and host cultures (Constantine et al., 2004; Berry, 2006).

Cultural distance presents particularly significant challenges, as greater differences between home and host cultures correlate with increased acculturative stress. This may explain why numerous studies focus specifically on Chinese international students, given the substantial cultural differences between Chinese and Western educational, social, and food systems. For graduate-level international students, additional stressors emerge due to greater academic independence, research responsibilities, and expectations of cultural competency in professional settings. Consequently, food-related practices emerge as a particularly rich and complex domain for investigating these acculturative stressors.

1.1.3 Psychological Effects and Current Intervention Limitations

The relationship between acculturative stress and depression among international students has been extensively documented. Shadowen et al. (2019) found that 45.3% of international students exhibited clinically significant depressive symptoms, while Hahn (2010) reported that 22.6% met criteria for clinical depression—twice the rate of domestic students.

The vulnerability of international students to these psychological consequences is amplified by their temporary status in the host country. Unlike permanent immigrants who may develop long-term social support networks, international students exist in a liminal space with temporary contact with the host culture, potentially preventing deep social connections and sustainable support systems (Berry, 2006).

Current interventions for acculturative stress have emerged primarily from psychological and social work perspectives, with psychoeducational programs showing some effectiveness in reducing stress and enhancing cultural adjustment. However, these approaches face critical limitations: they often focus predominantly on socio-cultural aspects while inadequately addressing psychological sources of stress, operate at broad institutional levels rather than addressing specific daily scenarios where stress manifests, and lack the nuanced, context-specific approaches needed for everyday cultural conflicts.

While culturally tailored interventions have proven more effective than generic approaches (Hall, 2001; Griner & Smith, 2006), current programs remain relatively crude and fail to provide support for specific daily situations—such as navigating shared living spaces or food-related cultural differences—where acculturative stress most frequently occurs.

1.1.4 The Social Challenge of 'Small Talk'

A significant yet often overlooked contributor to acculturative stress is the challenge of engaging in "small talk." In Western cultures, particularly in egalitarian and informal societies like the Netherlands (Hirst, 2009; West & Murphy, 2007), small talk functions as crucial "social grease" (Coupland & Robinson, 1992). Its purpose is to create a relaxed and friendly atmosphere in social situations through non-controversial topics, reinforcing a sense of egalitarianism without necessarily signaling a desire for a deeper, more intimate relationship—a nuance that can be a source of misunderstanding.

For many Chinese international students, this conversational style presents a substantial barrier, rooted in deep-seated cultural norms regarding interpersonal relationships. As sociologist Fei Xiaotong (1947) described, traditional Chinese society is structured around a "differential mode of association," which creates a strong distinction between in-group members (family, close friends) and out-group members ('outsiders'). This framework results in a high threshold for transitioning from an out-group to an in-group relationship, and consequently, many Chinese individuals lack experience and feel ill-equipped to engage in casual conversations with those outside their immediate circle.

This cultural predisposition is compounded by the anxieties of communicating in a second language. The cognitive load of selecting appropriate topics, navigating unclear social boundaries, and managing linguistic insecurities creates a vicious cycle where anxiety hinders the ability to engage in the very type of light, spontaneous conversation that small talk requires (Cui, 2015). This difficulty is not merely a linguistic issue; it is a significant social hurdle that can lead to missed opportunities for connection, increased feelings of isolation, and heightened acculturative stress. Identifying specific, everyday contexts where these social pressures manifest is therefore crucial for developing targeted design interventions.

1.2 Food and Cultural Identity for Chinese International Students

1.2.1 Food as Cultural Performance and Identity Construction

Food serves as a fundamental medium through which cultural identity is both constructed and performed in everyday life. People's identity is best understood as performative, with food becoming a critical component of this daily performance (Stajcic, 2013). Unlike language, which operates through precise linguistic structures, food functions as a broad and deep cultural medium that conveys complex meanings across multiple dimensions of human experience (Anderson, 2014).

As a form of material culture, food simultaneously embodies social and spiritual cultural features, representing the fundamental concept of food culture within anthropological frameworks. This multidimensional nature of food makes it particularly significant for understanding broader cultural meanings and practices. Food research, therefore, provides insights not only into dietary practices but into the entirety of cultural systems and worldviews.

In cross-cultural contexts, food becomes particularly powerful as a symbol of ethnic group identity. While the same food items—such as bread—may be consumed across different cultures, they generate unique identity meanings within specific cultural contexts. For international students separated from their mother culture, food often represents "the last vestige of culture that people shed" (Choi, 2014), making it a crucial anchor point for cultural identity maintenance during periods of cultural transition.

The significance of food in cultural understanding is captured in the anthropological insight that "one of the best ways of getting into a culture's heart would be through its stomach" (Chang, 1977). Food conveys subtle and complex messages that extend far beyond nutritional sustenance (Anderson, 2014). It connects intimately with emotional states—influencing mood, feeling, and psychological tone while serving as a social code through which individuals build and express relationships with their ethnicity and the broader world.

1.2.2 Food's Role in Cultural Adaptation Process

Anthropological approaches to food recognize it as an essential lens for understanding social life and relationships, extending analysis beyond production, distribution, and consumption to examine food as a carrier of communication, significance, and cultural narration. Food serves as an engaging pathway for cultural exploration because it naturally generates curiosity and questions about cultural details, including names, ingredients, origins, and historical contexts (Stajcic, 2013).

Each culture's cuisine reflects numerous factors including geographical conditions, climate, and religious or social sanctions, making ingredient combinations distinctive cultural markers. These culinary traditions contain extensive narratives about ancestral practices and historical developments, with comfort foods serving as "maps of who we are, where we come from, and what happened to us along the way" (Choi, 2014).

For international students, food can function as an important cultural learning pathway through everyday practices, allowing students to naturally acquire new cultural knowledge and skills as integral parts of their new life while helping them rebuild daily routines that promote feelings of settling and belonging.

1.2.3 Specific Challenges Faced by Chinese Students Abroad

Chinese international students face distinctive challenges related to food and cultural adaptation that stem from fundamental differences between Chinese and Western food systems, preparation practices, and dining cultures. Research indicates that international students with access to kitchen facilities for preparing preferred and familiar foods demonstrate higher satisfaction levels compared to those dependent on dining halls with limited options (Tolman, 2017). For Chinese students specifically, cooking skills often become focal points for social interaction, with those who can cook frequently becoming centers of social activity, thereby enriching their social lives through food-related connections.

Traditional Chinese medicine principles and diverse regional cuisines make food a culturally meaningful component of daily life that extends far beyond basic sustenance for Chinese international students. Research suggests that Chinese students typically invest significantly more time in food preparation and cooking compared to their Western counterparts, often spending 2-3 hours per day on food-related activities (Ma, 2015). This investment reflects cultural values that prioritize fresh food preparation and the social aspects of shared meals.

Chinese traditional medicine principles, particularly concepts of natural body balance, influence Chinese students' perceptions of Western food systems (Wu, Fang, and Cheng, 2013). Many Chinese students view prevalent Western foods such as cold sandwiches and salads as potential threats to their health, conflicting with traditional Chinese medicine principles that emphasize warm, cooked foods for maintaining bodily balance (Banna et al., 2016; Jiang and Quave, 2013). This creates ongoing tension between available food options and culturally informed health beliefs.

The transition from Chinese to international food systems represents a particularly dramatic lifestyle change for most Chinese students. During their secondary education in China, students typically focus intensively on academic achievement while family members handle food preparation or school cafeterias provide meals. In undergraduate programs, virtually all Chinese university students live in centralized dormitories without cooking facilities, with many institutions explicitly prohibiting cooking equipment use. Students typically rely on inexpensive school cafeterias or affordable food delivery services to meet their nutritional needs.

This background means that most Chinese students have minimal experience with independent living, self-directed food preparation, or self-care practices before studying abroad. The contrast with life in the Netherlands—where students must independently manage food shopping, meal planning, cooking, and kitchen maintenance—represents a fundamental lifestyle inversion that contributes significantly to cultural adaptation challenges during early study abroad periods.

This sharp transition transforms the mundane act of eating into a significant source of daily stress. While the cultural importance of food in adaptation is recognized, the specific, mundane challenges rooted in this lifestyle inversion are often overlooked by broader support systems, creating a critical gap between student needs and institutional support.

1.3 Research Gap

While the literature establishes the prevalence of acculturative stress and highlights food as a vital cultural medium, a critical disconnect remains between broad psychological support and the tangible, everyday realities of international students. Synthesizing the existing literature reveals a more profound and specific area for inquiry, structured around two intersecting gaps.

First, current interventions for acculturative stress are often context-blind. Rooted in psychology and social work, they tend to be programmatic and detached from the specific, mundane scenarios where stress is most acutely felt, particularly neglecting the impact of micro-social stressors like the pressure of small talk (Berry, 2006). These approaches, while valuable, lack the situated, design-based solutions needed to address the micro-interactions and environmental triggers within students' daily lives. Design interventions have the potential to provide ambient, everyday support through environmental and behavioral modifications, moving beyond explicit therapeutic engagement.

Second, the potential of food as a medium for designed intervention remains largely untapped. Research has powerfully demonstrated that food is not merely a source of conflict but an "invisible and unconscious pathway" for cultural learning and adaptation (He et al., 2025). However, as He et al. (2025, p. 320) note, this potent pathway "might be less recognized by stakeholders... and/or even by student sojourners themselves." This "invisibility" means its potential has not been systematically leveraged through concrete design interventions that could amplify these organic adaptation processes.

When these two gaps are bridged, the true research void emerges: there is a pressing need for situated design research that leverages the potent medium of food within the very contexts where acculturative stress—and its related social pressures like small talk—manifests. The literature has not sufficiently explored how design, as a practice-based discipline, can create interventions embedded in high-stress, everyday environments where cultural negotiation, social pressure, and food-related practices intersect. Therefore, this thesis aims to address this synthesized gap by exploring how design interventions, situated within such everyday contexts, can activate the latent potential of food-related interactions to mitigate the specific social stressors, such as the pressure of small talk, that contribute to acculturative stress among Chinese international students.

2. User Research

This chapter details the execution of the first 'diamond' of the design process: defining the problem space. It presents a three-phase, funnel-based user research methodology that combines introspection, online ethnography, and semi-structured interviews. The chapter demonstrates how this approach progressively narrowed the research focus from the broad theme of acculturative stress to the specific, high-impact contexts of the shared kitchen and supermarket, ultimately validating 'small talk' anxiety as the core issue to be addressed.

2.1 Research Methodology and Rationale

Primary Research Question:

How can design interventions leverage food-related experiences to support Chinese international students in reducing acculturative stress within their everyday living contexts?

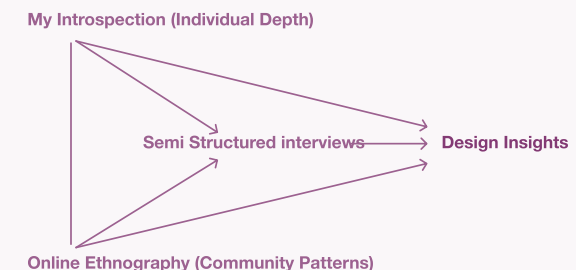
Sub-questions:

1. What specific food-related scenarios generate the most significant acculturative stress for Chinese international students in their daily lives?
2. What coping mechanisms do Chinese international students currently employ when facing food-related cultural conflicts?
3. How do shared kitchen and supermarket experiences function as sites of cultural tension and adaptation for Chinese international students?
4. What design opportunities exist within these everyday food contexts to provide ambient support for cultural adaptation?

A Mixed-Methods, Funnel-Based Approach

To adequately address the research questions, this study adopts a mixed-methods approach that strategically combines introspection, online ethnography, and semi-structured interviews. This methodological triangulation is not merely for data richness, but is a direct response to the dual challenges identified in the literature review: the context-blindness of traditional support systems and the invisibility of food-mediated cultural learning.

The research is structured as a three-phase exploratory funnel, designed to move from a broad personal understanding to a wider community context, and finally to deep, specific insights. This sequential yet iterative process ensures that each phase informs the next, progressively refining the research focus and leading to well-grounded, context-specific design insights that form the first diamond of the design process.



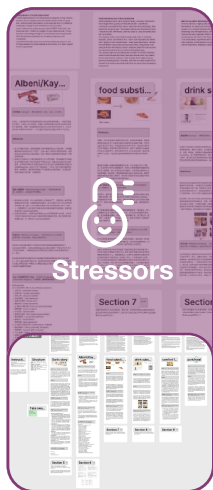
2.2 Phase 1: Introspection

2.2.1 Methodology and Framework

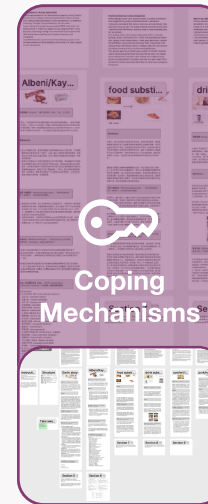
The introspective analysis employed a structured framework examining five dimensions for each significant food-related cultural conflict experience: **Context** (environmental and social circumstances), **What Happened** (specific events and interactions), **Emotion** (immediate and lasting emotional responses), **My Coping Mechanism** (behavioural and cognitive strategies employed), and **My Reflection** (retrospective analysis and learning outcomes). This systematic approach ensured comprehensive exploration while maintaining analytical rigour.

2.2.2 Key Findings: Stressors and Coping Mechanisms

As a member of the target population, I systematically reviewed my own food-related cultural adaptation experiences over two years in the Netherlands using the Context, What Happened, Emotion, My Coping Mechanism and My Reflection framework. Before arriving in the Netherlands, I had limited understanding of local living conditions and held misconceptions about Dutch lifestyle, creating numerous opportunities for cultural conflict and adaptation learning.



- *Food aroma conflicts in public dining spaces*
- *Conflicts between shared and individual food cultures*
- *Pressure of small talk in shared kitchens*
- *Uncertainty after failed attempts at initiating conversation*
- *Absence of cheap, timely, and delicious food delivery like in China*
- *Shop closures after 5 PM, no 24-hour convenience stores, difficulty buying food and water at night*
- *Pressure from prolonged deliberation about what to cook*
- *Expensive and poor-quality bubble tea shops in the Netherlands, while bubble tea shops serve as important social venues for Chinese people in China*
- *Excessive focus on food*



- *Analyzing food structure/characteristics to find substitutes for familiar Chinese foods*
- *Adopting local alternatives from economic and flavor perspectives, such as using low-roast coffee to replace bubble tea*
- *Using cheap local specialty foods as comfort food and forming social activity anxiety relief (reminds me of hospital lavender code/companion socializing/friend circle mobilization)*
- *Accepting life reality, becoming more proactive and mindful in planning and preparation*
- *Convincing myself that the cooking process would be enjoyable, reducing overthinking pressure about whether and what to cook*
- *Using spicy food to relieve stress*

2.2.3 Reflections and Transition to the Next Phase

The introspective analysis served two critical functions. First, as a method of inquiry, its findings provided **initial categories** for further investigation into the emotional and practical challenges of adapting to different food and social cultures (Xue & Desmet, 2019).

Second, and more importantly, the process of introspection itself yielded crucial methodological insights that shaped the subsequent research phases. The initial attempt to map the broad experience of "acculturation" proved to be too generic to yield deep insights. This led to the realization that to elicit rich, detailed accounts from future participants, the research must be grounded in highly specific contexts. This insight directly informed the decision to focus the later semi-structured interviews on **concrete scenarios** like the shared kitchen and supermarket, rather than asking broad, abstract questions.

Furthermore, during the reflection on personal coping mechanisms, it became clear that **RedNote had been an indispensable tool** for seeking guidance and community support throughout the adaptation process. This personal validation of the platform's role provided a strong, experience-based rationale for selecting RedNote as the site for the next phase of research: online ethnography.

2.3 Phase 2: Online Ethnography (RedNote Analysis)

2.3.1 Rationale for Using RedNote

Building on the personal validation from the introspection phase, the choice to conduct an online ethnography on RedNote (小红书) was also grounded in a strategic, methodological rationale. The platform has become the de facto primary search engine and experience-sharing hub for young Chinese users, especially those studying abroad. It functions as a vast, living archive of personal reflections, life hacks, and peer-to-peer guidance on navigating everyday challenges in a new culture. Unlike formal forums, RedNote's design encourages storytelling and emotional expression, allowing temporary communities to form around shared stories through comments and likes. This provides a rich, authentic, and unsolicited source of data on how students genuinely experience and cope with acculturative stress, offering insights that might be difficult to obtain through more direct research methods.



Figure 2.1 RedNote App

2.3.2 Search Strategy and Data Collection

The data collection process was designed to systematically identify relevant user-generated content. The search strategy focused on identifying cultural adaptation and food behavior intersections, but avoided academic terminology like "acculturative stress" which is not commonly used in Chinese vernacular. Instead, the approach employed emotion × context × food behavior combinations to capture authentic user language and experiences.

Search categories included:

- **Emotional keywords:** loneliness, homesickness, isolation, anxiety, comfort, unfamiliarity, overwhelmed, frustrated, depressed, freedom, disappointment, excitement
- **Contextual keywords:** dormitory, kitchen, office, warehouse, cafeteria, supermarket, convenience store, food delivery, international students, cultural conflict, foreigners, shared meals, room mates, lifestyle guides
- **Food behavior keywords:** taste, flavor, cooking methods, eating habits, comfort food, homemade meals, fast food, convenience foods, food sharing, local specialties, impossible foods

From the initial pool of hundreds of posts, a final corpus of 52 posts was selected based on their richness of detail and direct relevance to the research questions. To ensure focus on international student-specific experiences, the analysis deliberately excluded common issues that local students might also face, such as kitchen cleanliness problems or food theft in shared spaces.

emotion	×	context	×	food behaviour
loneliness,		studio		cooking
homesickness		kitchen		eating habits
isolation		office,		comfort food
anxiety		class		fast food
comfort		supermarket		food sharing
unfamiliarity		food delivery		food racism
...		...		...

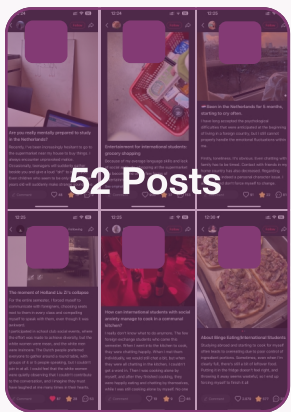


Figure 2.2 52 Selected RedNote Posts

2.3.3 Thematic Analysis: From Raw Data to Core Categories

Each of the 52 selected posts was systematically deconstructed using a detailed analytical framework. This framework coded the content of each post across **eight dimensions**: Topic Category, Scenario, Context, Trigger, Behavior, Coping Strategy, Emotional Pathway, and Food Role. This rigorous coding process allowed for a granular understanding of each individual story.

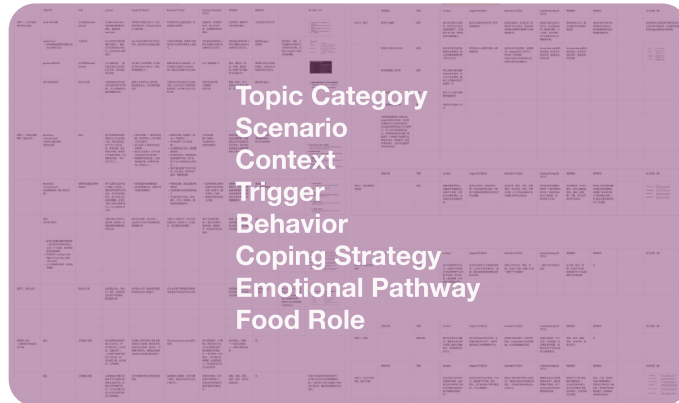


Figure 2.3 Analysis Screenshots

Through an iterative process of coding, comparing, and clustering these individual data points, six overarching thematic categories of food-related cultural stress emerged. These categories represent the synthesized collective experience of the community:



1. Public Food Space Cultural Tensions

- Small talk culture discomfort in shared kitchens
- Overlooked presence
- Food racism and cooking aroma conflicts



2. Supermarket Experiences

- Supermarkets as emotional anchors and cultural learning spaces
- "20-minute park effect" for mood regulation
- Low-threshold, affordable convenience refuge



3. Identity Reminders

- Food practices highlighting cultural outsider status
- Daily reminders of cultural differences
- Struggle under Double Consciousness



4. Overeating and Food Relationship Issues

- Portion control difficulties
- Excessive focus on food during adaptation
- Weight gain from European sweets leading to obesity concerns
- Binge eating followed by purging due to weight anxiety



5. Food as Stress Relief

- Mindful cooking for life rhythm control
- Comfort foods for emotional regulation: sweets, spicy food, ice cream



6. Systemic Lifestyle Gaps

- Absence of convenient food delivery systems
- Limited food ecosystem compared to China
- Loss of spontaneous richness/uncertainty in daily life
- Shift from instant choices to planned execution

2.3.4 Key Insights

The RedNote analysis confirmed introspection findings while revealing broader community patterns. Most significantly, shared kitchens and supermarkets emerged consistently as the two primary sites where food-related cultural tensions and adaptation opportunities occur most frequently and intensely for Chinese international students.

The authentic language and emotional expression found in RedNote posts provided crucial insights into the psychological dimensions of food-related cultural adaptation that formal interview settings might not capture. Users' candid descriptions of coping strategies, failed attempts, and emotional responses revealed that food-related cultural conflicts often stem from systemic differences between Chinese and Dutch lifestyle infrastructures rather than personal inadequacies.

These findings directly informed the design of subsequent interviews, focusing particularly on these two critical contexts where intervention opportunities could have the greatest impact.

2.4 Phase 3: Semi-Structured Interviews

2.4.1 Participant Recruitment and Screening

To gain deeper insights into the themes identified through introspection and online ethnography, a total of 11 participants were recruited for semi-structured interviews. Recruitment was conducted through WeChat groups for Chinese international students and personal networks.

A screening process was implemented to ensure the relevance and richness of the data. The primary criteria for selection included: 1) being a Chinese international student with at least one year of living experience in the Netherlands, and 2) having extensive experience using a multicultural shared kitchen. This purposeful sampling strategy aimed to engage participants who could provide deep and detailed accounts of the phenomena under investigation.

2.4.2 Interview Design and Structure

The interviews were designed as 55-minute sessions structured in five progressive parts, following a principle of moving from shallow to deep engagement and from comprehensive to specific exploration. This design ensured trust-building while systematically exploring food-related cultural adaptation experiences.

Part 1: Warm-up (Building Safe Space, 20 minutes)

This section established trust and provided initial understanding of participants' overall cultural adaptation experiences. Beginning with recent life situation inquiries, the conversation progressively deepened to explore perceived social and cultural differences, learning and living experiences, and the most challenging aspects of their two-year study abroad experience.

A cultural adaptation degree measurement scale was introduced not only to collect quantitative data but, more importantly, to stimulate participants' deeper thinking about what "adaptation" means to them personally. This tool served as a foundation for subsequent in-depth discussions.

Part 2: Cultural to Food Transition (10 minutes)

This section achieved the crucial transition from broad cultural adaptation experiences to specific daily life practices. Questions explored food's changing role in participants' study abroad lives and food-related behaviors

during negative emotional states. The final question—"Have you done anything food-related when feeling bad, bored, anxious, or homesick?"—served as a critical bridge to more specific scenarios.

Part 3: Shared Kitchen Scenarios (15 minutes) and/or

Part 4: Supermarket Scenarios (15 minutes)

Based on participants' responses in Part 2, interviews flexibly focused on either shared kitchen or supermarket experiences, or both when relevant. These sections deeply explored participants' experiences of cultural conflicts in specific life scenarios, coping strategies employed, and how these experiences influenced their cultural identity and adaptation processes.

Shared kitchen scenarios focused on daily life cultural differences and interpersonal interactions, while supermarket scenarios examined consumer culture and lifestyle habit adaptations. Both sections investigated how these experiences shaped participants' cultural learning and identity negotiation.

Part 5: Synthesis and Design Insights (10 minutes)

The final section asked participants to provide advice for newly arrived Chinese international students, serving both to synthesize their adaptation experiences and identify gaps in existing support systems. This forward-looking approach revealed opportunities for intervention design while validating previous findings.

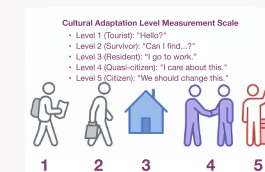


Figure 2.4 Scale which was Used in Interview

2.4.3 Data Analysis Approach

All 11 interviews were transcribed and analyzed using thematic analysis (Braun & Clarke, 2006). The coding process focused on identifying recurring patterns, coping strategies, and design opportunities within food-related contexts. The findings from the interviews were then triangulated with the insights from the introspection and online ethnography phases to build a comprehensive and robust understanding of the problem space, ensuring the final design opportunities were grounded in a multi-faceted evidence base.

3. Findings and Design Briefs

This chapter translates the rich qualitative data from the user research into actionable design insights. It synthesizes the findings into five distinct design briefs, each addressing a specific user need related to food, acculturative stress, and social interaction. The chapter concludes with a strategic analysis that justifies the selection of 'Design Brief 1: Small Talk Without Pressure' as the primary focus for the subsequent design exploration phase, completing the convergent stage of the first design diamond.

Through the synthesis of introspection, online ethnography, and semi-structured interviews, five distinct design opportunities emerged that address specific food-related cultural adaptation challenges faced by Chinese international students. Each design brief is grounded in authentic user experiences and quotes that reveal unmet needs within everyday contexts.

3.1 Design Brief 1: Small Talk Without Pressure

Quotes

1. Avoidance and Surveillance Anxiety

"I literally check through the peephole of my door before I go to the kitchen. If I hear someone in there, I'll wait until they leave. It's easier than having to figure out what to say." – F.

"When I'm cooking, I can feel them eating at the table right behind me. I constantly feel like I'm being watched. I feel like I should say something, but my mind just goes blank." – Z.

"I'm not an unsocial person, but in the kitchen, I feel like I'm interrupting their peace if I start a random chat. So I just put on my headphones." – C.
"I would worry that someone might suddenly walk in, and I'd have to start small talk." – F.

2. Failed Attempts and Confusion

"I once asked my roommate a question about his day, looking right at him. He didn't respond at all, as if I wasn't even there. I just stood there feeling completely invisible and stupid, and I still have no idea what actually happened." – Z.

"It's not just the language. It's the fear of the conversation fizzling out and the awkward silence that follows. It's draining." – T.

3. The Internal Conflict Between Task and Socializing

"I just want to focus on my cooking. The moment I start talking to someone, I forget the steps. I've messed up my dinner several times because of a conversation. But at the same time, I know it's super awkward if two or three people are in the same space and no one says a word." – Z.

"I'm a bit slow to warm up, and honestly I just don't know what to say." – C.

Insight

These quotes reveal a deeper anxiety beyond simple shyness or language barriers. The core issue is the unpredictability and high perceived stakes of unstructured social encounters. Students are not avoiding interaction itself, but rather the potential for awkwardness, misinterpretation, and the emotional labor required to sustain a conversation with no clear purpose or endpoint. The shared kitchen, a task-oriented space, amplifies this tension, making any social advance feel like a performance with a high risk of failure. This creates a cycle of avoidance that deepens feelings of isolation.

Target User

International students who, despite recognizing the social expectation to engage in small talk, feel unable, unwilling, or unequipped to do so within the task-oriented environment of a shared kitchen. These users experience a conflict between concentrating on the high-intensity work of cooking and managing the cognitive load of an emotionally ambiguous conversation, often leading to social withdrawal and avoidance of the space.

Design Goal

To create a solution that facilitates light, low-pressure social interaction through food-related micro-actions. The design should support users in initiating or responding to small talk without needing to over-perform emotionally or linguistically. It should transform shared kitchen spaces from socially intimidating zones into comfortable and ambient interaction environments that lower the threshold for small talk.



Figure 3.1 Visual Metaphor: Alessi Juicy Salif

3.2 Design Brief 2: The Emotional/Cultural Supermarket

Quotes

"Sometimes the only outdoor activity I do in a day is go to the supermarket. The cashier is the only real person I talk to." — RedNote User

"I wander around buying random things... it's really just an legit excuse to avoid doing anything else." — S.

"I learned some Dutch words in the supermarket, and I felt proud showing them to my friends." — RedNote User

"I saw milk with a pink and blue package showing a mother and baby cow. It turns out the milk came from cows whose babies got to drink their mother's milk too. I found that very touching." — My Introspection

Insight

The supermarket here transcends its transactional function; it becomes a sanctuary. The quotes highlight its role as a low-stakes, legitimate "excuse" to escape isolation and reconnect with the physical world. It's a space where students can feel a sense of agency and discovery (learning Dutch words, finding touching product stories) without the pressure of direct social performance. The core need is not for better shopping efficiency, but for a space that quietly supports emotional regulation, cultural curiosity, and a gentle sense of belonging in a foreign environment.

Target User

International students who experience feelings of loneliness, disconnection, or low energy during their everyday life in the Netherlands. These users often turn to supermarkets not just for groceries, but as a low-pressure way to leave the house, experience presence, and find small moments of cultural or emotional grounding.

Design Goal

To create a solution that transforms supermarket visits into emotionally supportive and culturally enriching micro-experiences for international students. The design should support moments of reflection, exploration, and informal learning—without demanding social energy or structured participation.



Figure 3.2 Visual Metaphor: Kalver Liefde

3.3 Design Brief 3: Taste Without Knowing

Quotes

"When I go shopping alone, I tend to stick to what I know—I'm not very adventurous. But when I go with friends, they recommend new things, and that's when I actually try something different. That becomes a kind of cultural exploration for me." — X.

"There are too many kinds of canned fish—I just stand there, search online, and still can't decide." — P

"I don't know if this bread is sweet or not... I can't tell if it suits my taste." — J

"Before I buy an apple at the supermarket, I check RedNote to see which kind is good." — X

"Lately I've been paying more attention to that ABCD nutrition label... When I want to improve my relationship with food, I pay special attention to the calories and nutritional values." — P.

Insight

This challenge is rooted in the loss of "cultural fluency" in a new food system. In their home culture, choosing food is an intuitive act based on years of accumulated knowledge. Abroad, this intuition fails, leading to decision fatigue and risk aversion. The quotes show that peer knowledge acts as a crucial "scaffold," bridging this gap and turning a moment of anxiety into one of exploration. The underlying need is not just for information (like nutrition labels), but for trustworthy, culturally attuned guidance that restores a sense of confidence and transforms the mundane task of shopping into a pathway for cultural learning.

Target User

International students who experience uncertainty, confusion, or hesitation while shopping for groceries in a foreign food system. These users often feel overwhelmed by the lack of familiar references, the difficulty of predicting taste and quality, or the absence of trusted cultural knowledge when choosing local food products.

Design Goal

To create a solution that supports international students in making food choices with greater clarity, curiosity, and cultural adaptability. The design should reduce decision fatigue maybe by providing culturally relevant taste references, lightweight peer-based suggestions, or guided discovery tools. The goal is to help users feel more confident and playful in their food selection process—transforming everyday grocery shopping into a moment of learning, adaptation, and self-directed exploration in a new cultural environment.



Figure 3.3 Visual Metaphor: Spicy Level Map

3.4 Design Brief 4: Cooking Starts Before Cooking

Quotes

"I get exhausted just thinking about what to make... but I actually enjoy chopping and cooking once I start." — My Introspection

"I don't cook to eat—I cook to take my mind off things." — S

"Cooking helps me pause. I tend to binge eat when I'm stressed, but if I cook, I slow down." — P

"I like cooking because it's one of the few things I feel I can still control." — P

"If there were something that could just tell me what I could make with these local ingredients, that would be helpful." — C

"When I don't know what to eat, I just buy a mystery box in AH. It decides for me." — S

Insight

The core tension here is between the cognitive load of "planning" and the therapeutic release of "doing." For these students, cooking is a form of mindfulness, a rare moment of control in a life filled with uncertainty. However, the mental effort required to decide what to cook acts as a significant barrier to entry, preventing them from accessing this therapeutic state. The need is for a system that can gently handle the executive function of decision-making, acting as a "cognitive ramp" that allows users to more easily transition into the flow state of cooking itself.

Target User

International students who experience emotional fatigue or stress when deciding what to eat, yet find cooking itself to be a grounding, soothing activity. These users often feel mentally blocked when choosing meals, even though cooking later provides a sense of control, mindfulness, or emotional relief.

Design Goal

To create a solution that eases decision-making fatigue while preserving the emotional and psychological benefits of cooking. The design should guide users gently through the first step—choosing what to cook—without compromising the meditative, grounding quality of the process itself. It should support users in shifting from overthinking to action, helping them regain a sense of rhythm, control, and comfort through everyday cooking.



Figure 3.4 Visual Metaphor: Food Mystery Box

3.5 Design Brief 5: A Reason to Step Outside

Quotes

"Going to the supermarket is just a reason to leave the house... sometimes I take a much longer route just to get there." — P

"When I feel bad, I go get ice cream—it gives me a reason to step outside. Sometimes a friend joins, and we talk a bit." — X

"If I don't know what to do, I just walk around Jumbo. I might not even buy anything. It's just a way to shift my state." — S

"Back in China, I didn't need to plan to find stimulation—stepping outside meant something would always happen. But here, unless I plan, nothing does. The world doesn't come to you." — RedNote User

Insight

This behavior reveals a proactive coping mechanism against the "structured emptiness" of life abroad, where spontaneity is scarce. Unlike their home culture where social life might unfold organically, here, every interaction must be planned. Creating small, self-directed "missions" (like getting ice cream or taking a long walk to the store) is a way to generate novelty and a sense of purpose without the high energy cost of formal social planning. The underlying need is for lightweight, ambient prompts that can seed these small adventures, helping students break the inertia of isolation and rediscover a sense of serendipity in their new environment.

Target User

International students living alone in the Netherlands who often feel lonely or emotionally stuck. In a lifestyle system where nothing happens unless planned, even basic activities like going out require effort and intention—unlike in their home culture, where daily life unfolds more spontaneously.

To cope, they create small excuses—like walking to the supermarket, buying a gelato, or taking a longer route—to gently reset their mood and feel reconnected to the world, without needing a specific goal.

Design Goal

To create a solution that transforms these small, self-initiated “excuses” into more meaningful and emotionally resonant micro-experiences. The design should provide a gentle nudge for users to step outside, explore their surroundings, and find moments of quiet connection, without imposing the pressure of a formal social activity or goal-oriented task.

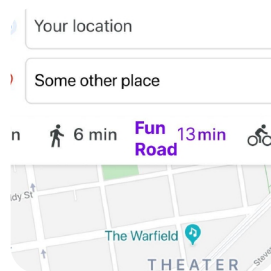


Figure 3.5 Visual Metaphor: Fun Road

3.6 Conclusion and Final Design Direction

After identifying these five distinct but interconnected design opportunities, the final step was to select a single, focused direction for this thesis. While all five briefs address valid and important user needs, the decision was made to proceed with Design Brief 1: Small Talk Without Pressure for a combination of strategic reasons.

First, it most directly addresses the core research problem of acculturative stress manifesting as social anxiety. The fear of small talk in the shared kitchen is not merely an inconvenience but a significant, recurring source of stress that directly impacts students' sense of belonging and well-being.

Second, the context is both specific and highly impactful. The shared kitchen is a unique crucible where cultural, social, and personal boundaries constantly intersect. It is a high-frequency, high-stakes environment. A effective intervention in this specific micro-context has the potential to create a significant positive ripple effect on a student's daily life.

Third, the problem presents a clear and feasible design challenge. Unlike broader challenges such as "loneliness" or "loss of spontaneity," the problem of facilitating low-pressure small talk is a well-defined interaction design problem. It allows for the exploration of ambient, subtle, and non-intrusive interventions, which aligns perfectly with the project's goal of avoiding "feature-heavy" solutions.

Finally, focusing on this brief offers the greatest potential for a transferable solution. While designed for the kitchen, the principles behind a effective "small talk facilitator" could potentially be adapted to other shared spaces, offering a more scalable contribution to alleviating social stress among international students. For these reasons, this direction was chosen as the most promising path for impactful and focused design exploration.

4. Co-Constructing Stories Workshop

Marking the beginning of the second design diamond, this chapter details the divergent exploration of the solution space through a co-creation workshop. It outlines the 'Co-Constructing Stories' methodology used to engage participants in evaluating four distinct design concepts aimed at facilitating low-pressure small talk. The chapter analyzes the rich qualitative feedback from the workshop, which ultimately led to the selection of a TV-based application as the most promising concept to develop into a functional prototype.

4.1 Background and Transition to Co-Creation

The previous user research phase (Chapter 2-3) effectively identified five key design opportunities, culminating in the selection of "Small Talk Without Pressure" as the final design direction. This addressed the "what"—the core problem to be solved. However, the "how"—the specific form and interaction model of a effective intervention—remained an open question. To bridge this gap and move from an abstract brief to a tangible concept, a co-creation workshop was designed. The primary goal was to test the underlying assumptions of the design direction and to map the broader social landscape of the shared kitchen, including common activities, interaction patterns, and latent emotional needs.

4.1.1 Research Question

How can we design solutions for Chinese international students in the Netherlands to ease the tension and awkwardness they experience when sharing kitchens with foreign roommates, and help them engage in small talk more comfortably—thus enhancing their confidence and relaxation in cross-cultural communication? The goal is to ensure that, upon entering the kitchen space, users can naturally access conversational cues or prompts, reducing the burden of mental preparation and lowering the threshold for casual interaction.

4.1.2 Research Objectives

Gain an in-depth understanding of the shared kitchen context:

- Understand the real experiences and emotional needs of Chinese international students in shared kitchens.
- Map out the interactions, conversations, and activities occurring in the kitchen.
- Identify both pleasant and uncomfortable experiences.

Test four design concepts:

- Identify which contents can naturally trigger conversations in the kitchen.
- Explore contextual appropriateness.
- Understand participants' preferences and concerns.

Collect concrete design suggestions and directions for improvement.

4.2 Methodology: Co-Constructing Stories

To effectively test design assumptions and dive deeper into the kitchen context, this study adopts the participatory design method of Co-Constructing Stories proposed by Ozcelik & Terken (2012). This method consists of two stages:

1. Sensitization

Through a guiding story provided by the designer, participants recall and relive past experiences, thereby concretizing the usage context. In this stage, the researcher further probes participants' related experiences through questions.

2. Envisioning

The researcher narrates a visionary story set in the future to guide participants into the scenario, then gathers their feelings and feedback through non-directive questions. In this process, participants supplement the story with details from their real experiences, making their evaluation of the future concept more grounded and insightful.

This method was chosen because it excels at moving beyond surface-level preferences. By grounding future concepts in participants' past lived experiences, it allows for a more robust evaluation of a design's contextual fit and potential social impact, which was critical for assessing how different ideas might genuinely influence small talk.

4.3.2 Preparation

- Recording device: to capture the full discussion.
- Visual materials: photos and floorplans of shared kitchens (e.g., The Social Hub, Professor Schermerhornstraat), plus design concept templates.
- Concept presentation materials: four design story scripts and supporting storyboards.
- Stationery: A4 paper, pens, for sketching and idea expression.
- Venue: a real shared kitchen (with stove, sink, dining table) to support recall and immersion.

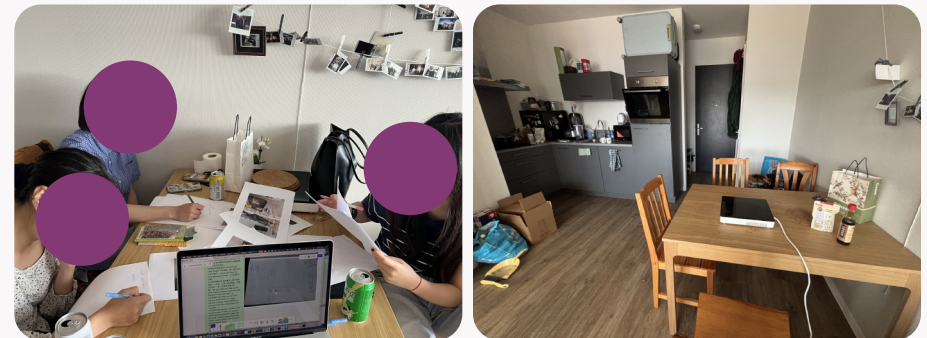


Figure 4.1 Workshop

4.3 Workshop Setup

4.3.1 Participant Recruitment

1. Target number: 4 people (1 researcher + 3 participants, forming a focus group).
2. Recruitment criteria:
 - Chinese international students living in the Netherlands for ≥ 1 year.
 - With ≥ 6 months of multicultural shared kitchen experience.
 - Roommates include different cultural and linguistic backgrounds.
3. Recruitment channels: Chinese student WeChat groups, international student associations, personal networks.
4. Duration: approx. 120 minutes.



Figure 4.2 Workshop Stimuli

4.4 Workshop Procedure

The workshop consists of Introduction, Sensitization, Envisioning, and Synthesis, lasting approx. 120 minutes.

0. Introduction (10 minutes)

Welcome and background (5 min)

The researcher explains the study's purpose: exploring how design solutions can help Chinese international students engage more easily in small talk with foreign roommates in shared kitchens. Participants are informed that discussions will be audio-recorded, used only for research purposes, and kept anonymous and confidential.

The researcher introduces the method: using Co-Constructing Stories to combine past real-life experiences with future design scenarios, jointly exploring kitchen communication contexts.

Icebreaker (5 min)

Participants briefly introduce themselves, stating how long they have lived in the Netherlands and their shared kitchen experience. This builds trust and a relaxed atmosphere.

1. Sensitization Stage (40 minutes)

1.1 Story Prompt (5 min)

The researcher tells a fictional but realistic story:

Li, a Chinese student who arrived in the Netherlands three months ago, lives in an international student dormitory. One evening, carrying noodles and chicken, he walks toward the shared kitchen. At the door, he hears voices and clattering dishes. Taking a deep breath, he enters: a blonde girl is washing vegetables, while two dark-skinned male students are chatting at the dining table. The air is filled with unfamiliar spice aromas. Standing at the doorway with ingredients in hand, Li feels unsure of what to do...

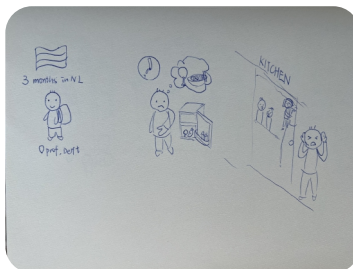


Figure 4.3 Visual Stimuli

1.2 Group Recall (20 min)

The researcher prompts participants to share:

1. “What does this story remind you of?”
2. “Have you had a similar experience? How did you feel at that time?”
3. “What would you have hoped to happen in that moment?”
4. “If you could relive it, what would you do differently?”

Participants may respond to each other to trigger more memories and resonance.

1.3 Scene Reconstruction (15 min)

The researcher provides a kitchen floorplan and asks participants to sketch a memorable experience (e.g., their first time entering the kitchen, encountering roommates, etc.), marking people's positions, actions, and environmental details.

Process:

- Silent drawing (5 min).
 - Turn-based sharing (approx. 3 min each, total 9 min).
 - Short group discussion (1 min).

2. Envisioning Stage (60 minutes, 4 × 15 min)

This stage includes four design stories, each with concept presentation → initial reaction → individual imagination → collection of thoughts.

2.1 Story 1: Flag Cutlery

- *Li enters the kitchen under slight pressure, greeting “hi,” and three roommates respond.*
- *A blonde girl picks up a set of cutlery: “Have you seen these?” Roommates explain it is “flag cutlery” distributed by DUWO.*
- *Li randomly selects a fork, plate, or knife. A roommate jokes: “Your fork has the Chinese flag—maybe it means you should cook a Chinese chicken dish?”*
- *Li replies: “There are countless Chinese chicken recipes—I often make Da Pan Ji! Are you from India? My plate has the Indian flag.”*
- *The Indian student says: “Yes, we use masala as our traditional spice.” Li responds: “I should try Da Pan Ji with masala, but unfortunately I don't have it.”*
- *The Indian student suggests a spice exchange: “How about you lend me your Laoganma, and I give you masala? That way we both finish the food challenge.”*
- *The blonde girl adds: “Sounds fun—could we have a vegetarian version next time? I'd love to join.” The roommates happily plan a Friday dinner.*

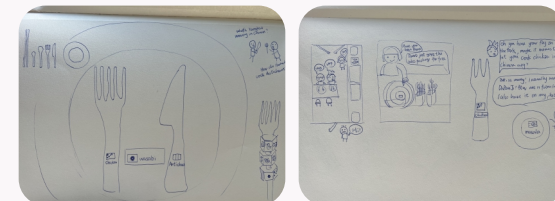


Figure 4.4 Visual Stimuli

2.2 Story 2: Fortune-telling Chopsticks

- Li enters the kitchen, greets roommates, and takes out “fortune-telling chopsticks” he brought from China.
- A girl asks curiously: “Why so many wooden chopsticks? The vase looks interesting.”
- Li smiles: “These are fortune-telling chopsticks—they can tell you what to eat.” Roommates are surprised and eager to try.
- The girl shakes them, and one falls: “It says I need wood energy, so eat more celery?”
- The Indian student also tries: “Too much fire energy—eat cucumber to cool down.”
- Li explains the Chinese Five Elements theory. Everyone finds it fun and says they’d like to try again in the future.

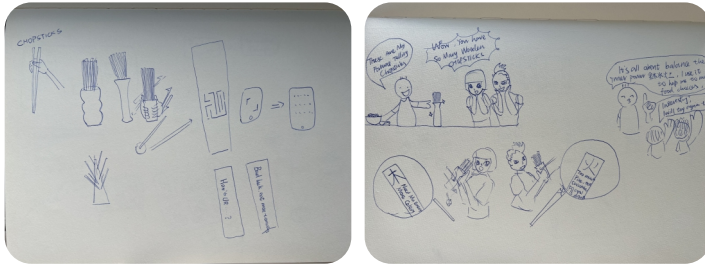


Figure 4.5 Visual Stimuli

2.3 Story 3: Dishwashing Pen

- Li enters the kitchen and notices some grease stains on his usual stove, shaped like an insect.
- A white girl laughs: “You spotted it! I was playing guessing games—I drew it with a DUWO dishwashing pen.”
- Li realizes: “Is that a fly? So funny!”
- The girl explains that “drawing reminders” are an elegant way to prompt cleaning. Li apologizes and cleans immediately.
- Later, Li also tries leaving playful doodles near the sink, creating a “silent and humorous” way of communication.



Figure 4.6 Visual Stimuli

2.4 Story 4: TV App

- Li enters the kitchen and notices an unused TV screen that stays on, showing four minimal icons (chili, lemon, chicken, egg).
- He presses the remote randomly, and the icons expand into colorful images with detailed information.
- An Indian roommate explains: “This is DUWO’s new app—I just uploaded a masala chicken recipe.”
- Li says: “Looks delicious—I’ll take a photo next time I cook and share it.”
- They discover the TV also displays supermarket discounts and roommates’ recipe photos/videos, easier to use than phones in the kitchen.
- Everyone starts sharing recipes through the TV, creating a new space for sharing and conversation.

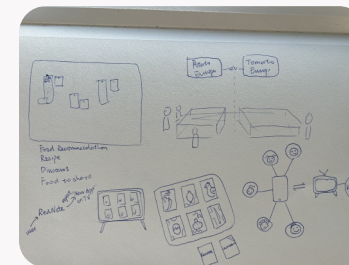
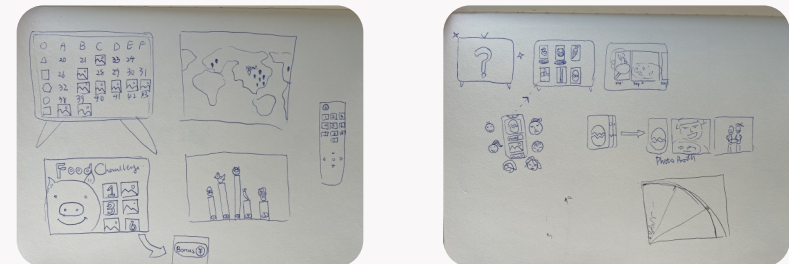


Figure 4.7 Visual Stimuli

3. Synthesis (10 minutes)

Concept ranking & selection (5 min)

Participants rank the four design stories by preference and explain their reasons.

Deep reflection (5 min)

Questions:

- “Which concept best supports small talk?”
- “Which aspects could be improved?”
- “If implemented, what would be your biggest concern?”

4.5 Coding Analysis Summary



Figure 4.8 Transcripts Analysis in Chinese

Phase 1: Sensitization

1. Hygiene

Participants widely noted that kitchen hygiene is both the biggest barrier to roommate relationships and communication, and also the most frequently discussed topic.

The tensions around hygiene mainly manifested as:

- Rule-free kitchens: Someone inevitably ends up shouldering the cleaning burden quietly, often without others realizing it. For example, one participant said, “A male flatmate went traveling, and our kitchen went many, many days without anyone taking out the trash.” Only then did everyone realize that he had been taking care of the kitchen’s cleanliness. This reveals an imbalance of labor and invisible contributions in shared kitchens.

- Rule-based kitchens: Even with hygiene rules in place, negligence and differing definitions of “clean” often turn the WhatsApp group chat into a venue for complaints, with messages full of sarcasm. The group chat gradually becomes an off-putting touchpoint and harms roommate relationships. One participant shared that hygiene conflicts even distanced previously harmonious relationships, and the WhatsApp group gradually “turned into a platform for mutual blame.”

Key Learnings:



- For kitchens without rules, use objective logging and visualizations to show who contributed to cleaning. This both nudges passive roommates to share responsibility and recognizes proactive contributors, reducing imbalance.
- If the design involves kitchen hygiene, avoid turning it into a “venting outlet” like a group chat; provide more constructive channels for expression to support fair task distribution and reduce emotional conflict.

2. Willingness to Communicate

When they don’t want to interact, participants commonly signal “do not disturb” by wearing headphones or pretending to be busy.

It’s noteworthy that most people enter a shared kitchen primarily to cook, not to socialize. This is both a practical constraint and a design clue: if cooking can naturally produce more conversational opportunities, the pressure of small talk can be reduced.

In certain situations (e.g., boring winter nights, a roommate sharing mulled wine), the kitchen does become a social space. This shows that with the right triggers, the kitchen can indeed spark interaction.

Key Learnings:



- Align with the “coming for food” motivation and embed the design in cooking activities to naturally catalyze small talk.
- Create more reasons to step into the kitchen (e.g., inspiration prompts, share previews) to increase encounters and chances to talk.

3. Activities and Interactions in the Kitchen

A least-liked scenario was entering the kitchen to find a group of strangers speaking a language the participant didn't understand, without prior notice from roommates about bringing friends. Language barriers and information opacity made them unhappy. This reflects a blurred sense of kitchen usage rights. One participant said, "I worry that sending a message will make others uncomfortable—as if I'm restricting their right to use the kitchen. But if I write too politely, it feels like I'm asking for their permission. After struggling with this, I just don't send anything and deal with it when it happens."

Another participant mentioned that sharing food strengthened bonds with a roommate—though such positive cases were relatively rare. More often, food/recipe sharing came with awkwardness. For instance, one participant misread someone's polite recipe inquiry as genuine interest; after enthusiastically responding, they were met with indifference, which increased social pressure and the psychological burden of entering the kitchen. In other cases, over-enthusiasm—like knocking on doors late at night to share food—was perceived as a privacy intrusion. As a meeting point between private and public life, the boundaries of a shared kitchen are inherently fuzzy and hard to navigate.

Key Learnings:



- Borrow from meeting-room reservation systems to reduce friction via transparency: a status panel or digital interface could make occupancy clear so exclusionary events (e.g., a dinner) can be arranged more smoothly and last-minute conflicts can be avoided.
- Decouple recipe/food sharing into offering vs accepting. The act of offering should not imply the recipient's immediate willingness to accept. Separating these actions reduces pressure on both sides and lets genuine needs/opportunities emerge naturally. This insight proved particularly crucial for the subsequent ideation phase.

Phase 2: Envisioning

1. "Dish Soap Pen"

The "dish soap pen" sparked substantial discussion. Some participants appreciated communicating via a drawing surface; they recalled dorm kitchens where whiteboards initially worked for writing names or introductions, and felt this could indeed foster interaction. They also found it interesting to turn grease into an opportunity for creation. However, more feedback pointed out that **the trigger here is essentially negative**, easily provoking emotional use. Since not everyone can draw, actual use may devolve into emotionally charged written accusations. This would contradict the design's intention and could escalate conflicts. Some even felt **that neutral drawings might still be interpreted as passive-aggressive**. This led to the conclusion that while hygiene is a core pain point, designing directly for it is fraught with the risk of **creating more conflict** than it resolves.

The concept did, however, validate the value of "same space, asynchronous interaction." Because roommates use the kitchen at different times, if traces or content can be left asynchronously, people gain more conversational material when they do meet. This "voluntary disclosure" mechanism gives those who lack small-talk skills a natural entry point and lowers the threshold for interaction.

2. Flag-Themed Tableware

Participants generally found the mechanism fun; they tended to choose tableware linked to their own cultural backgrounds, which boosted confidence in conversation. However, this self-oriented choice diverges from the original intent of using random cultural elements to spark cross-cultural dialogue.

When an unfamiliar culture appeared, the design lacked effective follow-ups, making it hard to sustain discussion. The key takeaway was that a effective trigger must be connected to a deeper well of content. The idea was seen as a **good "icebreaker" but incomplete**. Feedback suggested the design currently stops at "triggering" conversation and lacks substantive extensions—for instance, linking symbols to specific ingredients or recipes could deepen and prolong dialogue. Furthermore, since **forks/knives are used after cooking**, the intervention felt disconnected from the primary kitchen workflow.

3. Fortune-Telling Chopsticks

These were also seen as playful but suffered the same issue as the flag tableware: they spark talk only at the outset and lack follow-ups. The interaction currently supports **single-user play**, which is **not ideal for group dynamics**. The crucial insight here was that to foster small talk in a shared kitchen, the mechanism should ideally support **multi-user participation** and shared experiences to naturally drive conversation.

4. TV App

This concept received the most positive and constructive feedback, as it appeared to synthesize several key insights from the workshop. Participants strongly agreed that the shared kitchen TV is a chronically underused offline touchpoint. Activating it could provide rich, relevant content for communication in a non-intrusive way.

The idea of recipe sharing was interesting. Participants recalled their own experiences of sharing food and recipes, noting it was a natural and positive topic of conversation. This concept directly addressed the need to embed social triggers within the primary activity of cooking, a key insight from the sensitization phase. Unlike the other concepts, it provided not just a trigger, but **a platform for sustained, relevant content**.

Furthermore, the TV app offered a promising solution to the **"asynchronous interaction" problem**. It restructures the act of sharing: previously, it required mutual presence and readiness; now, it splits into "active upload" and "passive browsing". This decoupling, identified as a critical design implication earlier, reduces social pressure on both sides. Sharers needn't worry whether others are truly interested, and browsers can access information without any obligation to respond, creating a low-stakes information environment.

Operationally, participants noted that compared to a phone (where hands are often wet or oily in the kitchen), a TV controlled by a simple remote is far more practical for viewing recipes during cooking. The **large screen format was also seen as ideal** for group viewing and discussion. This led to a brief but insightful discussion about moving beyond screens. One participant mused about the potential for more ambient, "hands-free" cues. The idea was not about voice commands, but whether **the kitchen's "soundscape" itself could become a medium—using subtle, pleasant sounds to communicate** activity or share information in a non-intrusive way. This small but important insight was noted for future consideration.

The discussion then expanded to other potential features, with participants suggesting it could become a central kitchen hub: displaying a shared cleaning schedule, posting announcements about guests, or even acting as a communal music player. This richness of possibilities was both a strength and a challenge. While it highlighted the TV as a powerful and underutilized touchpoint, it also underscored the need for careful feature selection to avoid creating an unfocused or cluttered experience.

4.6 Workshop Conclusion and Next Steps

The co-creation workshop was instrumental in transitioning from a broad design direction to a concrete, testable concept. By evaluating four distinct ideas against participants' lived experiences, a clearer path forward emerged.

- The "Dish Soap Pen," while addressing the real pain point of hygiene, was deemed too risky, as its negative trigger could easily escalate conflict.
- The "Flag Cutlery" and "Fortune-Telling Chopsticks" were seen as fun but superficial. They provided a momentary icebreaker but lacked the depth of content needed to sustain a meaningful conversation and were disconnected from the core cooking workflow.
- **The TV App concept**, centered on recipe sharing, was selected as the **most promising direction** for prototyping. It was chosen because it uniquely appeared to integrate multiple key design principles identified during the workshop: it leverages an underused shared asset, enables low-pressure asynchronous communication, and offers practical utility. Furthermore, its potential to integrate various other kitchen-related functions (such as cleaning schedules or message boards) made it appear to be an attractive **'all-in-one' solution**. While promising on paper, its real-world effectiveness **remained a hypothesis to be tested**.

Therefore, the next phase of the design process will focus on developing and testing a functional prototype of the TV-based recipe-sharing application, as detailed in next chapter, to validate this promising direction.

5. The Failed Prototype

This chapter documents a critical turning point in the design process: the development and failure of the first functional prototype. It describes the 'all-in-one' kitchen hub, a TV application based on a 'content-driven' philosophy. The chapter then details the usability test that revealed this approach to be fundamentally flawed, as it created additional cognitive burdens rather than alleviating social pressure. The analysis of this failure yields the key learnings that necessitate a radical shift in the core design strategy.

5.1 Design Description

Building on the promising direction from the co-creation workshop, the first prototype was an ambitious TV and mobile application duo designed to serve as an "all-in-one" kitchen hub. The design philosophy was rooted in the workshop's key takeaway: provide rich, relevant content to spark conversation.

5.1.1 Concept and Features

The system attempted to integrate all the major insights from the user research and workshop into a single, feature-rich platform. The core idea was that by providing a multitude of shared topics on a public screen—from recipes and supermarket deals to cleaning schedules and food-sharing notices—users would have a constant supply of "excuses" to initiate small talk. The mobile app served as the primary input method for users to upload content, while the TV app acted as the shared display and consumption hub.



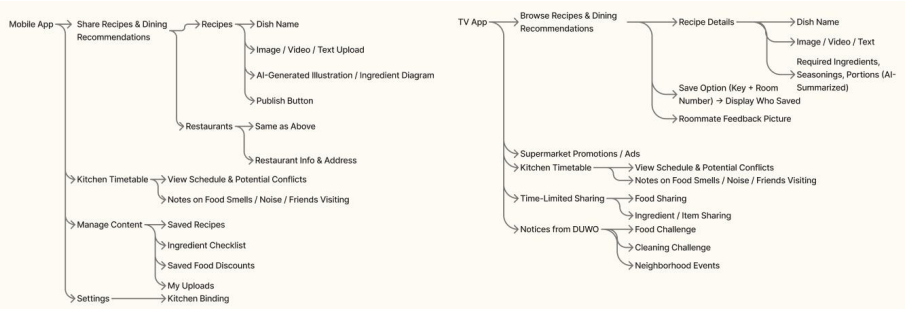
Figure 5.1 App Function Overview

The main feature of the design solution is recipe sharing. Secondary functions, incorporating insights from interviews and the co-creation workshop, include a kitchen timetable, food sharing notifications, cleaning reminders, and access to the housing agency's activities.

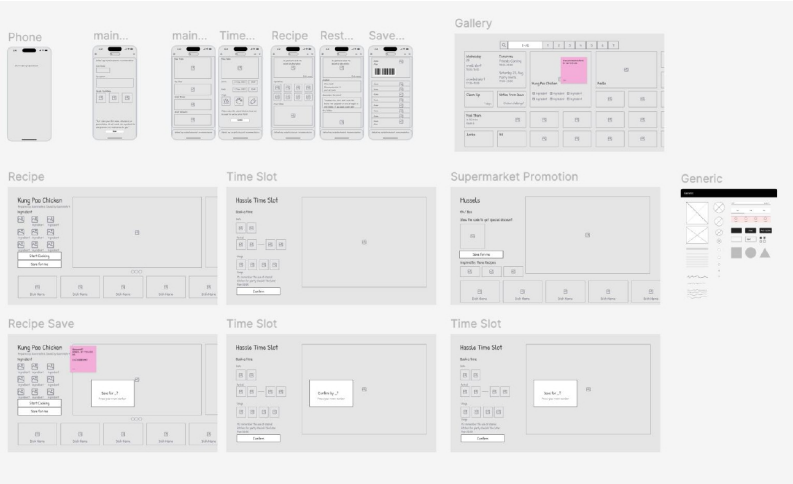
Users can upload recipes they want to cook on the mobile app. When they are cooking in the kitchen, they can use the TV to display the recipe on a large screen. Roommates can also watch on the TV to get cooking inspiration. For the target users who are not inclined to make small talk, they don't need to worry about what to talk about when they enter the

shared kitchen. They can use the content available on the TV to start a conversation, including the most important feature of recipes, as well as the kitchen timetable, food sharing notifications, cleaning reminders, and access to housing agency's activities.

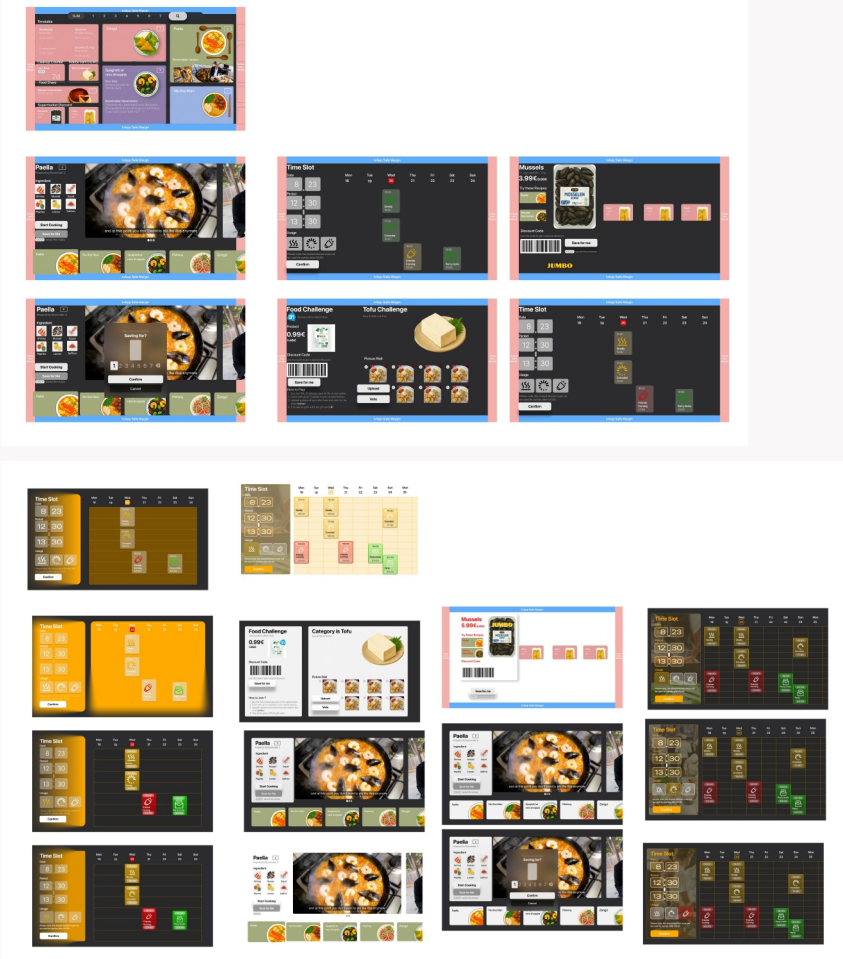
5.1.2 Information Architecture



5.1.3 Low-fi



5.1.4 Iteration Process



5.1.5 Final Design



Figure 5.2 Main Page Hifi



Figure 5.3 Other Pages Hifi

The idealized scenario was as follows: a student, feeling hesitant to enter a shared kitchen, could use the TV app's content as a social lubricant. Instead of needing to invent a topic, they could simply comment on a roommate's shared recipe, a new supermarket promotion, or a notice on the kitchen timetable. The screen was designed to be a "third object" in the space, deflecting the direct pressure of face-to-face interaction and providing a shared focal point for conversation. The design was, in essence, an attempt to solve the small talk problem by overwhelming it with content.

5.2 Usability Test

5.2.1 Experiment Design

For this usability test, I looked for participants from the previous co-creation workshop. Three participants who were not familiar with each other were selected. Even though they had met once at the co-creation workshop, the three participants were still not confident in their small talk abilities. This helped simulate an awkward situation similar to what a target user might experience. The test was conducted in a mock kitchen environment with a TV.

1. The test began by having the participants familiarize themselves with the main software features on the TV, with the moderator assisting to ensure they understood the functions.
2. In a role-playing scenario, two participants would enter the shared kitchen to chop vegetables, while another participant was already in the kitchen. Each of them had to communicate while watching the content on the TV.
3. The moderator conducted a feedback session with the three participants to discuss their experience and answer the following questions:
 - How do you initiate conversation through the TV app?
 - Do you think using the TV app for communication feels easy and natural?
 - What are your overall feelings? Do you have any questions or doubts?

5.2.2 Insights

The design test failed to meet expectations, primarily because an idealized design led to a flawed strategic direction. In light of this, this thesis will omit a detailed evaluation of the design specifics. It will instead concentrate on two core elements: first, the key insights that led to the pivot in design direction, and second, the critical lessons learned from this failure that will guide the next steps of the project.

Group 1: On Visuals & Feature Focus



A: "These food pictures... they look a bit weird, not very realistic. Is this AI-generated? It feels a little cheap."

B: "Wow, this AI image effect is kind of cool! But... after a while, it seems like every picture has the same style. It gets a bit boring."

A: "Exactly. And these strange, AI-generated pictures don't give me the desire to say, 'This looks delicious, I want to talk to my roommate about it.'"



Insight: Conflict Between Visual Consistency and Authenticity.
My initial reason for using AI-generated images was to quickly unify the visual style, given that user-uploaded content would vary in quality. However, testing revealed that this artificial consistency caused polarized reactions and, more importantly, weakened the core authenticity and trust of the shared content. For a post to inspire appetite and conversation, it must first feel real.



"What is this app for? The main feature is sharing recipes, but then it also has a timetable and cleaning reminders. It makes the product feel cluttered and unfocused."



Insight: Feature Bloat Dilutes the Core Value.
I had hypothesized that adding peripheral features to "improve roommate relations" (like a cleaning schedule) would indirectly facilitate small talk. But this approach got the cause and effect backward. These secondary features were disconnected from the core experience of "recipe sharing," confusing users and diluting the product's original value proposition rather than strengthening it.

Group 2: On Usability & The Core Problem



"The software is simple to use. Navigating with the remote to select content and check notifications is smooth and doesn't require any learning. The highlight border on selected items makes the navigation logic very clear, which is great."



Insight: Basic Usability is Validated.
This confirms that the product's interaction design and information architecture are clear and understandable. Users can complete tasks without friction.



"Using 'recipes' to start a conversation feels a bit forced. My roommates and I usually talk about more practical things, like 'Whose turn is it to clean today?' or 'Should we go to the supermarket together this weekend?' After you talk about recipes a few times, you'd probably run out of things to say."



Insight: User Interaction Revolves Around Shared Practical Problems, Not Created Topics.
I discovered that the target users share a preference for discussing practical matters. The design's attempt to "force" conversations with external content like recipes ignored the users' real-life context and more frequent needs. A design's effectiveness comes from its ability to integrate into and solve existing user problems, not from inventing a new need.



"If the app's goal is just to provide content for conversation, couldn't it offer other, more interesting or eye-catching things? Then again, if it did that, wouldn't the app's role change from a 'tool' to a 'content editor'? It would feel like a notice board on a wall—even if there's interesting stuff on it, that content has nothing to do with us personally. It's just 'a topic available for discussion.'"



Insight: A Confusion of the System's Role—From a Facilitator of User Connection to a Publisher of Content.
This feedback reveals a fundamental conflict: if the platform focuses too heavily on providing "interesting content" to spark conversation, its core value shifts from facilitating interpersonal connection to promoting content consumption. This would turn the product into an impersonal public notice board, where the content has low personal relevance to the users, thereby defeating the original purpose of fostering authentic, personal interaction.

5.3 Reflection

- 1. Feature Bloat Creates Cognitive Burden:** Instead of facilitating natural conversation, the feature-rich interface created a new set of problems. Participants felt a subtle pressure to "use" the app, turning what should have been an ambient support tool into another task to be managed. The sheer volume of information was overwhelming rather than helpful.
- 2. Active Engagement Competes with the Primary Task:** The usability test powerfully demonstrated that in the high-stress, task-oriented context of a kitchen, any design that demands a user's active attention—even to consume interesting content—competes with the primary task of cooking. Navigating the interface with a remote felt cumbersome and distracting.
- 3. The "Content-Driven" Approach is Flawed:** The core hypothesis—that providing more topics for conversation would solve the problem—proved to be misguided. The test revealed that forcing external "content" into the kitchen environment felt artificial and did not align with users' actual needs for practical, in-the-moment connection.

6. Final Design Ideation

Building upon the critical learnings from the failed prototype, this chapter articulates the project's core paradigm shift from a 'content-driven' to an 'atmosphere-driven' design philosophy. It presents a deeper contextual analysis of the shared kitchen, leading to an iterative exploration of three distinct interaction models. This process culminates in the conception of the final design, 'Fruit & Veggie Fireworks,' an ambient sound-interactive installation that reframes the design problem from stimulating conversation to first making shared silence comfortable.

6.1 Shared Kitchen Context Analysis

6.1.1 The Physical Context

What Makes the Shared Kitchen Different?

Unlike many other daily social situations, the shared kitchen poses natural barriers to spontaneous small talk, due to both its physical layout and the nature of the task itself.

The lack of a face-to-face orientation and eye contact is the primary physical barrier. In a kitchen, people typically stand side-by-side, facing countertops, sinks, or the stove—not each other. This "parallel," rather than "face-to-face," posture makes eye contact, which is crucial for initiating dialogue, extremely scarce and fleeting. Without this key non-verbal cue, starting a conversation can feel abrupt or intrusive.

Cooking itself is a high-intensity task. Activities like chopping, managing heat, and timing require significant cognitive resources. When a person's "mental bandwidth" is consumed by the task at hand, there is little energy left to initiate and sustain a casual chat. In this state, people either feel that small talk is unnecessary or that starting a conversation would simply be a burden.

Therefore, these factors—a side-by-side body orientation, a lack of eye contact, and high task intensity—combine to make the shared kitchen a uniquely challenging space for small talk. The silence in this context often stems not only from a lack of social willingness, but also from the inherent characteristics of the environment itself, which actively discourage casual interaction.

Setting	Duration	Body Orientation / Eye Contact	Task Intensity
Shared kitchen	Medium-long, intermittent	Mostly side-by-side or offset; little eye contact	High (cooking/cleaning/queuing)
Company cafeteria	Short-medium, concentrated	Face-to-face while eating	Low (eat-and-go)
Elevator	Very short	Side-by-side facing the doors	None
Group-work break	Short	Mostly face-to-face	Medium (task discussion)

Figure 6.1 Physical Context Analysis

6.1.2The Social Context Analysis

"Cooking With" is Not "Cooking Together"

To delve deeper into the nature of these Social Dynamics, we compared two scenarios in a shared kitchen that appear similar on the surface but are fundamentally different:

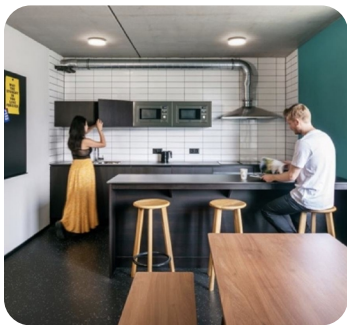


Figure 6.2 TSH Shared Kitchen Picture

By comparing two scenarios—cooking individually in a shared kitchen versus cooking together—we uncover a fundamental difference in social dynamics.

When roommates cook individually, they operate with separate goals. Social interaction is not a natural part of the process. In fact, the only inherent moments for communication are often transactional and tinged with friction, centered on negotiating limited resources like stove space. These interactions can interrupt personal tasks and create tension rather than connection. It's a state of parallel work, not collaboration, which is why small talk feels forced and must be consciously initiated. In contrast, when cooking together, the shared goal makes interaction essential and effortless.

Feature	Cooking Together	Cooking Individually (in a Shared Kitchen)
Goal	Shared Goal	Individual Goal
Planning & Discussion	Discussion-based: Involves talking about what to eat and what dishes to make to suit everyone's tastes.	No Discussion
Ingredients	Interactive: Involves collaborative prep and passing ingredients to each other.	Non-interactive
Division of Labor	Collaborative: Tasks are naturally divided (e.g., one person washes, one chops, one cooks).	No Collaboration
Kitchen Space	A "Cooperative" space	A "Shared / Contested" space, where individuals with different goals must coordinate its use.
Communication Mode	Initiated to advance the shared task (e.g., "Should I start chopping the...").	Initiated when one person's task is blocked by another's (e.g., "Are you done with the...").

Figure 6.3 Social Context Analysis

6.2 Core Insight

This insight led us to the true design challenge: "How can we create a positive and natural sense of connection for these students engaged in 'Parallel Work', without disrupting their individual cooking tasks or imposing any additional burden?"

The core tension is this: the very nature of 'Parallel Work' precludes direct, organic collaboration, yet the desire for connection persists. This raises the question: can we forge a new form of connection without altering the parallel nature of their tasks? We believe the solution lies in creating an "indirect, medium-driven" collaboration. The input for this medium would be the most authentic and abundant element that everyone in the kitchen already unconsciously generates: the sounds of cooking.

6.3 Design Solution

Our design's starting point is to address the social discomfort that arises from silence in communal spaces. Humans seem to have an instinct to fill a sonic vacuum, and "small talk" is often the most direct way to break the silence. However, this led us to reconsider: when people aren't talking, is a space like a kitchen ever truly "silent"? The reality is, it is not. A kitchen is, in fact, a vibrant acoustic environment. Every person who enters the kitchen has a clear purpose, generating sounds like the chop on a cutting board, the sizzle of hot oil, the rush of water while washing ingredients, or the chime of a microwave. These sounds, unconsciously created by people's functional activities, collectively form a unique kitchen "soundscape." They are authentic, natural, and full of latent energy.

My core concept is built upon this question: **can we transform this passive, functional background noise into an active, co-creative signal for a medium?** Instead of viewing these sounds as a form of "silence" to be overcome, we see them as a valuable, untapped resource for interaction. This leads to my final design proposal: **A Co-Creative Medium Powered by Kitchen Sounds.** It is a sound-reactive art installation on a TV screen that introduces a parallel, always-on channel for interaction into the kitchen space.



The ingenuity of this design lies in that it requires no change in people's existing behavior. People simply go about their usual activities; the ambient sounds they naturally produce while chopping, cooking, and washing are captured by the system in real-time and transformed into a shared, ever-evolving visual art piece on the screen.

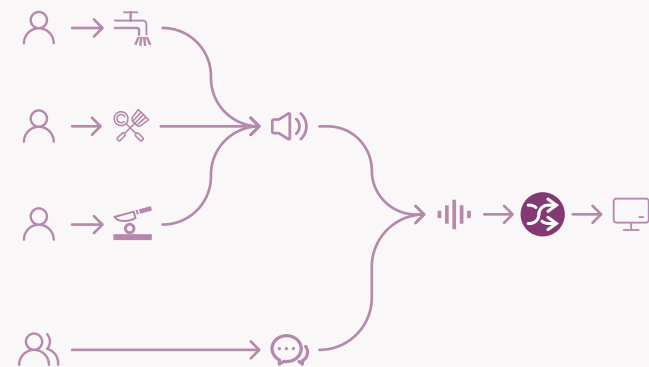
Through this medium, even without direct conversation, people are connected by the act of co-creating the content on the screen. Individual, independent actions converge into a silent, collective "task" and a shared experience. This shared creative process, much like preparing a meal together with friends, can naturally break the deadlock of silence. It provides a gentle entry point and a shared topic for more meaningful conversations to begin, thereby transforming potential social awkwardness into a lighthearted and engaging form of collective creativity.

Parallel: *It leverages the existing parallel activities.*

Always-on: *It provides a constant, ambient channel for interaction.*

Playful: *It invites curiosity and experimentation.*

6.4 Interaction Model Design



Within the kitchen's "soundscape," two core types of sound exist: Functional Ambient Sounds, generated by activities like chopping and cooking, and the Vocal Interactions that we ultimately hope to foster. How to handle the relationship between these two is the key challenge of this interaction design. Ambient sounds are passive, natural inputs received by the system, whereas vocal interactions are the ideal social goal. This raises a core question: how should the system use visual feedback to guide, differentiate, or combine these two sound types to achieve the ultimate goal of encouraging communication?

To systematically explore this question, I designed three distinct interaction models, each representing a different philosophical relationship between ambient and vocal sounds.

This exploration followed an iterative path. The three models presented below were not conceived in parallel but represent a sequential journey of thought. Each model builds upon the insights and addresses the conceptual limitations of its predecessor, reflecting an evolving understanding of the design challenge.



Model One: Egalitarian Model

- **Philosophy:** Ambient sounds and vocal interactions hold equal importance. Both are manifestations of the kitchen's "vitality" and co-create the visual content.
- **Interaction:** Both sound types trigger feedback of an equal tier but with different visual characteristics, mutually enriching the display.

Model Two: Incentive Model

- **Philosophy:** Vocal interaction is a behavior more worthy of being "rewarded" than individual activities.
- **Interaction:** All sounds can drive visual changes, but vocal sounds trigger faster and more significant visual feedback, serving as a positive incentive to encourage conversation.

Model Three: Progressive Model

- **Philosophy:** The process of individuals focusing on their tasks serves as preparation and accumulation for subsequent interactions. Quiet personal time also has value, as it makes future conversations more anticipated.
- **Interaction:** This is a two-stage interaction. Ambient sounds are responsible for "preparing" or "seeding" visual elements, while vocal sounds "trigger" or "detonate" these elements, causing them to blossom into a final, brilliant, reward-like effect.

Visual Strategy Principle

Regarding the specific visual design, I deliberately avoided abstract particle effects or purely generative art in the style of Processing. Although such effects can be visually stunning, they tend to emphasize technical implementation and visual expression. To better fit the context of a kitchen, I chose concrete themes related to "food." This not only creates a more engaging and cumulative visual narrative but also makes the interaction logic more intuitive and creative, testing product design thinking rather than pure visual programming skills.

6.5 Design Concept

Based on the models above, I conceived three specific design concepts.

6.5.1 Concept One: The Sound Cakery

a. Model One: Egalitarian Model

b. Concept

Every hour, a new, blank cake appears on the screen. The various sounds in the kitchen act as "ingredients" to decorate it.

- Sound of running water → Draws blue ripples on the cake's icing.
- Sound of cooking/heating → "Bakes" the cake from a light to a dark shade.
- Sound of chopping → Sprinkles chocolate shavings onto the cake.
- Vocal interactions → Adds colorful sugar pearls or fruits as decoration.

c. Design Value

Co-created Art: Every person and every sound contributes equally to the same creation, resulting in a unique hourly artwork.

Subtle Data Visualization: By reviewing the cakes from the past few hours, residents can form an intuitive sense of the kitchen's usage patterns. For example, an evening period with consistently dark-colored cakes implies frequent cooking activity, while a richly decorated cake signifies a lively social moment. This serves as a "subtle heatmap," helping people choose their preferred kitchen atmosphere (busy or quiet) while completely avoiding direct data surveillance and privacy concerns.



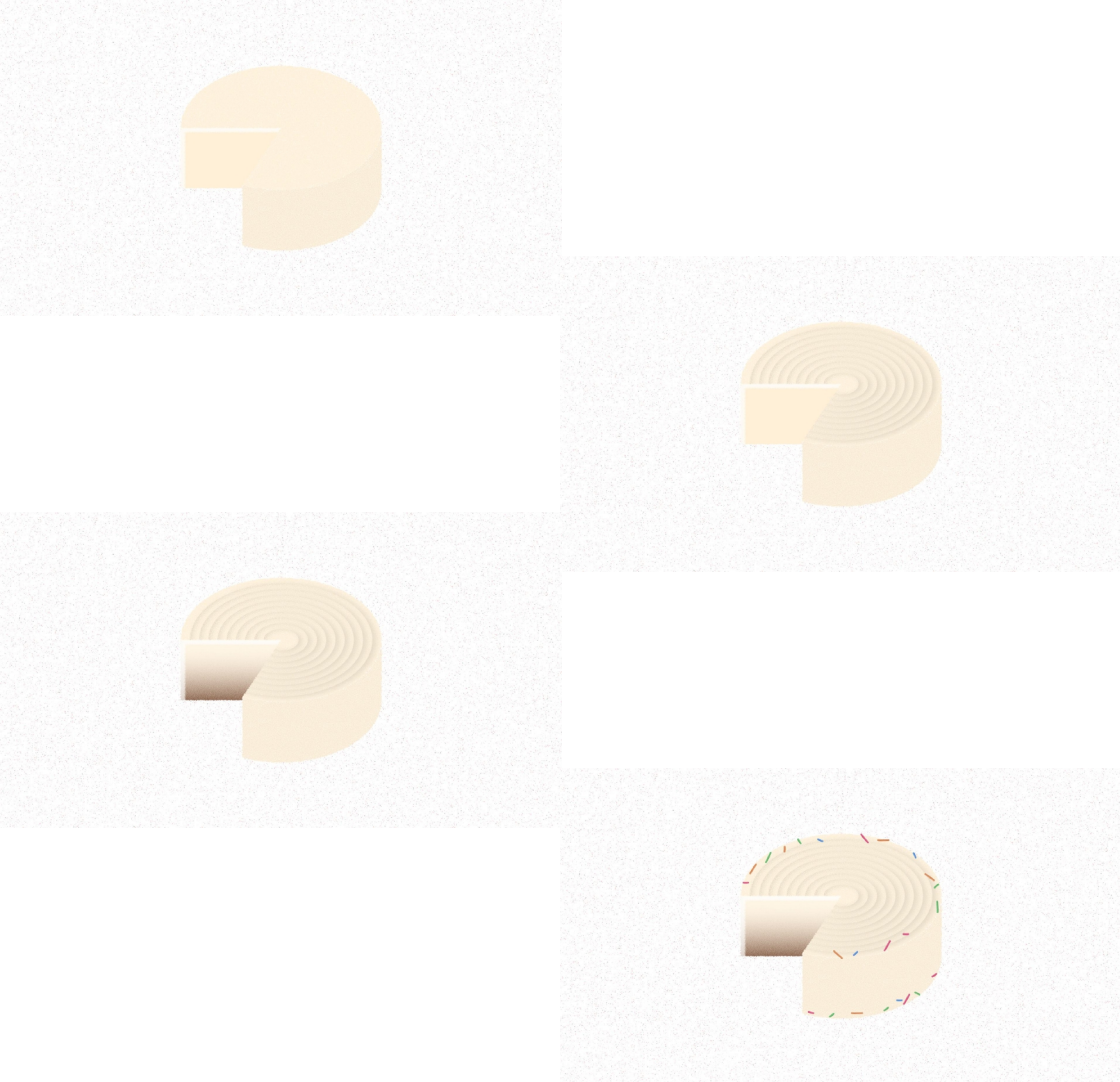


Figure 6.4 The Sound Cakery Screenshots

d. Critique & Iteration

While this egalitarian approach is appealing in its simplicity and co-creative spirit, its primary limitation became clear upon reflection. By treating all sounds with equal importance, the model fails to specifically guide behavior toward our core goal: fostering human-to-human communication. The interaction it creates is more between the individuals and the shared space, rather than directly between the individuals themselves. This insight prompted the next stage of exploration.

6.5.2 Concept Two: Pasta Poetica

a. Model Two: Incentive Model

b. Concept

Each day, a food-related short poem in English appears on the screen, initially blank. Any sound in the kitchen causes "pasta" to grow, thereby "writing" out the poem.

- Ambient Sounds → The pasta grows at a normal speed, slowly writing the verse.
- Vocal Interactions → The pasta grows at a significantly faster rate, completing the poem much more quickly.

C. Design Value

Clear Incentive: This mechanism creates a clear goal—to read today's poem. When people discover that conversation "unlocks" the content faster, they are naturally guided to interact.

Unique Rhythmic Beauty: The length of the verse written each hour varies, representing the "sound density" of that period. When reviewed, these fragments of varying lengths create unique pauses and cadences in the poem, as if the kitchen itself were "reciting" it with a rhythm born from chance.

Figure 6.5 Pasta Poetica Screenshots1



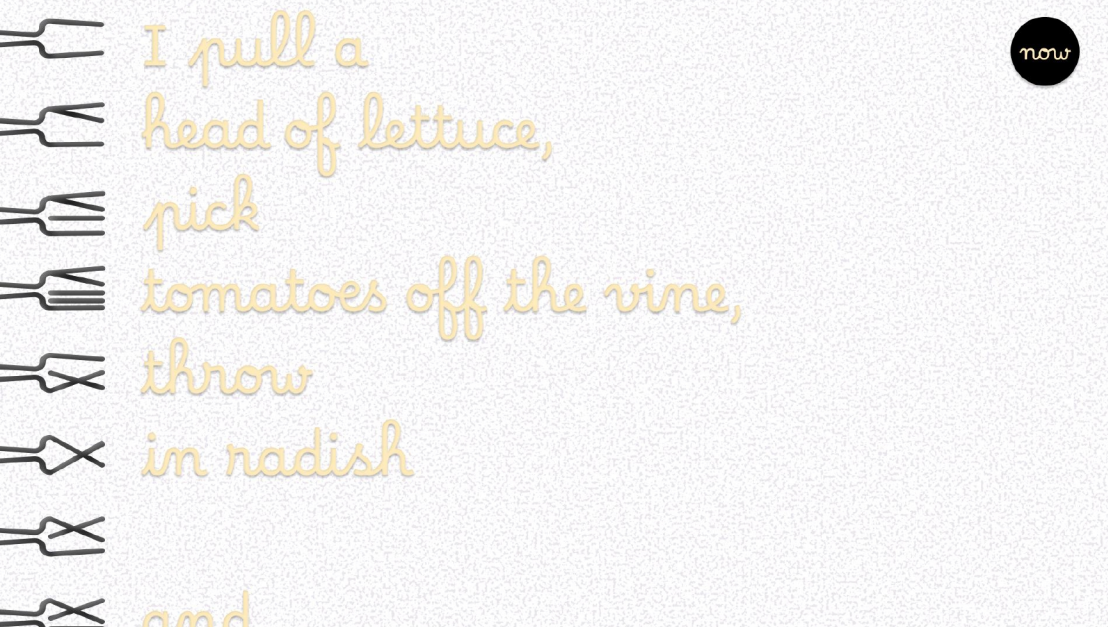


Figure 6.6 Pasta Poetica Screenshots2

d. Critique & Iteration

This incentive-based model effectively addresses the limitation of the first by creating a clear motivation for vocal interaction. However, the core issue lies in the implicit hierarchy of value created by the significant difference in feedback speed.

While ambient sounds are still acknowledged, the much faster progress triggered by conversation frames solitary activity as the "slow lane." On a psychological level, this contrast can inadvertently devalue the quiet, focused nature of individual kitchen tasks. Even if a user is content being alone, they might perceive their actions as less productive toward the shared goal of completing the poem. The experience subtly shifts from a relaxing background ambiance to a foreground "task" with an optimal, more efficient solution.

This led us to a crucial insight: a more ideal design should encourage connection without creating a sense of competition between being social and being alone. It should protect and even celebrate the value of solitary work, rather than framing it as simply a less effective means to an end.

6.5.3 Concept Three: Fruit & Veggie Fireworks

The critical analysis of the first two models clarified the core conditions for a effective design: it must both effectively encourage social interaction and respect the intrinsic value of individual, focused activity. Our third and final design, born from this synthesis, uses a progressive model to elegantly resolve the tension between these two states. It reframes them not as a conflict, but as a meaningful and poetic sequence.

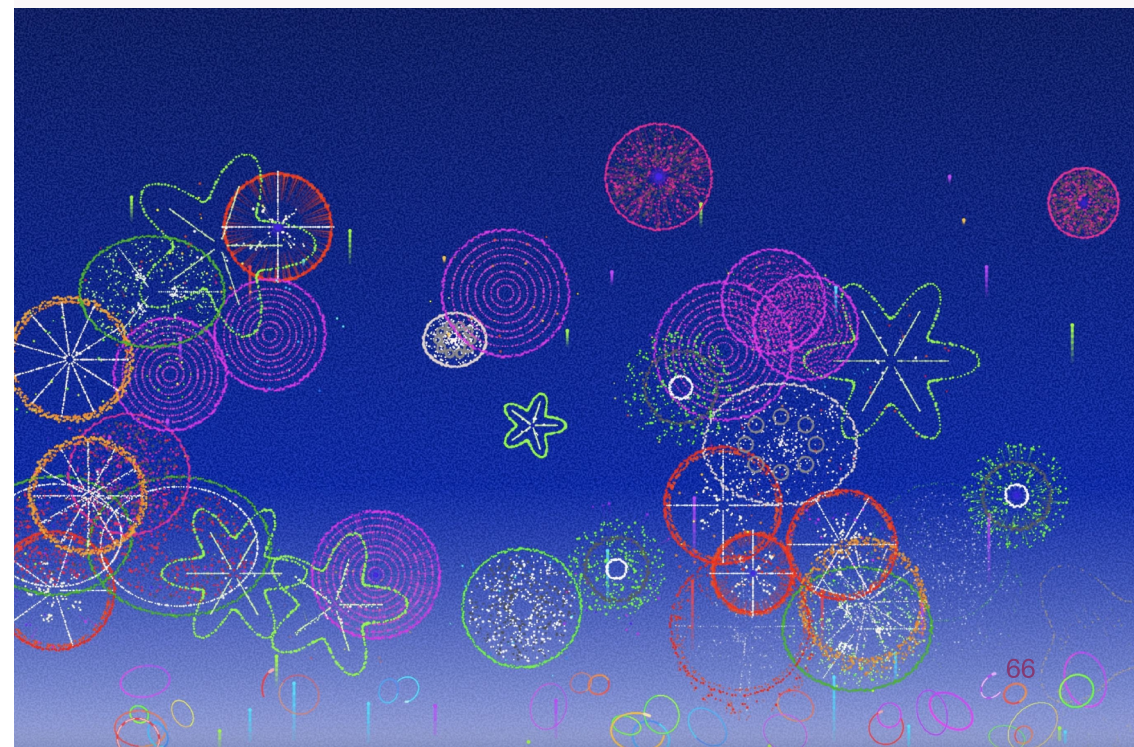
a. Model Three: Progressive Model

b. Concept

This design divides the interaction into two phases: "seeding" and "blooming."

- Ambient Sounds (Seeding): When people are quietly engaged in activities like chopping or washing, "firework seeds" are discreetly planted in the night sky on the screen.
- Vocal Interactions (Blooming): As soon as the system detects human voices, these pre-planted seeds are instantly "ignited," bursting into brilliant fireworks shaped like cross-sections of fruits and vegetables.

Figure 6.7 Fruit & Veggie Fireworks Visual



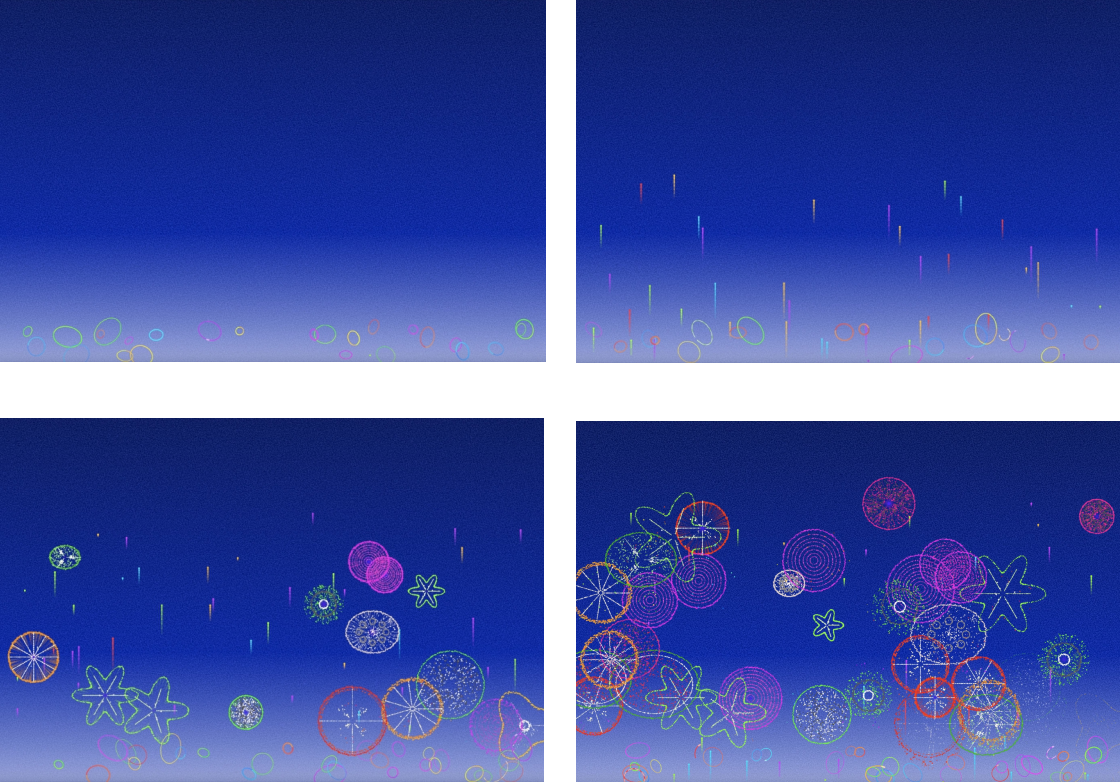


Figure 6.8 Fruit & Veggie Fireworks Process Screenshots

c. Design Value

Giving Meaning to Solitude: This model most cleverly interprets the idea that "solitude is preparation for togetherness." It allows people to feel that their focused, individual actions are contributing to a future beautiful experience (watching the fireworks), enabling them to embrace the quiet moments more contentedly.

Creating Surprise and Topics: The blooming fireworks serve as an immediate and spectacular reward for conversation. Furthermore, the unique and beautiful fruit and vegetable cross-sections (like starfruit, dragon fruit, or broccoli) can themselves become new, fun topics for discussion ("Look, what vegetable is that?"), further promoting interaction.

6.5.4 Final Design Selection

Based on this iterative exploration, **Concept Three: Fruit & Veggie Fireworks** was selected as the **final design direction**. It effectively resolves the core tension identified through the critique of the previous concepts:

it encourages social interaction without devaluing the quiet, focused nature of individual work. By **reframing solitude as a meaningful "preparation" for a shared moment of surprise**, this concept provided the most robust and psychologically considerate foundation for development.

6.6 Design Process and Details

6.6.1 Technical Implementation of Sound Distinction

The technical core of this concept is the ability to reliably distinguish "vocal interactions" from "functional ambient sounds" in real-time within a noisy kitchen environment.

We fully implemented this functionality using Processing. Its core principle is not speech recognition (identifying what is said), but rather real-time Acoustic Feature Analysis. The program continuously analyzes the audio stream from the device's microphone and makes judgments based on three key metrics:

1. **Sustained Loudness Shift:** Human speech typically causes a relatively smooth and sustained rise in the ambient volume, unlike instantaneous noises (e.g., metallic clangs).
2. **Spectral Energy Distribution:** The key energy of the human voice is primarily concentrated in the 300-3400Hz frequency band. The program checks if the energy proportion in this band is significantly higher than in others.
3. **Spectral Texture:** The spectrum of a human voice contains rich harmonics, presenting a "peaky" texture with distinct ridges. In contrast, the spectrum of ambient noise like fans or running water is relatively "flat."

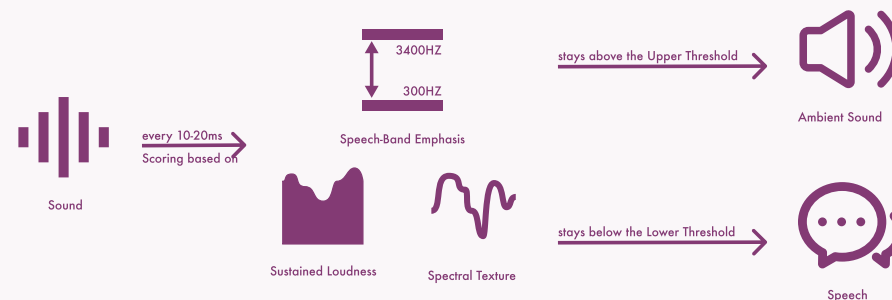


Figure 6.9 Technical Framework

The program synthesizes these three metrics into a real-time "Speech Score." Only when this score consistently exceeds a preset threshold for a continuous period does the system determine that a "conversation is happening." By incorporating an adaptive noise baseline and a cooldown mechanism, the system can effectively filter out transient or steady mechanical noises, preventing false triggers.

The entire analysis process is conducted in real-time, entirely on the local device, without any need to upload or record audio. This maximally protects user privacy while creating an engaging interaction.

6.6.2 Parametric Generation of Graphics

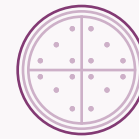
To programmatically generate the variously shaped "fruit and veggie fireworks," we needed to deconstruct the visual features of actual fruit and vegetable cross-sections into a set of parameters that could be controlled by code.

The inspiration came from detailed observations of common fruits and vegetables found in the kitchen. Whether it's a cucumber, a bell pepper, or a kiwi, their cross-sections reveal a rich variety of geometric patterns. I categorized these patterns into a generative system, organized from the outside in, allowing the program to "draw" an infinite number of combinations by adjusting these parameters.



Figure 6.10 Fruits and Vegetables' Cross-sections VS Firework

The Fruit & Veggie Firework Generative Parameter System



- A. Outline: Defines the overall external shape.
- Type: Circle, Oval, Lobed (like a bell pepper), Star-shaped (like a starfruit), etc.
 - Parameters: Control the specific form using vertex count, lobe/point magnitude, roundness, and aspect ratio.



- B. Rings: Simulates the layers of the peel and flesh.
- Parameters: Thickness of the outer peel; number and position of inner rings (e.g., onion, beet).



- C. Segments: Constructs the internal chamber structure.
- Parameters: Number of chambers/"spokes" (like an orange), core radius, curvature of the dividing lines.



- D. Seeds: Adds the detailed and most recognizable features of different fruits/vegetables.
- Annular: Like a kiwi, with seeds in a dense ring.
 - Chambered: Like a tomato, with clusters of seeds in 4-6 chambers.
 - Symmetrical: Like a lotus root, with 8-10 symmetrical holes.
 - Scattered: Like a dragon fruit, with small black seeds scattered throughout.
 - Tri-columnar: Like a cucumber, with three clusters in a triangular symmetry.



- E. Color: Defines the color scheme of the firework.
- Parameters: Assigns color combinations to the different parts, such as the peel, flesh, segments, and seeds.



- F. Animation Sequence: Controls the "blooming" process of the firework.
- Parameters: Defines the order of appearance, speed, and animation effects for each visual element (outline, rings, seeds), creating a dynamic and organic blooming experience.

Through this parametric system, every "firework" triggered by a human voice becomes a unique visual work, based on rules yet full of randomness, thus providing users with continuous surprise and the joy of discovery.

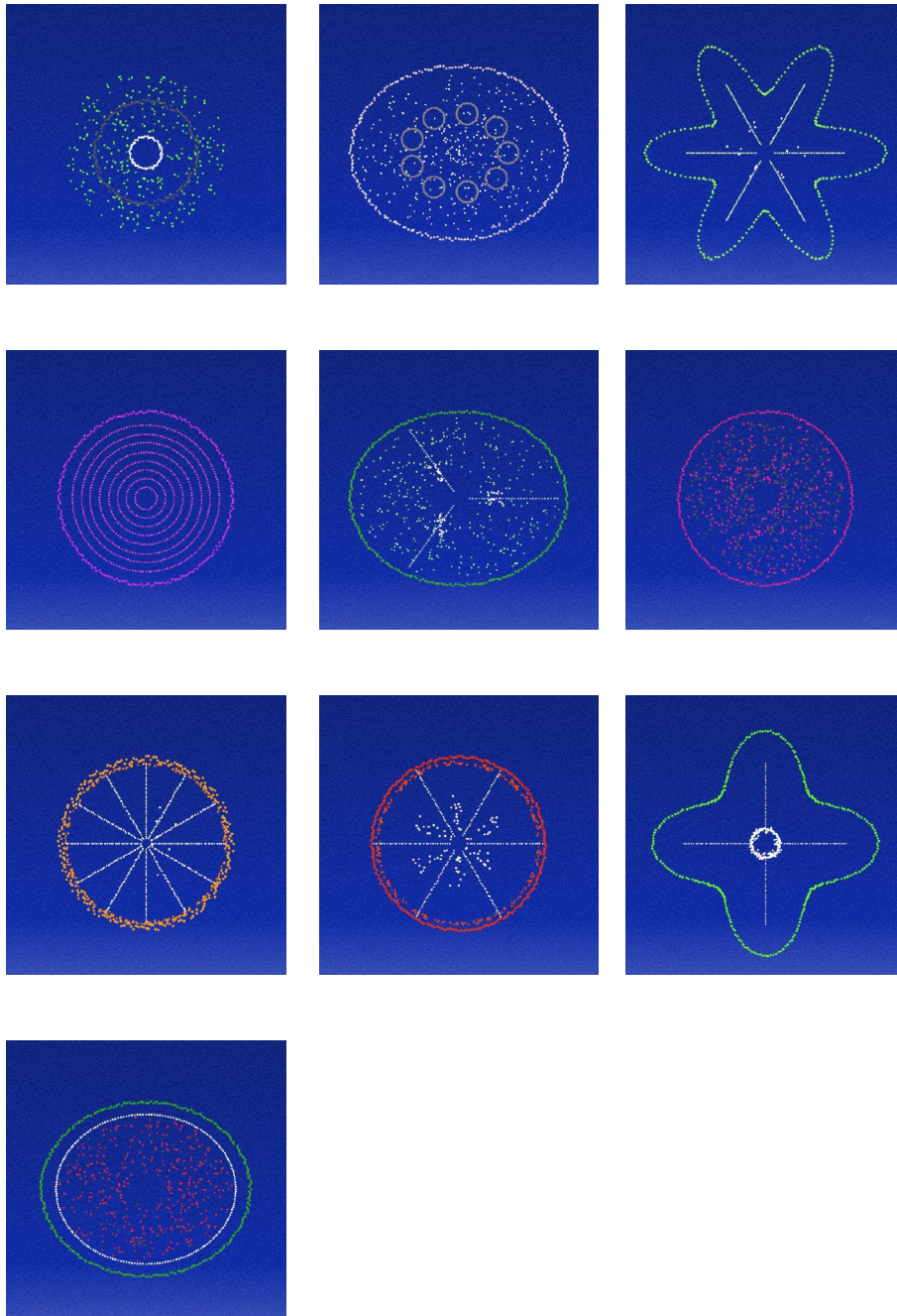


Figure 6.11 Processing Generation Results

6.6.3 Dynamic Visuals Design

The dynamic visual effects of the "Fruit & Veggie Fireworks" are the result of a process where I led the creative and aesthetic direction, collaborating with an AI for technical implementation. Throughout this process, I was responsible for setting the overall visual goals and experiential rhythm, while the AI assisted in finding suitable algorithms and generating initial code. Building on this foundation, I performed dozens of manual parameter adjustments to ensure the final effect achieved the desired poetic and realistic dynamic beauty I envisioned.

a. The Launch Process



The firework ascends from the bottom of the screen, visually guiding the user's eye with a bright and highly saturated glowing trail. Its trajectory is not a simple straight line but simulates physical acceleration and gravity, presenting a natural parabolic curve that gives the launch a sense of power and realism.

b. The Blooming Process



This is the climax of the visual experience. I designed a rich, multi-layered explosion structure: the initial explosion instantly forms a clear fruit or vegetable cross-section, while subsequent secondary and tertiary explosions release more auxiliary light particles. Through repeated tuning, I precisely controlled the timing between each layer to intervals of 0.1-0.2 seconds, creating a rhythmic and unfolding blooming experience. Simultaneously, the intense flash and diffusing halo at the moment of explosion greatly enhance the visual impact.

c. The Dissipation Process



To give the experience a soft landing, the particles from the bloom are affected by simulated dynamic wind and gravity, causing them to organically drift, gently fall, and gradually fade to transparency. This conclusion was designed to place a gentle and poetic end to the brilliant process.

7. Evaluation

This chapter presents the formal evaluation of the final design, 'Fruit & Veggie Fireworks.' It details the methodology for a usability test involving cross-cultural pairs of students in a simulated kitchen environment. The findings demonstrate the design's effectiveness in lowering the barrier to initial conversation and positively transforming the atmosphere of the space during periods of 'parallel work.' The chapter also synthesizes critical user feedback, providing concrete directions for future design improvements.

7.1 Evaluation Objectives

Effectiveness of Cross-Cultural Icebreaking: To validate whether "Fruit & Veggie Fireworks" can effectively lower the barrier to initiating conversation in a first-time encounter between a Chinese student (less accustomed to small talk) and a European student (more accustomed to small talk). Simultaneously, to evaluate if the design respectfully accommodates users who choose not to interact, framing their solitary work as a valuable accumulation for subsequent visual rewards and a shared anticipation for potential conversation.

Atmosphere Reshaping Capability: To assess the design's ability to transform the kitchen's atmosphere from a purely "Task Space" into a more "Playful" and "Comfortable Ambient Zone," especially during the silent phases of "parallel work."

Long-term Potential and Design Flaws: To gather critical user feedback, identify the design's potential limitations (such as novelty decay), and uncover concrete, actionable directions for future iterations.

7.2 Evaluation Method

7.2.1 Recruitment and Screening

Recruitment Channels: Participants were recruited through targeted outreach on different social platforms. Chinese students (Group A) were recruited via direct messaging in Chinese student WeChat Groups. European students (Group B) were recruited through similar direct messaging in university-wide international student WhatsApp Groups.

Screening Criteria: All applicants were screened using a brief online questionnaire based on the following criteria:

1. Must be an international student residing in the Netherlands for over six months.
2. Must have current or recent (within the last three months) experience living in a multicultural shared kitchen (with at least one flatmate of a different nationality).

3. Group A participants had to agree with the statement, "I am not accustomed to or tend to avoid initiating small talk with strangers." Group B participants had to agree with, "I am open to and comfortable with making simple small talk with strangers."

Final Cohort: We ultimately selected 6 international students, divided into two groups:

- Group A (3 participants): From China.
- Group B (3 participants): From Germany, the United Kingdom, and Spain.

Invitation and Communication: Selected participants received a formal invitation email detailing the study's purpose ("to evaluate a new interactive experience for shared kitchens"), the session duration (approx. 60 minutes), and participant rights. A coffee voucher was offered as a small token of appreciation for their time.

7.2.2 Scene Setup

The test was conducted in a kitchen environment that closely resembled a real living situation. A laptop running our custom Processing sketch was connected to a high-fidelity condenser microphone. The program performed real-time analysis of the kitchen's soundscape, algorithmically distinguishing between "ambient functional sounds" (e.g., running water, chopping, clanking cookware) and "human speech." The resulting visual output was projected in real-time via an HDMI cable onto a large-screen TV mounted on the kitchen wall, allowing the entire system to run automatically without any manual intervention.

7.2.3 Task and Scenario Simulation

Participants were paired up—one Chinese student with one European student—to form three test groups. They were informed that they were participating in a study about "experiences in new living spaces" and were given the following scenario: "You are new roommates who have just moved into this international student apartment and do not know each other. This is the first time you are encountering each other in the kitchen. Your task today is to each prepare a simple vegetable salad using the provided ingredients."

7.2.4 Procedure and Data Collection

1. Introduction and Informed Consent (5 mins): The researcher briefed each participant individually on the background and their task, after which they signed an informed consent form. Participants were informed that the session would be audio and video recorded for research analysis only and that their personal data would be kept confidential.
2. Individual Task Phase (5 mins): In each group, the Chinese student (A) entered the kitchen first to begin their prep work (washing and chopping vegetables). During this time, only ambient sounds were present, causing "firework seeds" to appear on the screen based on the sounds. The researcher observed their reaction to the screen's changes from an adjacent room via a monitor.
3. Encounter and Interaction Phase (15 mins): The European student (B) then entered the kitchen to begin their own task.
4. Semi-structured In-depth Interview (30 mins): Immediately after each group's session, individual semi-structured in-depth interviews were conducted with both participants to gather their most direct and candid feedback. The interview was guided by the evaluation objectives but allowed the researcher to ask follow-up questions to explore emergent themes and deeper insights.

7.2.5 Interview Guide

The semi-structured interviews were guided by the following key open-ended questions to probe the core evaluation objectives:

1. "Thinking back to other times you've been in a shared kitchen with a new person, how did this experience feel different? Could you walk me through the moment you first started talking to each other?"
2. "Can you describe the overall atmosphere in the kitchen, both when you were alone and after your roommate arrived? How did the screen on the wall affect that feeling, especially during the quiet moments?"
3. "Now that you've tried it, imagine this system was in your kitchen for the next six months. What are your thoughts about that? What parts might become annoying or less interesting over time, and what could be added or changed to make it even better?"

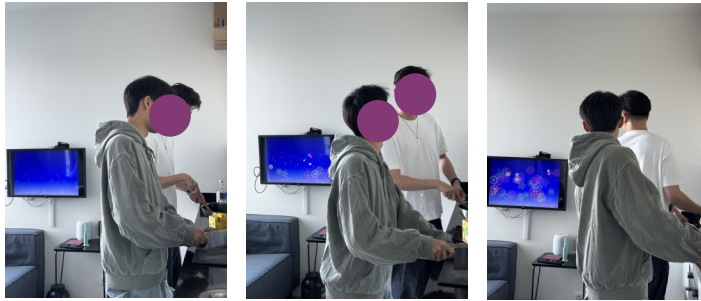


Figure 7.1 Evaluation Pictures

7.3 Key Findings

Finding 1: A Shared "Moment of Surprise" Effectively Lowered the Barrier to a First Conversation

P1 (Chinese Student): "When he (my European roommate) came in, I was getting a bit nervous thinking about what to say, so I just said a simple 'Hi.' I never expected that the moment we spoke, a firework that looked just like a tomato would burst on the screen. We both paused for a second, and then he smiled and asked me, 'Did we do that?' It was such a perfect coincidence because I was literally cutting a tomato at that moment. The topic shifted effortlessly from the 'coincidence' on the screen to the dish I was actually making."

P4 (German Student): "This design provided a perfect 'third-party' topic. We weren't directly facing each other in a sort of 'interrogation'; instead, we both turned to the screen to explore this novel thing together. It significantly reduced the pressure of the initial interaction."

P2 (Chinese Student): "The most interesting part was discovering that we could trigger the fireworks just by 'having a conversation.' We thought it was so much fun that we started happily and randomly chatting about anything, just to see what other effects we could create. That process made me completely forget about having to think, 'Should I make small talk? Is this question appropriate?' I immediately stopped feeling nervous."

In all three cross-cultural pairing tests, the "blooming" of the fireworks effectively acted as a social catalyst. It broke the silence or potential awkwardness of a first encounter, becoming a natural starting point for conversation.

Finding 2: Parallel Work Became a Shared Anticipation, Not an Awkward Silence

P6 (Spanish Student): "Usually, if you're not talking with a roommate in the kitchen, the air can feel a bit tense. But this screen made the silence interesting. I watched my chopping sounds turn into little seeds made of light rings, and it felt like we were contributing to something 'together,' even when we weren't communicating."

P5 (Italian Student): "It's like a co-op game, but it's completely voluntary. Our cooking is like 'earning coins' (the seeds), and talking is like 'unleashing a special move' (the fireworks). That setup is very cool and adds a layer of fun to the daily task of cooking."

P3 (Chinese Student): "It made the kitchen feel 'alive.' While waiting for the water to boil, I found myself watching the changes on the screen. When I saw enough seeds had accumulated, I couldn't help but want to say something to my roommate to try and see what new pattern would appear. He saw me doing this and came over to investigate with me, and we discovered many different fruit and vegetable cross-sections. Time passed faster, and I felt much more relaxed."

P4 (German Student): "At the end of the test, we were chatting and sharing the bell peppers we had both cut, while fireworks continued to bloom on the screen. That moment honestly felt like we were at a friend's backyard BBQ watching fireworks. It was very enjoyable and not at all like two people who had just met for the first time."

Participants universally agreed that the dynamic visual feedback system fundamentally changed their perception of the kitchen space. Even when they were separately focused on their own cooking tasks without speaking, the accumulation of "seeds" on the screen transformed the meaning of silence from a potential source of awkwardness into a "collective build-up" for future interaction.

Finding 3: Critical Feedback and Future Iteration Directions

a. From "Fixed Content" to a "Dynamic Ecology"

P4 (German Student): "It's super cool right now, but I seriously doubt if I would still feel the same way after a month. Maybe by then, it would just become another wallpaper. It might be better if the shapes and colors of the fireworks could have more random variations, or if something new, like popcorn, could burst out."

P5 (Italian Student): "Yes, right now it's just simple fireworks, but it would be great if it were more ecological. For instance, if our interactions were collectively nurturing a plant, its effects could be cumulative, and it could have tiny, unpredictable growth changes every day. That would be much more engaging in the long run."

P3 (Chinese Student): "The visual effects could be richer. Beyond the screen, perhaps it could be connected to an LED strip behind the TV. When a firework blooms, the entire wall could light up, which would make the experience much more immersive."

b. Enhancing User Agency and Contextual Awareness

P4 (German Student): "A potential issue is that when there's only one person in the kitchen, the system isn't really necessary and might waste electricity. If the system could intelligently detect when 'two or more' people are present to activate itself, it would be both energy-efficient and better aligned with its social purpose."

c. Enriching Cultural Meaning and Interactional Depth

P6 (Spanish Student): "I love this idea, and I think it could be even more culturally specific. For example, it could have special themes for different national holidays. For Chinese New Year, it could be red 'firecrackers' made of little chili peppers. For the Holi festival in India, it could be bursts of colorful gulal herbal powders. That would make it not just fun, but also culturally meaningful."

7.4 Future Design Implications

This evaluation powerfully demonstrates that "Fruit & Veggie Fireworks," as an ambient interactive intervention, is significantly effective in fostering initial cross-cultural social interactions. It effectively validates our core design hypothesis: an unobtrusive, rewarding interaction that grows organically out of the context is more effective at solving the social challenges of a "parallel work" scenario than a system that provides external content.

At the same time, the critical feedback from users makes it clear that "Fruit & Veggie Fireworks" is not a perfect endpoint, but a promising starting point. The suggestions offered are not design "flaws," but rather a valuable dialogue about the future possibilities of human-computer interaction that the design has opened up. Future iterations can focus on the following core directions:

- Building an "Ecological Narrative": Adopt user suggestions to upgrade the system from an "instant reward" mechanism to an "ecosystem" with memory and vitality. By introducing elements like dynamic growth, seasonal changes, and collective memory, we can counter novelty decay and foster long-term emotional connection.
- Enhancing "Contextual Intelligence": Develop more intelligent environmental sensing capabilities, such as using camera or microphone arrays to detect the number of people, enabling the system's automatic activation and sleep modes. This would allow it to "appear" at the right moments and "disappear" during times of solitude. However, this direction presents a significant challenge: balancing enhanced awareness with the preservation of user privacy in a shared kitchen. Devising a solution that is both intelligent and unintrusive, without resorting to invasive sensing methods, remains a critical hurdle.
- Deepening "Cultural Meaning": Establish an open, customizable theme library that allows users to select or even upload visual elements with specific cultural symbolism. Automatically triggering cultural "Easter eggs" on festive occasions would transform the system into a window for cultural exchange and celebration.

8. Discussion

8.1 Conclusion

This project set out to address the acculturative stress experienced by Chinese international students, a challenge that acutely manifests as "small talk" anxiety within the shared kitchen. Through a "Double Diamond" design research process, this broad problem was progressively narrowed down to this specific, high-impact context. The most critical finding of this entire study emerged from the failure of an initial content-driven prototype, which catalyzed a fundamental paradigm shift. This led to the development of the final design, "Fruit & Veggie Fireworks," an ambient sound-interactive installation. The final evaluation demonstrated its effectiveness in lowering the barrier to initial cross-cultural conversations and transforming the meaning of shared silence from something awkward into a collective, hopeful anticipation.

The key takeaway of this research journey is that for social challenges within "parallel work" contexts like a shared kitchen, the most effective design approach is not to actively **stimulate conversation with content**, but to subtly **reshape the atmosphere of the space itself**. The goal is to first make silence comfortable, thereby creating a fertile ground from which voluntary, natural, and low-pressure social interactions can emerge.

This chapter provides a comprehensive evaluation and in-depth reflection on the final design solution, "Fruit & Veggie Fireworks." It not only documents the direct user feedback on the design but, more importantly, seeks to distill from this feedback actionable insights for future iterations and to discuss the broader design value uncovered by the project.

8.2 Discussion: Probing the Designer's Role and Boundaries

This project's central narrative—the pivot from a failed "content-driven" prototype to a effective "atmosphere-driven" one—opens up a deeper discussion about the role and limits of the designer when intervening in complex socio-cultural problems.

8.2.1 The Designer as "Stimulator" vs. "Cultivator"

The initial TV App prototype embodied the role of the designer as a "Stimulator." It operated on the assumption that social interaction could be engineered by providing external content—recipes, schedules, prompts—to actively "make" conversation happen. The failure of this approach revealed its inherent limitations: in a task-focused environment, such stimulation can easily become another form of cognitive load, a new source of pressure, and an artificial intrusion into the organic flow of human interaction.

In contrast, the final "Fruit & Veggie Fireworks" design explores the role of the designer as a "Cultivator." A cultivator does not force a plant to grow; they tend to the soil, ensure adequate light and water, and create the optimal conditions for growth. Similarly, this design does not force interaction. Instead, it focuses on improving the quality of the "social soil"—the shared atmosphere. By making silence meaningful and rewarding naturally occurring sounds, it cultivates a space where connection is more likely to sprout on its own terms. It fosters possibility, but crucially, leaves the final agency of whether, when, and how to interact entirely with the users.

8.2.2 The Capabilities and Limits of Design Intervention

This distinction helps to clarify what design can and cannot do in this context.

- **What Design Can Do (Its Capability):** Design is exceptionally capable of reconfiguring the micro-structures of an environment to subtly influence human perception and behavior. As this project demonstrated, by thoughtfully manipulating ambient sensory inputs like sound and light, designers can effectively lower the activation energy required for a positive social encounter to begin.
- **What Design Cannot Do (Its Limitation):** Design cannot, and should not, attempt to script or replace the nuanced, deeply personal dynamics of human relationships. Any design that presumes to "solve" a social problem by dictating the content or form of an interaction risks oversimplifying human connection and removing the very authenticity it seeks to foster. The ultimate boundary of design in this space lies in empowerment, not replacement. Its most profound role is that of a humble stage-setter, creating a beautiful and supportive backdrop for the unscripted drama of human connection to unfold.

8.3 Limitations of the Study

An honest appraisal of this research requires acknowledging its specific limitations, which in turn point toward avenues for future inquiry.

- From First Encounters to Long-term Coexistence: The evaluation scenario was deliberately designed to test the "ice-breaking" capabilities of the design in a first-time encounter between new roommates. This it did effectively. However, the dynamics between roommates who are "familiar but not close"—a common state of being in shared living—are far more complex. Whether this design can effectively mediate the nuanced tensions of long-term coexistence, or if it would be perceived differently by people with an established history, remains an open and important question that this study did not explore.
- The Gap Between a Controlled Test and "Life in the Wild": The evaluation was conducted in a simulated kitchen environment. While this allowed for control over the test conditions, participants were aware they were in a study. The chaotic, unpredictable, and multi-sensory reality of a real, functioning shared kitchen—with competing sounds like music or phone calls, and the myriad of other daily activities—presents a far more complex challenge. The true effectiveness and robustness of "Fruit & Veggie Fireworks" can only be verified through a long-term "in-the-wild" deployment.

8.4 Future Work and Recommendations

The findings and limitations of this project naturally lead to several concrete directions for future research and design:

- Conduct a Long-Term "In-the-Wild" Study: The most critical next step is to move beyond the lab. Deploying a more robust version of the system in a real international student dormitory for a period of 3-6 months would be invaluable for assessing its long-term impact, observing emergent user behaviors, and testing its resilience against the "novelty effect."
- Explore "Atmosphere-Driven" Design in Other Contexts: Based on the core theoretical contribution of this thesis, future research could apply the "atmosphere-driven" design philosophy to other "parallel work" spaces where social anxiety is common, such as office break rooms, laundromats, or co-working spaces, exploring other sensory modalities like light or even scent.
- Deepen the Design's Cultural and Contextual Richness: Responding to the valuable user feedback from the evaluation, future iterations of the design should focus on building an open, customizable cultural theme library. Allowing users to upload or select visual elements tied to specific holidays (like Chinese New Year or Holi) would transform the system from a general social facilitator into a rich medium for active cultural exchange and celebration.

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Appendix

- a. Interview Transcript (Chinese Original)
- b. Interview Transcript (English Translation)
- c. Visual Stimuli for Interview
- d. Workshop Prompts (FigJam Board)
- e. Workshop Stimuli
- f. Design Iteration Process & Early Attempts
- g. "Sound Cakery" Figma Animation Prototype
- h. "Pasta Poetica" Figma Animation Prototype
- i. "Fruit & Veggie Processing" Code Snippet
- j. Original Project Brief
- k. Final Three Design Demo Videos

- a. User Interview Transcript (Original in Chinese)

第一部分 | Warm-up（建立安全空间） 20mins

目标：了解基本背景 + 建立信任感 + 让受访者开始自我表述

1. 最近过的怎么样，还enjoy在荷兰的生活吗？
2. 为什么会选择来荷兰？你当时有做哪些方面的准备来了解荷兰的生活？
3. 你觉得中荷之间的社会文化差异大吗？具体是什么呢？可以举几个例子来说聊一聊吗
4. 我们接下来问一个稍微有一点敏感的问题，你觉得远离家乡出国留学是一种怎样的体验？你会感到孤单或难过吗？会想念父母、朋友或家乡吗？
5. 你在学校课堂、作业、小组合作是一种什么样的体验？你感受到的文化差异大吗？有没有让你觉得“我不太被理解”或“沟通别扭”的经历？
6. 你觉得“适应”对你来说意味着什么？你现在在荷兰生活适应的如何？从你身边人的经历你觉得谁适应的最好，谁适应的不好呢，为什么？你觉得适应好的标志是什么？
7. 文化适应程度测量 请用1–5的量表来评价：

- 1 游客
- 2 生存者
- 3 居民
- 4 准公民
- 5 公民



8. 在荷兰生活对你来说，最难的一件事是什么？是社交？饮食？语言？还是别的？你是怎么应对的？

第二部分 | 从文化转向食物 10mins

目标：挖掘“食物行为”如何成为文化调节或情绪安抚手段

1. 食物在你生活中扮演什么角色？（附带表格帮助选择）
2. 你觉得食物在你每天的生活里，占什么比重？你喜欢做饭吗？为什么？
3. 你有没有在心情不好、无聊、焦虑或想放松的时候，做过和食物有关的事？比如做饭、点外卖、去超市、看食谱……当时为什么？有没有特别想吃的/特别不想碰的？

第三部分 | 共享厨房（场景一） 10mins

目标：深入挖掘共享厨房中的文化张力和设计介入机会

1. 你使用共享厨房的综合体验如何？你与哪些背景的人共享厨房？你与他们的关系如何？你们平时会打招呼、聊天，还是各做各的？
2. 什么时候你在共享厨房里感到最舒适？什么时候感到最不自在或烦心？你觉得这和文化背景有关系吗？
3. 你在共享厨房中经历过什么culture shock么？有没有哪次你体验到了文化差异？比如沟通方式、烹饪方式、烹饪食物不同之类？你当时是怎么处理的？之后你和他们的相处有变化吗？/small talk
4. 你和室友有没有约定过/被约定厨房使用的规则？如果有摩擦，你们通常怎么沟通的？私下聊？写字条？群聊说？还是默默忍着？你觉得这样的沟通方式有效吗？
5. 你在共享厨房做菜/中国菜的时候，会担心什么吗？比如气味、别人的眼光、占用时间等？你是怎么处理这些担心的？

第三部分 | 逛超市（场景二） 10mins

目标：探索超市作为文化接触点和放松空间的复杂功能

1. 你平时会经常逛超市吗？一般是一个人还是和朋友一起？经常去哪些超市？
2. 你觉得自己在逛超市时的状态更像是在“办事”，还是“放松的闲逛”？有没有固定路线或者固定买的东西？
3. 你在逛超市时会关注些什么？
4. 你觉得在荷兰逛超市和国内有什么不一样？
5. 你在荷兰超市有体验过什么文化冲击culture shock? 食物种类/销售方式有没有哪一次在超市的经历让你印象深刻？你有没有在荷兰的超市遇到过搞不懂/好奇的商品、标签、标识、流程？你是怎么处理的？
6. 你有没有和人吐槽过荷兰超市？（“比如有人说Jumbo决定肉不会打折出售可让他们一开始很困扰，后来理解是为环保。有类似的例子在你身上发生吗？”）

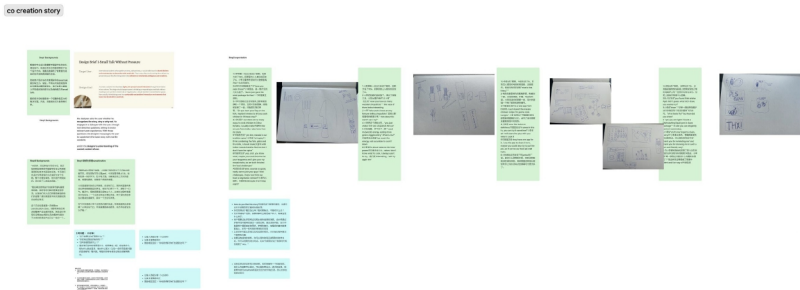
第四部分 | 总结和设计洞察 5mins

目标：识别具体痛点，为设计介入提供方向

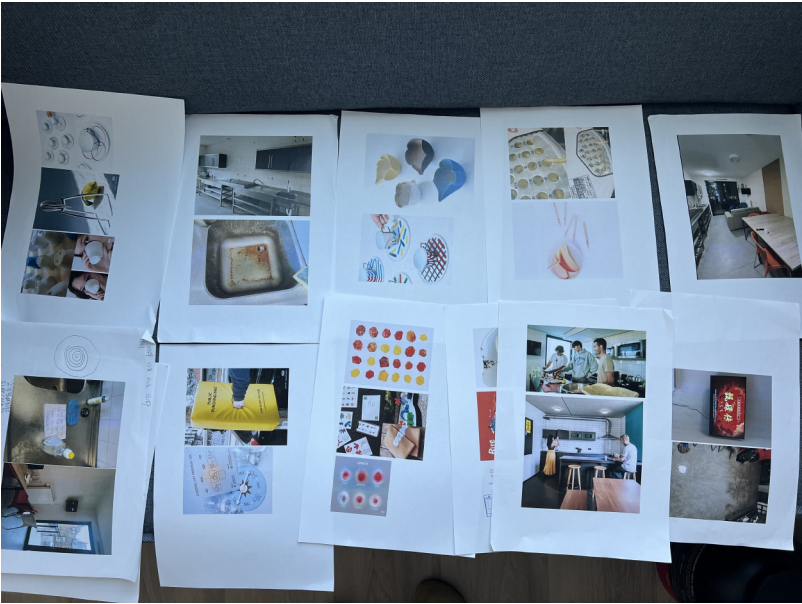
1. 如果你要给一个刚来荷兰的中国留学生一些关于“怎么用食物更好适应荷兰/”的建议，你会想说什么？
2. 你觉得还有什么关于你在荷兰文化适应或“食物”有关的经历，是我们今天没有聊到，但你自己觉得很重、很值得分享的？



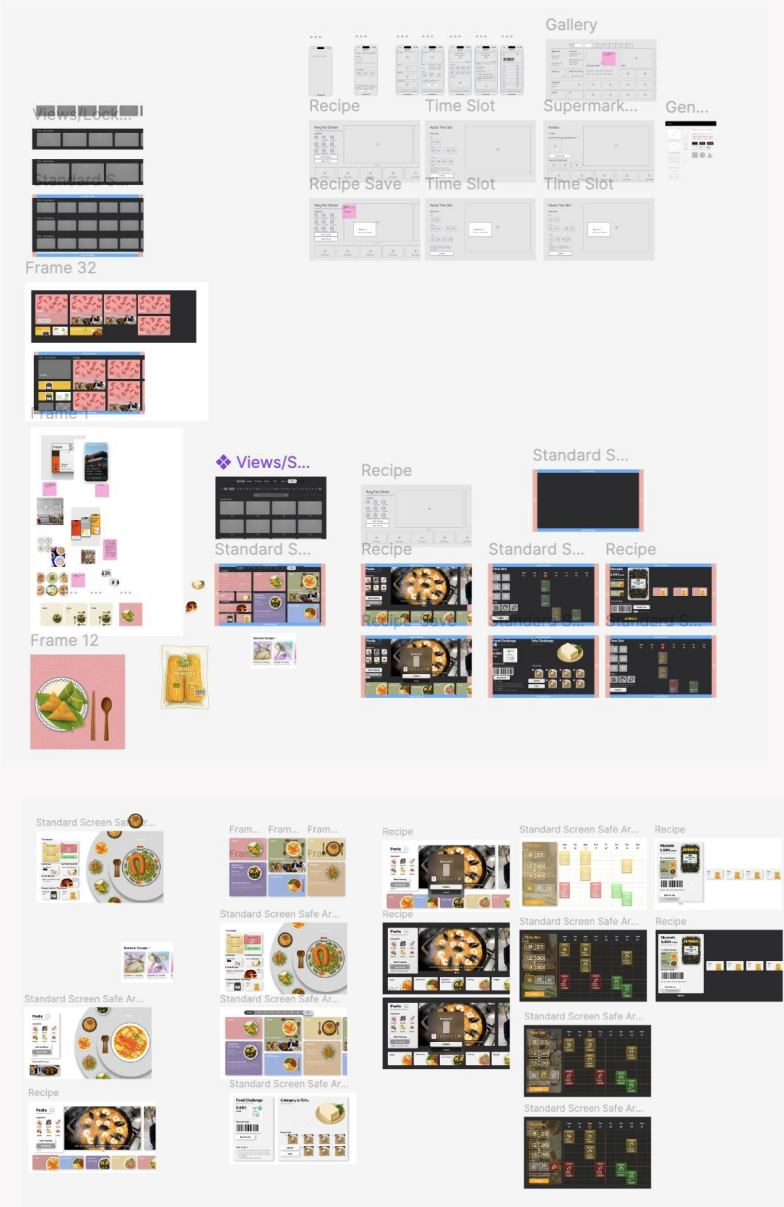
• d. Ideation Workshop: FigJam Prompts



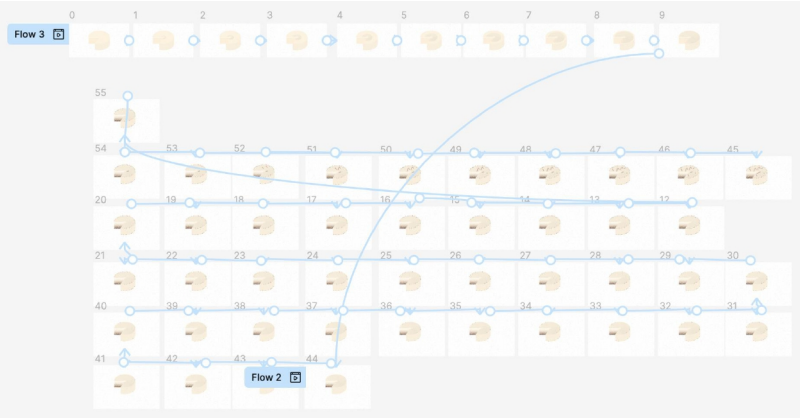
• e. Workshop Stimuli



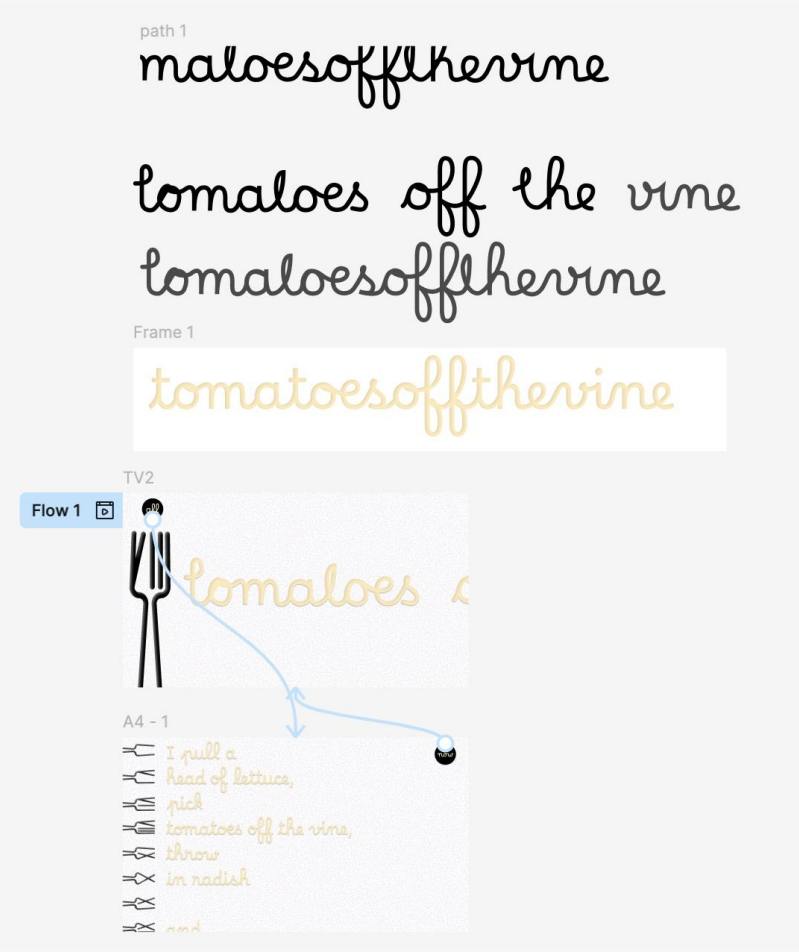
• f. Design Iteration Process & Early Attempts



• g. "Sound Cakery" Figma Animation Prototype



• h. "Pasta Poetica" Figma Animation Prototype



i. "Fruit & Veggie Processing" Code Snippet

```
final firework fruit
1 /**
2  * Kitchen Talk Fireworks - Fruit Cross-Sections x10 + Seed-Shaped Boxes
3  * Requirements: Processing 4.x + processing.sound
4  * MIT permission required.
5  */
6
7 import processing.sound.*;
8
9 // ===== 00 / VAD 00 =====
10 AudioIn mic;
11 Amplitude ampAnalyzer;
12 FFT fft;
13
14 int BANDS = 1024;
15 float[] spectrum = new float[BANDS];
16 float SAMPLE_RATE = 44100;
17 float NYQUIST = SAMPLE_RATE * 0.5;
18 float HZ_PER_BIN = NYQUIST / BANDS;
19
20 float SPEECH_LO_HZ = 300;
21 float SPEECH_HI_HZ = 3400;
22 float TOTAL_HI_HZ = 8000;
23
24 float ampEMA = 0.004;
25 float EMA_ALPHA_IDLE = 0.02;
26 float EMA_ALPHA_SPEECH = 0.005;
27
28 float TH_ON = 0.02;
29 float TH_OFF = 0.48;
30 int ON_FRAMES = 10;
31 int OFF_FRAMES = 18;
32
33 float SPIKE_ABS = 0.04;
34 float SPIKE_RATIO = 2.2;
35 int BOX_THROTTLE_MS = 250;
36 long lastBoxMs = 0;
37
38 static final int IDLE=0, SPEECH=1, COOLDOWN=2;
```

```
final firework fruit
1213 stroke(hu, currentSat * 0.8, currentBri, glowAlpha);
1214 point(pos.x, pos.y);
1215 }
1216 }
1217
1218 // =====
1219 pushMatrix();
1220 translate(pos.x, pos.y);
1221 rotate(rotation);
1222 strokeWeight(baseStroke * particleSize);
1223 stroke(hu, currentSat, currentBri, lifespan);
1224 point(0, 0);
1225 popMatrix();
1226 return;
1227 }
1228
1229 // Rocket
1230 // =====
1231 if (hasTrail && trail.size() > 1) {
1232   for (int i = 0; i < trail.size() - 1; i++) {
1233     float alpha = map(i, 0, trail.size() - 1, 0, 255);
1234     strokeWeight(3);
1235     stroke(hu, 180, 255, alpha);
1236     PVector p1 = trail.get(i);
1237     PVector p2 = trail.get(i + 1);
1238     line(p1.x, p1.y, p2.x, p2.y);
1239   }
1240 }
1241
1242 strokeWeight(4);
1243 stroke(hu, 180, 255);
1244 point(pos.x, pos.y);
1245 }
1246
1247 boolean isDone() { return isFruit ? lifespan <= 0 : lifespan < 0; }
1248
1249 float easeOutCubic(float t) { t = constrain(t, 0, 1); return 1 - pow(1 - t, 3); }
1250 }
```

j. Original Project Brief





IDE Master Graduation Project

Project team, procedural checks and Personal Project Brief

In this document the agreements made between student and supervisory team about the student's IDE Master Graduation Project are set out. This document may also include involvement of an external client, however does not cover any legal matters student and client (might) agree upon. Next to that, this document facilitates the required procedural checks:

- Student defines the team, what the student is going to do/deliver and how that will come about
- Chair of the supervisory team signs, to formally approve the project's setup / Project brief
- SSC E&SA (Shared Service Centre, Education & Student Affairs) report on the student's registration and study progress
- IDE's Board of Examiners confirms the proposed supervisory team on their eligibility, and whether the student is allowed to start the Graduation Project

STUDENT DATA & MASTER PROGRAMME

Complete all fields and indicate which master(s) you are in

Family name	Zhang	IDE master(s)	IPD ☐	Dfi ☐	SPD ☒
Initials		2 nd non-IDE master			
Given name	Zikang	Individual programme (date of approval)			
Student number	5941318	Medisign	☐		
		HPM	☐		

SUPERVISORY TEAM

Fill in the required information of supervisory team members. If applicable, company mentor is added as 2nd mentor

Chair	Hendrik N.J. Schifferstein	dept./section	Form and Experience
mentor	Zhuochao Peng	dept./section	Form and Experience
2 nd mentor			
client:			
city:		country:	
optional comments			

Ensure a heterogeneous team. In case you wish to include team members from the same section, explain why.

Chair should request the IDE Board of Examiners for approval when a non-IDE mentor is proposed. Include CV and motivation letter.

2nd mentor only applies when a client is involved.

APPROVAL OF CHAIR on PROJECT PROPOSAL / PROJECT BRIEF -> to be filled in by the Chair of the supervisory team

Sign for approval (Chair)

Rick Schifferstein

Digitally signed by Rick Schifferstein
Date: 2025.06.06 10:50:19 +02'00'

Name Rick Schifferstein Date 6 June 2025 Signature

• d. Ideation Workshop: FigJam Prompts

CHECK ON STUDY PROGRESS

To be filled in by SSC E&SA (Shared Service Centre, Education & Student Affairs), after approval of the project brief by the chair. The study progress will be checked for a 2nd time just before the green light meeting.

Master electives no. of EC accumulated in total

EC

Of which, taking conditional requirements into account, can be part of the exam programme

EC

★	YES	all 1 st year master courses passed
	NO	missing 1 st year courses

Comments:

Sign for approval (SSC E&SA)

G. Janse

Digitally signed by G. Janse
Date: 2025.06.12 16:58:32 +02'00'

Name

G. Janse

Date

12-6-2025

Signature

APPROVAL OF BOARD OF EXAMINERS IDE on SUPERVISORY TEAM -> to be checked and filled in by IDE's Board of Examiners

Does the composition of the Supervisory Team comply with regulations?

YES	★	Supervisory Team approved
NO		Supervisory Team not approved

Comments:

Based on study progress, students is ...

★	ALLOWED to start the graduation project
	NOT allowed to start the graduation project

Comments:

Sign for approval (BoEx)

Monique von Morgen

Digitally signed by Monique von Morgen
Date: 2025.07.16 09:40:36 +02'00'

Name

Monique von Morgen

Date

16/7/2025

Signature

DESIGN FOR our future

TU Delft

Personal Project Brief – IDE Master Graduation Project

Name student

Zikang Zhang

Student number

5941318

PROJECT TITLE, INTRODUCTION, PROBLEM DEFINITION and ASSIGNMENT

Complete all fields, keep information clear, specific and concise

Project title

Designing Interventions around Food to Support International Students in Navigating Acculturative Stress

Please state the title of your graduation project (above). Keep the title compact and simple. Do not use abbreviations. The remainder of this document allows you to define and clarify your graduation project.

Introduction

Describe the context of your project here; What is the domain in which your project takes place? Who are the main stakeholders and what interests are at stake? Describe the opportunities (and limitations) in this domain to better serve the stakeholder interests. (max 250 words)

International students have to face challenges in adapting to academic and social environments may include difficulties with language and communication, developing friendships, and lack of knowledge of the culture of the country of study, along with changes in food, finance and social support. The new environment and cultural differences between home culture and host-culture experienced by students have the potential to cause obstacles, one of which is acculturative stress—stress that occurs as a result of the acculturation process. Acculturative stress significantly impacts their mental wellbeing and quality of life. In this context, food and related practices—though often seen as mundane—play a crucial, complex, and frequently overlooked role.

Research highlights the dual function of food in acculturation. On one hand, food can trigger acculturative stress: unfamiliar cuisines, dietary norms, and food systems may lead to "food shock", intensifying homesickness, isolation, and even discrimination (He et al., 2024). On the other hand, food also acts as a coping mechanism. Familiar meals provide emotional comfort and a sense of continuity. Cooking can promote independence, while shared food experiences foster community and cross-cultural connection.

These adaptive processes often occur as invisible learning or unconscious pathways. Students gain knowledge and routines through self-directed practices like cooking or grocery shopping. However, this embodied and often overlooked dimension of adaptation remains under-recognized by stakeholders such as universities and student services. Most existing systems focus on visible needs or nutrition, missing opportunities to activate food as a powerful everyday resource.

This project aims to explore how design can engage with students' everyday food experiences to make these adaptive processes more visible and usable. By activating food as a culturally resonant and emotionally supportive medium, the project seeks to support international students in navigating acculturative stress

→ space available for images / figures on next page



Personal Project Brief – IDE Master Graduation Project

Problem Definition

What problem do you want to solve in the context described in the introduction, and within the available time frame of 100 working days? (= Master Graduation Project of 30 EC). What opportunities do you see to create added value for the described stakeholders? Substantiate your choice. (max 200 words)

Acculturative stress is a well-documented challenge for international students, affecting both mental wellbeing and social functioning. It is often triggered by a combination of factors such as language barriers, value conflicts, unfamiliar routines, and the loss of existing support networks. While current psychoeducational and social support programs have proven effective in mitigating acculturative stress, they are not always accessible, context-sensitive, or integrated into international students' everyday lives.

Recent research highlights the complex role of food in the acculturation process. Food can act as both a trigger of stress—due to dietary differences, food shock, or cultural isolation—and a coping mechanism, offering emotional comfort, identity continuity, and social bonding through shared practices like cooking and communal eating. These food-around experiences often unfold as invisible or unconscious learning pathway for cultural adjustments.

This project addresses the question: How might design activate food practice as a everyday medium to support international students in coping with acculturative stress? Within the time frame of 100 working days, the project aims to explore how food design interventions—embedded in daily life—can be designed to surface these hidden adaptive processes and provide culturally resonant, emotionally grounding, and socially connective experiences.

Assignment

This is the most important part of the project brief because it will give a clear direction of what you are heading for. Formulate an assignment to yourself regarding what you expect to deliver as result at the end of your project. (1 sentence) As you graduate as an industrial design engineer, your assignment will start with a verb (Design/Investigate/Validate/Create), and you may use the green text format:

Design an intervention around food that enables international students to navigate and ease acculturation stress through everyday food experiences.

Then explain your project approach to carrying out your graduation project and what research and design methods you plan to use to generate your design solution (max 150 words)

This project will follow a user-centred design approach structured around the Double Diamond model to explore how food-related experiences can support international students in easing acculturation stress. The process includes:
1. Discover phase: Conduct literature review on acculturation stress, food culture, and student wellbeing. Use cultural probes, food diaries, and interviews to explore TU Delft's international students' lived experiences.
2. Define phase: Synthesize insights to identify emotional and social needs related to food, and define opportunity areas for intervention.
3. Develop phase: Co-create and prototype early concepts with students—such as interactive tools, rituals, or communal practices—grounded in their everyday food experiences.
4. Deliver phase: Test selected concepts through participatory workshops or contextual pilots. Collect user feedback to refine functionality, emotional impact, and cultural fit.
Final output: Provide a student-informed intervention concept or toolkit that leverages food as a culturally resonant medium to support emotional regulation, identity, and connection.

Project planning and key moments

To make visible how you plan to spend your time, you must make a planning for the full project. You are advised to use a Gantt chart format to show the different phases of your project, deliverables you have in mind, meetings and in-between deadlines. Keep in mind that all activities should fit within the given run time of 100 working days. Your planning should include a **kick-off meeting, mid-term evaluation meeting, green light meeting and graduation ceremony**. Please indicate periods of part-time activities and/or periods of not spending time on your graduation project, if any (for instance because of holidays or parallel course activities).

Make sure to attach the full plan to this project brief. The four key moment dates must be filled in below

Kick off meeting2025.5.23

Mid-term evaluation2025.7.17

Green light meeting2025.9.11

Graduation ceremony2025.10.9

In exceptional cases (part of) the Graduation Project may need to be scheduled part-time. Indicate here if such applies to your project

Part of project scheduled part-time	
For how many project weeks	
Number of project days per week	

Comments:

Motivation and personal ambitions

Explain why you wish to start this project, what competencies you want to prove or develop (e.g. competencies acquired in your MSc programme, electives, extra-curricular activities or other).

Optionally, describe whether you have some personal learning ambitions which you explicitly want to address in this project, on top of the learning objectives of the Graduation Project itself. You might think of e.g. acquiring in depth knowledge on a specific subject, broadening your competencies or experimenting with a specific tool or methodology. Personal learning ambitions are limited to a maximum number of five. (200 words max)

As a Chinese international student adapting to life in the Netherlands, I've encountered many cultural gaps—but few have been as emotionally complex and silent as those surrounding food. A moment that stayed with me was finding a niche and familiar ingredient from my culture background in supermarket. It created a rare sense of belonging. In contrast, I've also chosen not to eat at all just to avoid drawing attention. These memories sparked my desire to explore how design might address the emotional undercurrents of food in intercultural life. These small, embodied experiences revealed how food is not just nourishment, but a site of cultural identity, vulnerability, and negotiation.

With this project, I hope to grow my ability to work with sensitive, personal narratives through design. I want to translate cultural insights into thoughtful interventions and explore how food—as an everyday practice—can support emotional resilience and acculturation stress. Most of all, I want this project to speak to others who've felt the same silent tensions around something as seemingly simple as lunch.