Intergenerational Design Toolkit for Digital Games

A Strategic Foresight Approach to Bridging Digital Divides

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Full toolkit: https://openresearch.ocadu.ca/id/eprint/5029/6/AppendixC-Design_Toolkit.pdf

Abstract

This study focuses on the design of digital game interactions among non-relative generations in the Chinese community of the Greater Toronto Area, Canada. It explores how face-to-face digital co-play can foster connections between university students and seniors, addressing relational alienation associated with social isolation. Compared to existing intergenerational game studies that are largely based on Western contexts or family relationships, this study focuses on cultural differences, the digital divide, and conditions for non-relative interaction within immigrant communities. It goes beyond simply understanding loneliness at the individual level, defining it as a state of relational and spatial alienation occurring within a specific community and interaction environment, which can be understood through the Chinese concept of “lěngqīng (冷清)”. The study employs a consultation-informed, evaluation-oriented research design, combining two face-to-face consultation workshops, a literature review, expert interviews, and the strategic foresight tools for STEEPV and CLA for comprehensive analysis. Research has found that the ability of intergenerational digital games to support connection does not depend on the existence of the game itself, but rather on whether it possesses a low barrier to entry, clear and understandable goals and rules, a role structure that avoids one-way assistance, and interactive conditions that foster cultural resonance and sustained motivation for participation. Based on the above analysis, this study yielded two main design outcomes: a modular intergenerational game design toolkit and an asymmetric cooperative puzzle prototype called *Across the Table*. Overall, this study contributes by combining intergenerational game design, the cultural context of immigrant communities, and strategic foresight methods to propose a more culturally targeted, relationally sensitive, and long-term adaptable design path to support intergenerational play practices in Chinese communities to move from “ lěngqīng"(冷清, literally "chilly and silent") to “rènao”(热闹, literally “hot and clamorous”).

Keywords: intergenerational digital play, Chinese immigrant communities, non-kin interaction, digital divide, strategic foresight, design toolkit

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We are also grateful to the Yee Hong Caregiver Education and Resource Centre for supporting the community consultation process and allowing this project to engage with a real community setting.

We would like to thank all workshop participants, including both older adult and youth participants, for their time, openness, and willingness to take part in this study. Their observations, reflections, and responses provided an important empirical foundation for the project.

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Statement of Contributions

This Major Research Project was completed collaboratively by Harvey Li and Yang Yi. Both authors contributed to the overall research framing, literature review, methodology design, workshop planning and facilitation, qualitative analysis, foresight analysis, toolkit development, final paper writing, revisions, appendices, and submission preparation.

Harvey Li led the ethics and partner communication process, expert interview planning and execution, and workshop data organization. Yang Yi led the game prototype concept development, prototype design and development, and bilingual game manual development.

Both authors contributed to the interpretation of findings and the translation of research insights into the final design toolkit and written MRP paper. Both authors reviewed and approved the final submission materials.

1 Introduction

1.1 Background

Many countries, including Canada, are becoming aging societies, and social isolation has become an increasingly prominent issue. While digital technologies have the potential to alleviate isolation, they may also create new forms of alienation. Older generations typically have lower internet usage and digital literacy than younger generations, further exacerbating the digital divide (Davidson & Schimmele, 2019). Younger generations often have more confidence in digital tools and may not be aware of this gap. Therefore, digital spaces that could have connected people may instead become places where older people feel excluded.

These issues are particularly visible in immigrant communities. Chinese Canadians often experience changes in family structure, migration patterns, and daily communication methods. Many seniors immigrate in their later years, facing challenges such as language barriers, unfamiliarity with technology, and limited local social networks. Meanwhile, many Chinese university and college students live away from home or balance busy schedules and personal lives, making it more difficult for them to maintain regular communication with older relatives who remain in China. These changes create emotional and cultural distance.

In this context, this study does not merely view intergenerational estrangement as an individual-level sense of loneliness; it also understands it as a relational issue that occurs within specific communities and interaction environments. For many Chinese immigrant communities, the problem is not just that an individual feels lonely; rather, there is a lack of continuous contact between different generations, a lack of opportunities to participate in activities together, and a lack of conditions for gradually building familiarity and trust through repeated interactions. This state can be understood as a kind of “冷清” (lěngqīng, literally "chilly and silent"). Here, "冷清(lěngqīng,)" does not merely refer to an individual's emotions; rather, it refers to a space or community lacking popularity, few interactions between people, and difficult natural development of relationships. Therefore, this study not only focuses on how to alleviate individual loneliness, but also on how to create conditions that are more likely to

gradually form a sense of warmth, continuous interaction, and joint participation through interactive designs that are close to Chinese cultural experiences.

Research indicates that both younger and older Chinese Canadians face significant risks of loneliness. 31% of post-secondary students reported significant loneliness (Fagan et al., 2025), and loneliness is often associated with lower well-being among older Chinese immigrants in situations of limited social support (Su et al., 2022). These issues are intertwined with significant digital literacy gaps. Internet use is nearly universal among Canadians aged 15 to 64, but this drops to 68% among adults aged 65 and older (Statistics Canada, 2019). Cultural differences further widen this gap, as senior immigrants tend to follow more hierarchical communication styles, while younger people prefer more egalitarian dialogue (Chung, 2021).

This study considers digital games that support online interaction as a potential arena for intergenerational participation. Identified social, technological, and cultural differences and barriers underscore the necessity of developing digital designs within the Chinese Canadian community that are more aligned with their cultural experiences and more easily accessible to different generations. This matters for gameplay because games are not only digital systems that require operation, but also social contexts where people interact. Participants bring their cultural expectations and communication habits into the game world, and these factors further influence whether the game can support meaningful connections.

1.2 Research Problem

Although there have been many studies on intergenerational design, most of them focus on the Western cultural context or family-based interactions. Research on non-relative intergenerational games in immigrant communities is still very limited (Zhang & Kaufman, 2016; Costa & Veloso, 2016; De La Hera et al., 2017). The Canadian Chinese community faces unique social and technological challenges. These challenges include differences in communication methods, values regarding independence and changing family roles, and uneven familiarity with the digital environment (Chung, 2021). These challenges collectively lead to a broader intergenerational estrangement that is both social

and technological.

The current intergenerational digital game design frameworks still fall short in terms of cultural considerations (De La Hera et al., 2017; Peng & Neville, 2025). Many frameworks assume that participants share common norms in communication, game play, and mutual learning, but these assumptions may not align with the actual experiences of Chinese elderly and young people. For instance, intergenerational design frameworks often presuppose more equal communication methods and social power relations, as well as a sense of comfort in attempting and exploring through games. However, these assumptions may conflict with certain cultural norms, such as emphasizing respect for elders, favoring indirect communication, and Chinese older participants being more cautious in public expressions (Zhang & Kaufman, 2016; Chung, 2021). Therefore, the existing methods are not yet capable of fully supporting the design of intergenerational digital games, making them truly inclusive, culturally relevant, and accessible for participation by different generations. Clearly, research is needed to address these gaps and simultaneously focus on cultural context and long-term adaptability.

1.3 Research Questions

1.3.1 Primary Research Question:

How can face to face digital gameplay be designed and used to foster intergenerational (IG) connection and reduce social isolation among Chinese people living in the Greater Toronto Area (GTA), particularly university/college students and retirees?

1.3.2 Secondary Questions:

- What types of gameplay interactions, game mechanics, and inclusive design strategies best promote sustained engagement and overcome intergenerational digital barriers in the Chinese community in Canada?
- How do cultural values influence older and younger Chinese participants' attitudes, collaboration styles, and emotional receptiveness to IG digital play?
- How can foresight-informed strategies support the long-term adaptability and scalability of intergenerational digital games?

- What meanings do participants attribute to intergenerational digital play in relation to social connection and loneliness?
- Given the rise of emerging technologies and the aging of game-literate population in Canada, how might IG gameplay evolve over the next 5–15 years?

In this study, "game mechanics" refers to the concrete rules, actions, roles, feedback systems, and task structures that shape how players interact during the game. This includes elements such as turn-taking, shared goals, asymmetric information, hints, time limits, and role assignment. Later sections will analyze these mechanisms as design factors that affect communication, confidence, and collaboration between elderly and younger participants.

1.4 Objectives & Scope

While the gameplay experiences examined in this project take place in face-to-face settings, they are designed to explore intergenerational interaction in ways that may be extended to future online game environments. Conducting the workshops in person allows for closer observation of participants' communication patterns, emotional responses, and interaction dynamics, which are difficult to capture in fully online contexts. The findings are therefore grounded in in-person intergenerational gameplay experiences, while offering design insights that may inform the development of online intergenerational games in future work.

More specifically, the project aims to:

- Identify interaction patterns that help reduce digital frustration and encourage positive communication between older and younger Chinese in Canada.
- Develop a culturally grounded design framework based on evidence from gameplay evaluations and participant reflection
- Produce a modular toolkit that includes game mechanic templates, pairing strategies, and facilitation guides for intergenerational programs.
- Explore how strategic foresight can be used to prepare for changing technologies, shifting cultural expectations, and the future of aging in immigrant communities.

The scope of the study focuses on Chinese university or college students

(typically aged 18–24) and Chinese retirees aged 65 and above living in the Greater Toronto Area.

Research activities took place at the Yee Hong Caregiver Education and Resource Centre in Richmond Hill, Ontario, in a shared, accessible physical setting. Methods include literature review, evaluation workshops, prototype testing, and interviews. The study will not aim to create a fully polished commercial game. Instead, it will generate prototypes, models, and frameworks that demonstrate core concepts and principles. A key limitation is the small sample size, which means findings may not represent the entire Chinese Canadian population. However, the goal is to offer insights that can be scaled or adapted in future work.

1.5 Personal Motivation

As a research team, we are motivated by personal experience with intergenerational distance in immigrant contexts and by a shared interest in how digital systems shape everyday social connection.

Harvey is a designer born in China and educated in Canada. When Harvey first arrived in Canada, Harvey lived in a homestay with an older Chinese woman. During that time, she and several of her friends often asked for help with everyday digital tasks, such as using apps or basic software functions. Although they had lived in Canada for many years, language barriers and long-standing habits limited their social circles, and some shared that they felt lonely occasionally. At the same time, as a newly arrived international student, Harvey also experienced loneliness and difficulty adjusting to a new cultural environment. These parallel experiences helped him recognize that both older and younger immigrants can feel disconnected within the same community, though for different reasons. With a background in UX and interaction design, this has motivated Harvey to explore how digital systems can be designed to better support social connection, particularly within communities that are often overlooked in mainstream technology design.

Yang is a technical game designer born in China and educated in Canada. His motivation bridges a personal observation of cultural disconnect with a professional shift toward “Games for Change.” Yang noticed that conversations with older relatives often stalled due to a lack of common topics, creating a sense

of distance despite physical proximity. However, he observed that this awkwardness often dissolved within the structure of a game, where clear rules provided a shared language and a neutral ground for interaction. This realization prompted a re-evaluation of his technical background: rather than designing complex interaction systems solely for entertainment, Yang recognized that game mechanics could be used to distribute agency and empower players. This project reflects his commitment to designing digital environments where older and younger participants can interact as equals, using co-play to overcome the barriers that limit face-to-face connection.

Overall, Harvey and Yang bring different but complementary perspectives to this project. Although personal motivations and backgrounds are not the same, they share an interest in understanding participants' experiences on their own terms and in being attentive to how our positions as researchers may influence interpretation. A more detailed discussion of positionality will be taken up in the Discussion section, where both reflect on these issues in relation to the study findings.

2 Literature Review

2.1 Intergenerational Play: Definitions, Design factors, and Evaluation-based Iteration

2.1.1 Defining intergenerational play and Evaluation-Based Iteration

Intergenerational digital gaming is often discussed as playful interactions between different generations through digital games. In empirical reviews, common reported benefits include strengthened family bonds, reciprocal learning, enhanced intergenerational understanding, and reduced social anxiety (De La Hera et al., 2017). This research context does not simply view intergenerational gaming as shared presence or entertainment, but rather as a socially meaningful activity whose effects depend on how the interaction is organized and structured within the gaming context.

Intergenerational gaming can serve various purposes, including recreational play, serious learning-oriented goals, and what some authors call "serious

fun”(Loos et al., 2019). This matters because one set of mechanics can shape both enjoyment and the social experience of playing together.

In this field, co-design is described as involving users from the very beginning to the end of the process, and it is often presented as an iterative cycle that runs from analysis to evaluation (Loos et al., 2019). It is also framed as an approach that attends to power relations by treating stakeholders as partners rather than end users, which is especially relevant under conditions of intergenerational asymmetry

(Pirinen, 2016). However, this study does not adopt co-design as a methodology. Instead, it uses an evaluation-based iteration process in which participants join as play testers and interviewees, while design decisions and prototype changes remain researcher led. Iterations are researchers-led to limit changes to a small number of mechanics at a time, so that the differences in interaction can be attributed to specific design adjustments rather than to multiple co-created changes introduced simultaneously. Full co-design would also have required additional ideation and decision sessions, increasing cognitive and language demands, so researchers limited participation to play and interviews to minimize participant burden while still capturing experiential evidence.

Within this review, the key implication is contextual rather than methodological: intergenerational play cannot be treated as a universal form, and cultural and linguistic adaptation need to remain core design conditions when play moves into a Chinese immigrant, non-kin community setting. Design-relevant frictions: skills, confidence, empathy, and power asymmetries

Intergenerational digital play often looks simple on the surface, two people from different age groups playing together. However, in practice, such interactions are often hampered by friction. One major issue is the literacy gap, which shows up as uneven online skills even when both players have access to devices and the internet. Digital divide research shows large variation in online skills, and performance-based measurements reveal a negative correlation between internet skills and age. (Hargittai, 2002).

Skill disparities can also undermine confidence. Research on digital inequality indicates that unequal access to opportunities further contributes to inequality in social participation, and identifies self-confidence as one of the factors influencing how individuals experience the stages of acquisition and use (Van Dijk, 2017). Beyond skills and confidence, intergenerational interaction itself may also require proactive stimulation, as negative age stereotypes and weak mutual understanding can inhibit interactive participation between different age groups (Loos et al., 2019). These gaps can also further influence power relationships during intergenerational play. Aarsand (2007) found that younger players with stronger digital skills may control the interaction by deciding how the game is played and setting the pace of participation. While this finding comes from a family gaming context, it highlights a broader risk in intergenerational game design: the digital skills gap may turn younger players into "informal gatekeepers" rather than equal collaborators.

Ultimately, some of the most difficult barriers to overcome in designing intergenerational games are easily overlooked because they often manifest as seemingly minor usability and evaluation issues. Usability issues refer to interface-level friction that diverts participants' attention from each other to the device itself, such as confusing menus, illegible small print, or unclear system feedback. Evaluation issues refer to limitations in research design and evaluation methods, such as interventions that are too short to produce meaningful results, or prototypes that have not been systematically tested before being used in research.

This distinction is particularly crucial in the context of game testing. For instance, if a participant has difficulty operating due to a confusing menu, this might initially be regarded as an issue of usability, but the researcher might mistakenly interpret it as the participant's lack of interest in communicating with the partner, viewing it as a sign of a failed intergenerational connection, thereby distorting the assessment of the game's social impact (Zhang & Kaufman, 2016). Given these asymmetries, a pragmatic approach is needed to pre-establish safeguards during the guidance and evaluation of game activities. For instance, assigning roles, controlling the pace and task requirements can prevent any one party from dominating the interaction for extended periods. Furthermore, combining observational records with post-activity interviews can further identify dynamic power relationships that participants might not

explicitly articulate.

2.1.2 Key frameworks and evidence base in intergenerational game research

Across studies, a consistent set of reported benefits appears. De la Hera et al. (2017) categorized these benefits as reinforcing family bonds, enhancing reciprocal learning, increasing understanding of the other generation, and reducing social anxiety. These categories are typically discussed within a family-based context, particularly in studies of grandparents and grandchildren playing together; therefore, the understanding of "connection" or "learning" in the literature is often influenced by this family context. Even so, this classification can still serve as a shared language for discussing social and emotional outcomes and provide a clear point of reference when discussing what changes might occur in non-kinship or community settings (De La Hera et al., 2017).

Although the overall evidence base remains limited, intergenerational digital game research has developed several ways to help organize key design factors. One widely cited approach divides the factors to be considered in design into two main categories: player-centric factors and game-centric factors. Player-centric factors include the nature of the interaction between generations, the motivation to participate in the game, and differences in ability. For example, asymmetrical role assignments may occur in the interaction, with younger players demonstrating technical skills while older players assume supportive or advisory roles; different generations may also have different preferences for game pace and challenge. These role patterns should not be regarded as age-based default arrangements. Asymmetrical role assignments are more appropriate only when there are genuinely significant differences between a pair of participants in terms of operational dexterity or familiarity with a particular interface, and the direction of this asymmetry may also vary from pair to pair.

When a game involves multiple task demands, such as navigation, interpretation, timing, memory, communication, or interface control, the interaction can be organized through asymmetrical roles, allowing each player to contribute based on their personal preferences. For example, one player controls the character's movement in a three-dimensional environment, while the other player undertakes supporting tasks through a simpler two-dimensional interface, such as clearing obstacles or solving puzzles. These roles should not be

assigned by age, but by each participant's preference, confidence, and observed comfort with the task. A well-known example is Keep Talking and Nobody Explodes, where one player operates a complex bomb device, requiring strong operational skills and visual focus, while the other player reads the instruction manual and provides instructions, requiring reading and communication skills. In this way, the cognitive and motor requirements are effectively distributed between the two participants rather than concentrated on one player. Game-centric factors include goal-related and space-related forms of interaction. For example, is the game organized around a shared cooperative goal or around cooperative competition? Does the interaction rely on communication based on shared presence or on mediated communication channels (De La Hera et al., 2017)? This distinction helps explain that the success or failure of intergenerational play is not solely due to the "people" themselves, or solely due to the "game" itself, but rather to whether the two are compatible.

See the earlier section of this chapter regarding the classification of benefits by De La Hera et al. (2017); the following section moves directly on to co-design methods.

When the focus shifts from outcomes to methods, the literature includes co-design as a comparatively concrete process model used in some intergenerational digital game projects.

Loos et al. (2019) describe the co-design of intergenerational digital games as an iterative cycle encompassing analysis, design, development, and evaluation, with evaluation occurring not only in the final stage but throughout the entire process. They also emphasize the importance of "distributed collaboration," where participants both spend time together building shared understanding and have time to work separately, allowing different groups to contribute in a less stressful manner. In practice, this often means working in smaller groups, progressively developing ideas, and recognizing that younger participants may provide technical support, while older participants contribute life experience and content knowledge (Loos et al., 2019). These models are not presented as a one-size-fits-all formula, but they help explain why facilitation, pacing, and role structure are just as important as the game mechanics themselves.

At the same time, the literature suggests that intergenerational play studies often leave roles and context under-specified. Zhang and Kaufman (2016) note that many studies assume familiar relationship types, such as grandparent–

grandchild pairs or older adult–youth interactions, and older adults are frequently positioned as an “advisor” during play. These assumptions can quietly shape design choices, because they rely on existing trust, shared history, or family obligation. That makes it harder to generalize findings to non-kin settings where those social foundations are not guaranteed (Zhang & Kaufman, 2016).

Participatory design research on immigrant families further emphasizes how culture and language directly influence the specific patterns of intergenerational interaction. Liaqat et al. (2021) show that design activities can reveal interaction patterns that support cultural exchange, such as storytelling and value-based dialogue, while also creating space for more balanced contributions across generations. The key is not that every intergenerational game must revolve around storytelling, but rather that intergenerational design itself is highly sensitive to cultural norms and communication styles. Therefore, models and tools developed from a specific context often require adaptation when applied to other communities (Liaqat et al., 2021).

2.1.3 From Family-Based Assumptions to Non-Kin Community Contexts

A large portion of the work within this field discusses family contexts, especially grandparent–grandchild relations, so many design assumptions quietly lean on kin-based trust, obligation, and familiar ways of talking to each other (Loos et al., 2019). Even when systematic reviews discuss intergenerational play benefits in broad terms, reported outcomes are often framed around family-oriented concepts, such as strengthening family bonds or supporting learning within existing relationships (De La Hera et al., 2017). As a result, many design insights are drawn from contexts where participants already share a social history and a baseline level of trust.

This emphasis raises questions about how well these findings transfer to non-kin settings. In community-based programs, participants may begin with little shared experience, and interaction cannot rely on family obligations or long-term relational ties. Design elements described as effective in family contexts may therefore function differently when applied to interactions between relative strangers.

Research methodology in intergenerational game research also reflects this limitation. Building on Loos et al.'s (2019) notion of distributed collaboration introduced earlier, this matters even more in non-kin settings where participants lack shared history, so "time apart" functions as a pressure-reduction mechanism rather than simply a scheduling preference. While these recommendations are not framed exclusively around non-kin or cross-cultural contexts, they suggest that relationship-building and communication processes play a central role in intergenerational collaboration.

Research on immigrant families makes cultural and language constraints explicit. Studies show that many existing technologies and design approaches were not developed for the lived realities of immigrant older adults and younger family members in multigenerational households. "Lived realities" refers to a practical language mismatch across three layers: the language shared within the pair (e.g., Cantonese or a regional dialect), the interface language of games and services (often English-dominant), and the language required for navigating Canadian institutions. For instance, an older adult may communicate comfortably in Cantonese while the student is Mandarin-English bilingual, and the game interface remains English-only, creating a triple translation burden during play and discussion (Liaqat et al., 2021). Liaqat et al. (2021) further note that relatively little participatory design work has involved multiple generations participating together. Instead, participatory activities in immigrant family technology research often rely primarily on input from grandchildren, with older adults positioned at later stages such as use, testing, or evaluation rather than participating in shared ideation or design decision-making. Taken together, these findings point to a gap in culturally adaptive intergenerational game design research, particularly beyond family-based and kin-centered contexts.

2.2 Digital Divide & Chinese Diaspora

2.2.1 Beyond Access: Skills, Language Barriers, and Digital Confidence

Research on the digital divide increasingly suggests that simply discussing "access" is insufficient to explain inequality. Hargittai (2002) argues that even among those who are already online, inequalities persist because users differ in

the online skills required to effectively find information, a dynamic she frames as a “second-level digital divide”. Van Dijk (2017) offers a similar perspective. He emphasizes that the digital divide often becomes most pronounced after people have acquired devices and internet connectivity, as the use of digital media must then be integrated into daily life. In his phased model, access is a process that begins with motivation and attitudes, followed by material access and skills, and finally develops into sustained use, while social support influences an individual's progress at each stage (Van Dijk, 2017). This matters in the context of the aging of the Chinese diaspora. Based on interviews with nine elderly Chinese immigrants living in Canada, Zhu et al. (2025) argue that the digital divide is not merely a matter of technology access, but a socially contextual phenomenon influenced by cultural mediation. In this process, language barriers, such as government platforms offering only English and English-language interfaces, limit the elderly's ability to operate independently and narrow the range of tools they can actually use. These studies collectively show that psychological and trust-related frictions remain a significant component of actual barriers. Van Dijk mentions that anxiety and fear of technology remain persistent obstacles, while Zhu et al. point out that concerns and distrust regarding fraud lead the elderly to avoid certain digital services (Van Dijk, 2017; Y. Zhu et al., 2025).

2.2.2 Common communication patterns across generations

Intergenerational “brokering” is a stable pattern in immigrant families. Subramoney et al. (2025) define cultural brokering as youth in immigrant families interpreting cultural norms for others, a context-dependent interpersonal process that often supports caregivers. Within this broader phenomenon, language mediation is a more frequently studied form, referring to the use of language to facilitate communication in everyday institutions such as banks, schools, and healthcare, and it is described as demanding and emotionally intensive for young brokers (Subramoney et al., 2025).

Le et al. (2024) define online search and brokering (OSB) as the phenomenon in which youth search online for information for their immigrant families, and they note that OSB typically includes brokering the retrieved information through language translation and cultural explanation. They further argue that language and cultural barriers help explain why this information-seeking burden often falls on children in immigrant and refugee families (Le et al., 2024).

In research on Chinese senior immigrants' health-technology experiences in Canada, WeChat and video chat are described as crucial bridges for maintaining family ties and emotional connection, and children or grandchildren often introduce these platforms and provide technical and emotional support that shapes technology uptake (Y. Zhu et al., 2025). These studies frame intergenerational brokering as recurring family information work that can be burdensome, while also pointing to concrete design-relevant touchpoints for improving how families access, translate, and act on digital information (Subramoney et al., 2025).

Although brokering is documented most often in family settings, the underlying interaction pattern, one person translating, interpreting, and packaging information for another, can also appear in non-kin pairings when language and digital confidence are uneven. This makes "explainability" a design requirement: games and workshop prompts should externalize rules, reduce hidden system states, and legitimize clarification talk as part of play rather than as a disruption.

2.2.3 Platforms as Diasporic Infrastructure: WeChat and Cultural Reproduction

Li's UK-based study (2022) argues that Chinese-language internet-based media can construct a virtual Chinese cultural environment and a Chinese-language context online, which may encourage Chinese people in the UK to retain Chinese cultural identity and to form imagined Chinese communities, including through WeChat groups. Li also frames a tension between adaptation and integration: this online environment may function as a buffer during cultural shock and support faster adaptation, yet it may not encourage integration when users remain cocooned in Chinese-language contexts and become less inclined to initiate contact with the host society (S. Li, 2022).

This "site" framing aligns with platform studies that treat WeChat as both a platform and an infrastructure. Plantin and de Seta argue that platforms can acquire infrastructural properties such as ubiquity and criticality of use, becoming deeply integrated into everyday social life (Plantin & De Seta, 2019). In a Canadian context, Zhu et al. (2025) similarly connect WeChat's Chinese-language interface and everyday features such as voice messages and video calls to preserving familiar cultural practices across distance for Chinese senior immigrants in Canada. WeChat has also been documented as a high use social

platform among university age international students, with evidence linking WeChat use to social self-efficacy and cross-cultural adaptation in student populations (Zhang & Ting, 2024). Together, these studies support treating WeChat as shared diasporic infrastructure across age groups, while leaving open how generational differences in feature use and communication norms shape whether the platform strengthens intergenerational contact in practice.

2.3 Social Connection and Well-Being Outcomes of Play

This section focuses on outcomes that may arise from community-based co-play and are related to social connection, including loneliness, emotional state, and perceived social support. The aim is to understand how co-play influences people's sense of connection and emotional experience over time, particularly in non-clinical, everyday settings. The research reviewed here is used to demonstrate that these outcomes can be considered measurable effects of social play, rather than defining play as a therapeutic or clinical intervention. By keeping the discussion focused on social experience and well-being, this review provides appropriate design and assessment guidelines for community-based intergenerational co-play.

2.3.1 Loneliness and Mood as Outcomes of Social Play

Loneliness is typically framed as perceived social isolation rather than objective aloneness, and it is linked to health and mental-health risks through behavioral, psychological, and physiological pathways (Hawkley & Cacioppo, 2010). This framing matters for game-based interventions because the relevant target is not “more activity” alone, but changes in felt connection and related mood states. In a randomized study with very old adults (M = 82), participants assigned to play Wii with a partner for 10 weeks reported lower loneliness and a pattern of greater positive mood than a watch-TV-with-a-partner control, suggesting that structured co-play can shift social and affective outcomes (Kahlbaugh et al., 2011). A recent systematic review similarly reports that cooperative or social play is often positioned as supporting improved social interaction and participation, with potential benefits for social support and integration. Gutiérrez-Pérez et al also emphasize that the evidence base remains incipient and calls for stronger controlled and qualitative studies (2023). Moving from association to a testable mechanism, a randomized pilot trial using Nintendo Wii Tennis with older adults with subthreshold depression measured depression, perceived social

support, and loneliness pre/post, found overall improvements over time. The study modeled loneliness as a significant predictor of subthreshold depression, with multiple-player mode linked to lower loneliness than single-player mode (Li et al., 2020).

Taken together, these studies support outcomes that are feasible to operationalize within the scope of this MRP, including perceived loneliness, short-term mood, and perceived social support, measured through self-report feedback (Li et al., 2020; Kahlbaugh et al., 2011). It is worth noticing that within this MRP, these instruments are used to track changes in reported experience rather than to make any clinical assessment.

2.3.2 Mechanisms of Engagement and Meaning in Play (SDT and SST)

To understand how digital play fosters connection, it is necessary to examine "gaming effects": a term referring to the cognitive, emotional, and social impacts elicited by gameplay. While this field often focuses on potential harms like addiction, Granic et al. (2014) argue for a more balanced perspective that also accounts for potential benefits. They summarize evidence across cognitive, motivational, emotional, and social domains, suggesting that the act of playing itself can generate positive psychological resources, such as improved mood, and emotional resilience, that are essential for supporting social connection.

Self-Determination Theory (SDT) offers a cross-age explanation for why games can generate genuine engagement across different age groups. This theory considers autonomy, competence, and a sense of belonging as fundamental psychological needs and links the fulfillment of these needs to indicators of health and well-being (Ryan & Deci, 2000). In gaming contexts, SDT-based research has shown that players' perceived in-game autonomy and competence are associated with higher levels of enjoyment; for some players, these studies have also reported changes in emotional state and state self-esteem before and after gaming (Ryan et al., 2006). In multiplayer settings, the satisfaction of autonomy, competence, and relatedness is related to both game enjoyment and intentions for future play, which makes “socially designed” games particularly relevant when the research objective includes sustained engagement (Ryan et al., 2006). Socioemotional selectivity theory further suggests that aging is associated with stronger motivation to derive emotional meaning and weaker

motivation to expand horizons, implying that older adults may value play that is affectively meaningful and instrumentally challenging (Carstensen et al., 2003). Finally, games can also be viewed as learning environments, not just recreational activities. Gee (2004) argues that excellent video games embed strong learning principles, including a “psychosocial moratorium” where real-world consequences are diminished, and learning that is tied to participation in affinity groups.

2.3.3 Youth Motivations, Incentives, and Reciprocal Benefits in Intergenerational Connection

Young people do not usually enter intergenerational programs because they already value intergenerational connection as an abstract social goal. More commonly, they participate through specific entry points, such as school or service requirements, curiosity, interest in the activity itself, or the opportunity to build new social connections (Cohen-Mansfield, 2022). Research on community-based intergenerational programs also indicates that friendship, mutual support, and alleviating loneliness can all be motivations for participation (Xu et al., 2022). This suggests that young people are more likely to join a program if it provides an immediate and identifiable reason for participation, rather than presumably because they already have a commitment to intergenerational bonding.

What keeps young people engaged is the quality of interaction rather than contact alone. Youth are more likely to continue participating when the interaction is enjoyable, socially comfortable, and relatively positive (Cohen-Mansfield, 2022). Research also shows that high quality intergenerational contact is associated with more positive attitudes among younger people, partly because it reduces intergroup anxiety (Drury et al., 2016). Therefore, sustained engagement depends on whether the interaction makes people feel it's worth returning to.

The benefits that young people gain from intergenerational connections are also more specific than general claims about empathy or personal growth. A systematic review of non-familial intergenerational programs involving adolescents and older adults found benefits for younger participants such as identity formation and skill development, alongside broader outcomes including improved attitudes, reduced stereotypes, and greater intergenerational solidarity (Webster et al., 2023/2024). Experimental studies further show that youth

participation can strengthen a sense of purpose, increase comfort in interacting with older adults, and improve attitudes toward seniors (Pillemer et al., 2022). In reverse mentoring contexts, students have also reported a better understanding of older adults' capacities, including a stronger recognition that older adults can continue learning and using digital tools (Leedahl et al., 2020). Taken together, these findings indicate that young people benefit socially, developmentally, and attitudinally from sustained intergenerational interaction.

This matters for the present project because the study examines non-kin, community based intergenerational play rather than one way support. Young participants should therefore be understood not only as helpers, but as co-participants who also need a reason to join, a reason to stay, and a meaningful outcome from participation. That reciprocal framing is important for designing gameplay that supports shared contributions rather than informal assistance.

3 Methodology

This study adopts a methodological framework combining consultation-informed design research with strategic foresight, aiming to analyze the actual experiences of intergenerational participants in digital game interactions, as well as how different game mechanisms affect communication, collaboration, and emotional responses. The research focuses on identifying and summarizing effective interaction patterns through structured consultation workshops, and placing these findings within a broader social, cultural, and technological context for understanding. Secondary literature review and expert interviews are used alongside workshop consultation as key inputs to the study. The literature review provides the main analytical perspective for this study, particularly focusing on interaction patterns, cultural contexts, and the design-related challenges observed during the game process. These themes are carried over to the analysis stage and help shape the judgment criteria used in the strategic foresight framework.

The research process consists of three main stages: first, two face-to-face consultation workshops are used to surface interaction patterns, barriers, and participant feedback; second, these consultation findings are synthesized with secondary literature and expert interviews; third, this synthesis informs the development of the toolkit and prototype concepts, which are further interpreted through strategic foresight.

3.1 Research Design & Ethics

3.1.1 Research Design

This study employed a consultation-informed, evaluation-oriented research design. The empirical input from participants was gathered through two face-to-face consultation workshops that used the same workshop structure, the same selected games, and the same data collection procedures, while involving different intergenerational pairs in each session. These workshops were designed to surface interaction patterns, communication barriers, role dynamics, and experiential feedback relevant to intergenerational digital play. Rather than functioning as formal prototype testing phases, they served as structured consultation sessions that informed later design development.

These workshops are not two consecutive intervention phases, but rather repeated implementations of the same assessment activity. This arrangement allows each workshop to be limited to fewer than ten participants, making it easier for two researchers to guide, observe, and conduct post-game interviews, while also allowing for more detailed attention to the interaction details within each intergenerational pairing. This iterative process is researcher-led and based on observed interaction patterns and assessment data, rather than participant-led co-design or collaborative content creation. These activities also take place in a shared physical environment.

In both workshop sessions, participants from different generations experienced the selected digital games in non-familial pairs in a shared physical environment. Researchers were responsible for the overall process of design, observation, and recording, but participants were not required to participate in any form of design decision-making, content generation, or rulemaking. Their roles were consistently limited to consultation contributors and evaluators, with their engagement primarily manifested in interactive behaviors and feedback. The fact that participants were paired in a non-relative context, without any existing personal or familial relationships, allowed this study to focus on the dynamics of interaction beyond pre-existing kinship roles.

Based on insights generated from these consultation workshops, together with findings from secondary literature, expert interviews, and strategic foresight analysis, the researchers developed a toolkit and prototype concepts as design

responses. However, these prototype concepts were not empirically evaluated in a separate, independent participants' workshop. Therefore, in this study, they are positioned as synthesized, research-informed design outcomes rather than as products empirically validated through a second stage of participant testing.

The strategic foresight approach does not directly involve the data collection process but rather functions during the analysis stage. Researchers combine the qualitative assessment results with the STEEPV framework and Causal Layered Analysis (CLA) to understand the long-term social, cultural and value drivers behind intergenerational game interactions, and to evaluate the applicability of the refined design principles in future scenarios.

3.1.2 Ethical Considerations

This study involved participants of different age groups. The research process followed the relevant norms of OCAD University and the Yee Hong Caregiver Education and Resource Centre's research ethics committees. Workshop activities were conducted in collaboration with the Yee Hong Caregiver Education and Resource Centre, and the use of collected workshop materials was subject to the partner organization's internal review and approval process. All participants would receive clear research explanations before participating in the study and voluntarily sign the informed consent form. Participants could choose to withdraw from the study at any stage, and there would be no adverse consequences.

In the design of the workshop, the study focused on the participation experience of older participants. The trial-play process emphasized clear guidance, rhythm control, and necessary technical support to reduce operational pressure. All data collected during the research, including questionnaire results, audio recordings, and observation notes, were anonymized and securely stored, and were only used for academic research purposes.

3.1.3 Participant Recruitment and Screening Criteria

The research subjects came from the Chinese communities in the Greater Toronto Area, consisting of two groups: undergraduate or college students and retired seniors. This grouping reflects typical generational differences in digital literacy, communication styles, and technology usage habits.

The student participants were current undergraduate or college students and

self-identify as Chinese or Chinese Canadian. Senior participants were 65 years of age or older. Participants were not required to have prior experience with digital games to ensure the study covered different levels of interactive scenarios. Through intergenerational pairing, this study observed differences in performance among individuals from diverse backgrounds and with varying skill levels during game interactions.

Participants were distributed across two face-to-face workshop sessions, both following the same game and assessment process and using the same selected games. This arrangement helped keep the size of each workshop within a range that facilitated facilitation, observation, and post-game discussion, while also maintaining consistency in the workshop setup.

3.2 Consultation Workshops and Data Collection

The data was collected through two structured face-to-face consultation workshops; see Section 3.1.1 for the format and research-design function. The resulting findings are grounded in in-person gameplay experiences and may inform future online intergenerational game design.

3.2.1 Consultation Workshop Format

Two face-to-face workshop sessions were conducted using the same evaluation format and the same selected digital games. At the beginning of each workshop, participants completed a pre-test questionnaire to gather basic background information, including age, language preference, past gaming experience, and a self-assessment of their confidence in their digital skills. Subsequently, participants experienced selected digital games in an intergenerational pairing manner.

The selected games were characterized by a focus on cooperation and communication, avoiding emphasis on competitiveness or operational complexity. Within the consultation process, these selected digital games functioned as elicitation devices. They enabled participants to reflect on communication, collaboration, role distribution, comfort, and difficulty through direct experience, allowing the researchers to identify design-relevant patterns and tensions. The researchers conducted structured observations to record the language communication methods, collaboration strategies, role allocation, and emotional responses of the participants during the game process. After the trial

play, participants completed an evaluation questionnaire and participated in a brief discussion to assess their interactive experience.

The main purpose of these workshop sessions was to identify which interaction patterns were helpful or hindered intergenerational communication under the existing game mechanisms, and to provide empirical evidence for subsequent prototype development. These concepts are discussed in this study as design translations, rather than as a separate phase of participant testing.

3.2.2 Data Collection Tools

The study employed a variety of tools for data recording, including structured observation record templates, audio recordings of the trial play process and discussions, and photo records of the workshop site. Both workshop sessions followed the same process and used the same observation, questionnaire, and discussion tools to support consistency and comparability across the data collected from different participant groups. The complete questionnaires and guidance materials will be included in the appendix.

3.3 Analytical Framework

The analysis in this study was not intended to measure the effectiveness of a finalized intervention. Instead, it was used to synthesize participant consultation, secondary literature, expert insight, and foresight interpretation into design principles, toolkit components, and prototype concepts. In this process, qualitative workshop findings were treated as consultation inputs for design development, while literature review and expert interviews were used to contextualize, challenge, and extend the interpretation of recurring patterns.

3.3.1 Qualitative Analysis

The qualitative data mainly derives from observation records, discussion audio, and open-ended interview responses collected across the two workshop sessions. These are processed using the thematic analysis method. The analysis is divided into two stages. The first stage involves open coding to identify recurring behavioral patterns, communication methods, and emotional responses. The second stage integrates the initial coding into higher-level themes to summarize the key features of intergenerational game interactions.

3.3.2 Quantitative Feedback Analysis

The quantitative data mainly comes from the evaluation of questionnaires across the two workshop sessions. These questionnaire responses are used descriptively to summarize participants' interaction experience, collaborative feelings, and digital confidence under the selected gameplay conditions. Although the overall participant sample is limited, it is appropriate for an assessment-oriented workshop study that aims to inform iterative refinement and generate design relevant insights rather than population level estimates. Within an information power framework, Malterud et al. note that "a purposive sample of six to 10 participants with diverse experiences might therefore provide sufficient information power" in exploratory work (2016, p. 4). Accordingly, research results do not aim for statistical inference or compare the questionnaire responses at different workshop stages through quantitative indicators, but rather as a structured supplement to the qualitative findings and as a way to identify recurring tendencies across participant groups. This position is also consistent with evidence on qualitative sample adequacy and thematic saturation. Existing studies have shown that in qualitative research, core themes can often be identified in smaller samples, and theme saturation usually occurs within six to twelve interviews (Guest, Bunce & Johnson, 2006). In this study, the combination of quantitative feedback and repeated play observations helps to enhance the explanatory power of intergenerational interaction patterns, even with a limited sample size. The conclusions obtained still have a strong analytical value.

3.3.3 Integration of Strategic Foresight Tools

After completing the thematic analysis, the research results were further interpreted using strategic foresight tools. The STEEPV framework was employed to place the research findings within a broader social, technological, economic, environmental, political, and value context. Subsequently, Causal Layered Analysis (CLA), a foresight approach proposed by Inayatullah (2004), was used to explore underlying cultural assumptions and long-term drivers beneath surface interactions.

CLA examines an issue across four layers of depth: the litany (surface-level events and popular narratives), systemic causes (institutional and structural factors), worldview (the cultural values and beliefs that legitimize those structures), and myth/metaphor (the deep, often unconscious narratives that frame how a problem is understood). In this study, the CLA is used not only to

analyze why intergenerational digital alienation persists despite existing technological and policy support, but also to translate consultation findings into deeper cultural and design implications. This is done by going beyond observable usability barriers to explore the deeper cultural metaphors related to aging, dignity, and gaming.

The use of the STEEPV framework is informed by the literature review, which highlights that intergenerational play is shaped not only by game mechanics, but also by broader social, cultural, and value-based factors such as digital inequality, cultural norms, and power asymmetries. STEEPV provides a structured approach to these identified themes in the literature, enabling research to move beyond immediate game observations and examine how these factors interact with long-term social and technological changes.

Through this integration process, the research not only focused on the interaction patterns observed in the workshop sessions but also identified which design principles might remain effective in future technological environments and changes in social structures. This foresight analysis helps avoid limiting research conclusions to specific contexts or short-term conditions and provides a reference for the long-term design of intergenerational digital games.

4 Contextual & Foresight Analysis (STEEPV + CLA)

4.1 Purpose & Approach

As described in Section 3.3.3, this chapter uses strategic foresight tools to extend the workshop findings beyond their immediate context. The analysis is conducted in three steps. Section 4.2 uses the STEEPV framework to scan the external social, technological, economic, environmental, political, and value forces shaping the intergenerational digital game within the Chinese Canadian community, synthesizing them into four sets of key tensions. Section 4.3 then employs a hierarchy of causal analysis (CLA) to delve deeper beneath these surface observations, examining the deeper cultural structures that sustain intergenerational alienation. Finally, Section 4.4 integrates these two parts of the analysis into a set of context-aware design criteria and systemic insights to inform the toolkit development in Section 6.

4.2 STEEPV Analysis Summary

4.2.1 Horizon Scanning (Signals of Change)

The following scan maps the external drivers shaping the context of intergenerational digital play in the Chinese diaspora in the Greater Toronto Area. These signals highlight both structural barriers and emerging cultural shifts. Robustness is assessed through indicators such as program continuity, frequency, dedicated staffing, and the presence of both senior serving and youth serving delivery partners.

Dimension	Signal	Source(s)
Social	Language and cultural barriers increase social isolation risk for immigrant seniors, particularly affecting intergenerational relationships within immigrant families.	*(Gov of Canada, 2024; Liaqat et al., 2021)*
	Many new immigrant seniors live in intergenerational households, yet caregiving duties in an unfamiliar cultural context can still feel isolating.	*(Gov of Canada, 2024; Y. Zhu et al., 2025)*
	Employment and Social Development Canada explicitly funds projects for vulnerable children and youth who are at high risk of, or already experiencing, negative impacts due to social isolation	*(Employment and Social Development Canada, 2021).*
	Yee Hong runs an Intergenerational Pen Pal Program intended to foster communication and social interaction across generations.	*(Yee Hong, n.d.)*
	The Chinese population is concentrated in the GTA, creating a dense diasporic context where cross generational contact is feasible.	*(Statistics Canada, 2026)*
Technological	Seniors' adoption of digital technologies is closely linked to social connectedness; adoption rates rose significantly during COVID-19.	*(Lin et al., 2023; Y. Zhu et al., 2025)*
	WeChat functions as critical daily communication infrastructure for the Chinese diaspora, with approximately 1.2 billion monthly active users globally.	*(Lau, 2020; Plantin & De Seta, 2019)*

	Unequal digital skills and literacy amplify feelings of exclusion and loneliness among older adults, constituting a "second-level digital divide."	*(Hargittai, 2002; Lin et al., 2023)*
	In Canada, mobile devices are now the top gaming device for 52 percent of players, indicating a mobile first direction for gameplay access.	*(Entertainment Software Association of Canada, 2025).*
	In Canada, the gaming community spans key age groups, with 35 percent aged 55 plus, and 27 percent aged 16 to 34, suggesting that gaming participation is broadly distributed across generations.	*(Entertainment Software Association of Canada, 2025).*
Economic	Immigrant and refugee seniors are more likely to live in poverty and face financial barriers to accessing services.	*(Gov of Canada, 2024)*
	Caregiving and work obligations limit the time families can dedicate to shared leisure and intergenerational play.	*(Gov of Canada, 2024; Liaqat et al., 2021)*
	The Government of Ontario operates the Seniors Community Grant Program, which funds local not for profit community groups to deliver projects that help older adults stay active and connected and avoid social isolation.	*(Ontario Ministry for Seniors and Accessibility, n.d.)*
Environmental	COVID-19 accelerated seniors' shift to online communication but also widened the digital gap for those without access or skills.	*(Lin et al., 2023; Y. Zhu et al., 2025)*
	In geographically distributed immigrant families, remote intergenerational communication tends toward brief routine exchanges, with geographic separation amplifying language and cultural barriers.	*(J. S. Zhu & Zhao, 2025)*
Political	Canada's New Horizons for Seniors Program funds community-based social inclusion and intergenerational projects.	*(Gov of Canada, 2025)*
	Platforms like WeChat serve as essential community infrastructure while simultaneously	*(Lau, 2020; Plantin & De Seta, 2019)*

	being targets of geopolitical policy, creating platform uncertainty for diaspora users. For example, the Government of Canada announced that WeChat would be removed from, and blocked for download on, government issued mobile devices due to privacy and security concerns, illustrating that access and acceptability of diaspora platforms can be shaped by state policy.	*(Treasury Board of Canada Secretariat, 2023)*
Values	Filial piety and hierarchical communication norms shape intergenerational dynamics in Chinese-Canadian families; first-generation immigrants favour top-down patterns while second-generation members prefer egalitarian exchange.	*(Chung, 2021)*
	Attitudes toward gaming among older adults are shifting: an estimated 45–57 million seniors in China now play video games, roughly double the figure from mid-2020.	*(Fan & Liang, 2021)*

4.2.2 Cross-Impact Synthesis: Critical Tensions

While the signals above provide isolated data points, the most significant design implications emerge where these dimensions intersect. By analyzing the cross-impacts between categories, such as how cultural values shape technology use, we identified four critical tensions that our design must navigate:

Tension 1: The Digital Paradox of Connection (Social + Technological + Environmental)

- **The Conflict:** As noted in the scan, digital platforms (Technological) are now the primary infrastructure for social life (Social). However, the very tool meant to connect seniors, technology, is also the primary barrier excluding them due to the "second-level digital divide" (Section 2.2). The Environmental signals reinforce this paradox: COVID-19 demonstrated that older adults could shift to online communication when circumstances demand it, yet that same period also widened the gap for those without adequate access or skills (Lin et al., 2023; Y. Zhu et al., 2025). Meanwhile, in geographically distributed immigrant families, remote intergenerational communication tends to collapse into brief routine exchanges rather than

meaningful interaction (J. S. Zhu & Zhao, 2025), suggesting that simply providing a digital channel is insufficient without structured activities that sustain participation.

- **Implication:** We cannot view "social play" and "technological support" as two separate stages. Game design must function as a "digital broker", directly embedding technological support into social interactions to lower the barrier to entry. Crucially, the design must also provide shared tasks, ensuring that remote interactions move beyond routine "say hi and bye" check-ins, instead of using gameplay as a scaffold to support deeper communication.

Tension 2: Feasibility vs. Policy Ambition (Economic + Political)

- **The Conflict:** While government policies like the New Horizons program (Political) encourage ambitious innovation, the economic reality for many immigrant seniors is constrained resources (Economic). Solutions relying on high-end hardware, such as VR or PCs, are not well-suited to the realities of this demographic. Meanwhile, platforms like WeChat, which serve as critical community infrastructure, are also influenced by geopolitical policies (Lau, 2020; Plantin & De Seta, 2019), creating platform uncertainty that further complicates long-term deployment strategies.
- **Implication:** To ensure scalability and economic viability, the design should prioritize low-cost delivery methods and operate well on common personal devices, especially smartphones and tablets, rather than relying on expensive proprietary hardware. Furthermore, dependence on a single platform introduces real-world disruption risks. These risks include participants' inability or unwillingness to install or update specific applications, institutional or device-level limitations rendering certain applications unusable, and sudden changes in platform availability or credibility. To address these scenarios, the project should support parallel communication channels and simple backup plans, such as web-based registration and reminder processes, SMS or email reminders when necessary, and printable or offline versions of core instructions so that the event can continue even if a platform is unavailable.

Tension 3: Egalitarian Play vs. Filial Hierarchy (Values + Social)

- **The Conflict:** Modern game mechanics often assume players are equals

(Values). However, Chinese intergenerational dynamics are grounded in filial piety and hierarchy (Social). Forcing a grandmother to "compete" with her grandchild may cause discomfort or "loss of face" rather than fun. In non-kin settings, this tension takes a different form: there is no existing social script for why a young stranger and an older adult should play together at all. Without family obligation as a default motivator, both sides lack a cultural framework for initiating or sustaining playful interaction.

- **A Counterbalancing Signal:** Importantly, attitudes towards gaming among older adults are changing. It's estimated that between 45 and 57 million older adults in China currently play video games, roughly double the figure from mid-2020 (Fan & Liang, 2021). This suggests that the cultural assumption that "gaming is only for young people" is eroding, suggesting that a "respectful gaming" design strategy has real-world grounding rather than being purely aspirational.
- **Implication:** The game mechanics must support "respectful gaming." This means using asymmetrical roles where the youth handles dexterity and execution to leverage their numerical confidence, while allowing seniors to focus on strategy and experiential judgment, leveraging their life experience. For non-kin pairs, the design must also provide an explicit "reason to gather," using shared cultural touchpoints such as food, holidays, or dialects as natural entry points for connection. The shifting attitudes among seniors toward gaming provide a favorable cultural tailwind for this approach.

Tension 4: Kin Trust vs. Non-Kin Scriptlessness (Social + Values + Environmental)

- **The Conflict:** Most intergenerational play research assumes a baseline of kin-based trust, where family obligation and shared history provide a foundation for interaction. However, this project pairs strangers across generations in a community setting. For non-kin pairs, there is no pre-existing relationship, no shared history, and no cultural obligation to connect. For families, the disconnect manifests as polite but hollow exchanges sustained by obligation rather than genuine engagement; for non-kin, the gap is total: strangers across generations simply never encounter each other. The deeper cultural structures that sustain this disconnection, including the spatial and atmospheric dimensions that existing Western frameworks such as "loneliness" fail to capture, are examined through CLA in

Section 4.3. This gap is echoed in the literature: Liaqat et al. (2021) note that relatively little participatory design work has involved multiple generations participating together, with older adults typically positioned at later stages such as testing or evaluation rather than shared ideation. The Environmental scan further underscores the urgency: even within families, remote communication tends to collapse into brief routine exchanges (J. S. Zhu & Zhao, 2025), suggesting that without deliberate structural support, intergenerational contact, whether kin or non-kin, defaults to superficial interaction.

- **Implication:** The design must actively construct the conditions for trust. This requires repeated sessions rather than one-off events, structured icebreakers grounded in shared cultural references, and community spaces (such as partner organizations) that serve as neutral ground for non-kin pairing. The goal is to create the conditions under which shared cultural frequency, low-stakes play, and repeated co-presence can accumulate into a sense of belonging that does not require kinship. The cultural metaphors that frame both the current disconnection and its proposed resolution are developed in Section 4.3, where CLA is used to move beneath these surface-level tensions to the myth and worldview layers that sustain them.

4.3 Causal Layered Analysis (CLA)

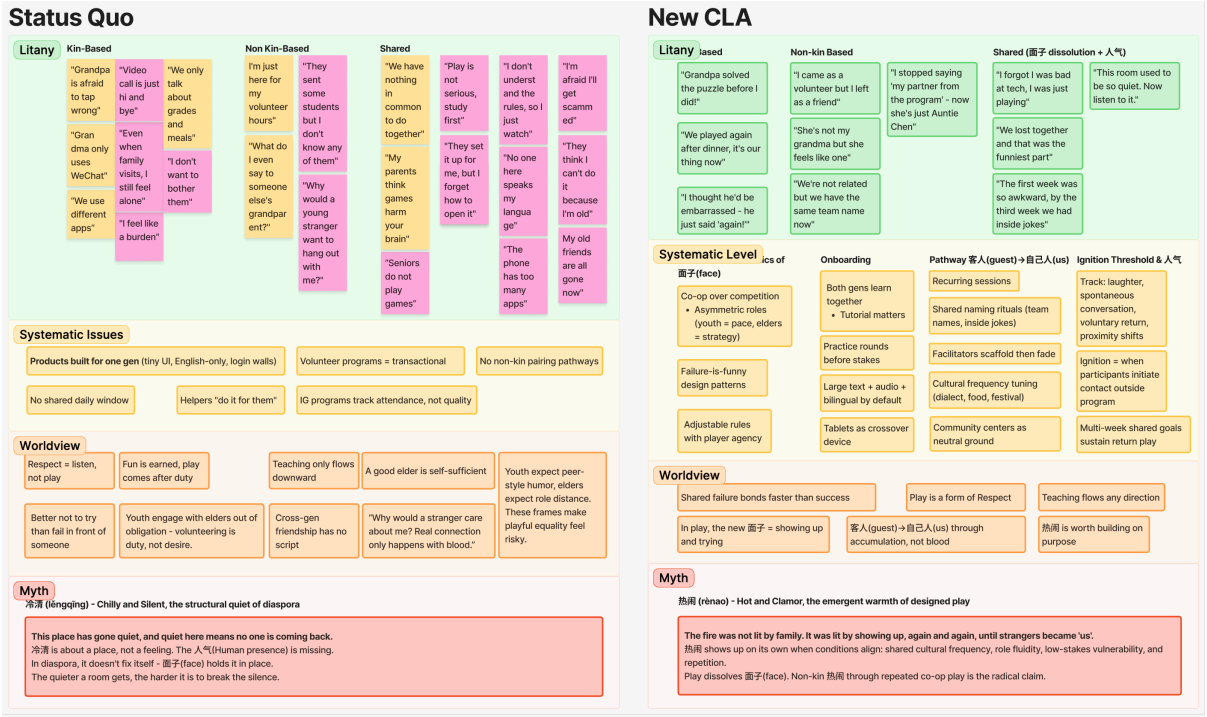

Figure 1 Overview of the four-layer CLA framework applied to intergenerational digital play. A larger and more legible version of this diagram is provided in Appendix F.

As described in Section 3.3.3, this study employs Causal Layered Analysis (CLA) to move beyond surface-level observations and examine the deeper cultural structures that shape intergenerational disconnect. This section applies the four-layer framework of CLA - litany, systemic causes, worldview, and myth/metaphor - to the specific context of Chinese Canadian intergenerational digital play. Moving from the surface "litany" of daily complaints down to systemic causes, worldviews, and core myths, this analysis helps explain why previous interventions often fail: they address symptoms rather than the deeper cultural metaphors about aging and gaming.

4.3.1 The Litany: "Seniors Don't Play"

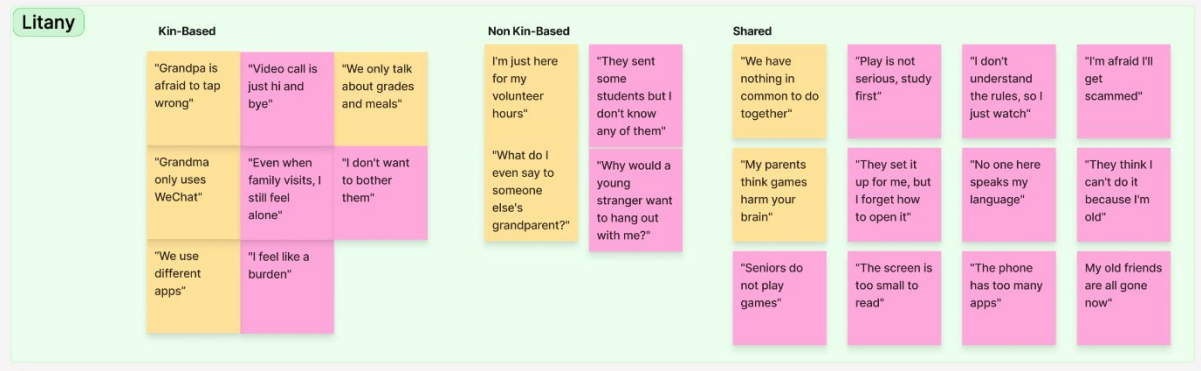

Figure 2 CLA Layer 1 - The Litany: "Seniors Don't Play."

At the surface level, the problem manifests as a series of disconnects justified by age-related stereotypes. The literature review documented several frictions that feed this surface narrative: uneven digital skills negatively associated with age (Hargittai, 2002), confidence gaps that shape how people progress through stages of technology use (Van Dijk, 2017), and negative age stereotypes that inhibit intergenerational engagement (Loos et al., 2019). However, these structural frictions are rarely explicitly acknowledged in everyday discourse. Instead, within families, common statements include "Seniors do not play games," or "My grandma only uses WeChat." These statements function as a "litany" of excuses, framing the issue as inevitable generational gaps or personal preferences. From this perspective, the lack of intergenerational gaming is often explained through simplified assumptions, such as the idea that games are too fast paced, too competitive, or too difficult for seniors to follow, while younger generations are "too busy with school."In non-kin contexts, the litany takes a different shape. Young people might say, "What do I even say to someone else's grandparents?" or "I'm just here for my volunteer hours." Seniors, on the other hand, might ask, "Why would a young stranger want to be with me?" These statements reveal that the barrier is not only about technology or language but also about the perceived absence of any reason to connect in the first place.

In both scenarios, these explanations pathologically attribute the problem to the users themselves: the seniors are too slow, the young people are too impatient, the strangers are too distant. They frame the problem as a personal issue rather than questioning the environments that create this alienation.

4.3.2 Systemic Causes: The Infrastructure of Disconnect

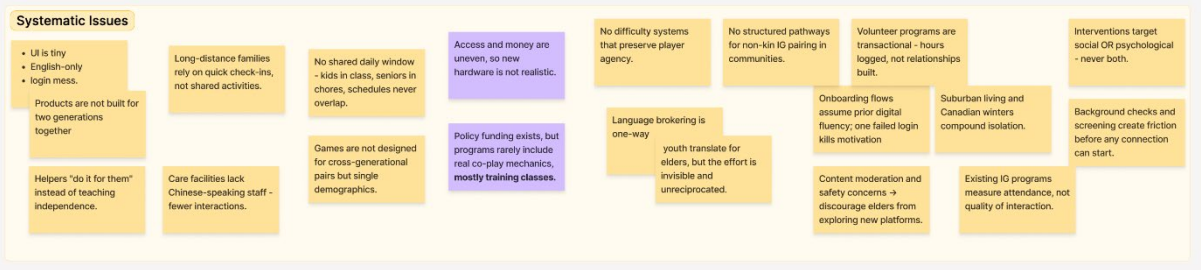

Figure 3 CLA Layer 2 - Systemic Causes: The Infrastructure of Disconnect.

Beneath these personal excuses lie systemic failures. As Tension 1 established, the digital divide extends well beyond physical access: Van Dijk's (2017) staged model shows that even after obtaining devices and connectivity, users must still navigate motivation, skills, and sustained usage, with social support shaping each transition. What the CLA adds is an observation about the structure of exclusion itself: digital ecosystems are age-segregated by design, sorting older users into a parallel, diminished digital world through small text, English-only menus, and complex login flows. Section 2.2.3 further showed that platforms like WeChat have acquired infrastructural status for the Chinese diaspora, meaning that they function not only as communication apps but also as everyday systems for family contact, community coordination, payments, information sharing, and social participation (Plantin & De Seta, 2019; Section 2.2.3). Yet this very reliance creates vulnerability when policy or geopolitical forces threaten platform access.

Structurally, daily routines further split the generations: children are in school, parents are at work, and the elderly are doing housework, leaving no shared time for interaction. For families living apart, communication is often reduced to "let's say hello" via quick video calls, which lacks the shared activity needed to sustain conversation. While policy funding exists, such as New Horizons for Seniors Program (Employment and Social Development Canada, 2024). It often supports digital literacy training courses rather than creating spaces for co-play, leaving the structural gap unaddressed.

For non-kin interaction, the systemic gaps run even deeper. In most communities, there are no structured pathways for intergenerational pairing outside of families. Existing volunteer programs are transactional: hours are logged, but relationships are not truly established. Background checks and screening processes create friction before any connection even begins. By the time a young volunteer clears the administrative pipeline, the interaction has

already been framed as a service delivery rather than a relationship. When helpers do engage with seniors, they tend to "do it for them" instead of teaching independence, reinforcing a one-directional care dynamic rather than the reciprocal exchange that the brokering literature identifies as both burdensome and socially meaningful (Le et al., 2024; Subramoney et al., 2025).

4.3.3 Worldview: The Clash of Dignity and Play

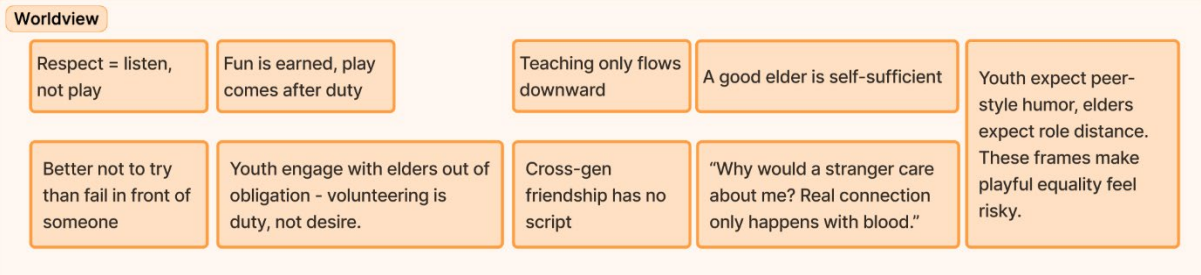

Figure 4 CLA Layer 3 - Old Worldview: The Clash of Dignity and Play.

Deeper still lies a clash of cultural worldviews. The tension between filial hierarchy and egalitarian play (Tension 3 in Section 4.2.2) operates at this deeper worldview level. The Confucian value of filial piety (xiao, 孝) often dictates a hierarchy that conflicts with the egalitarian nature of modern play (Chung, 2021). For a senior, "respect" means being listened to, not competing on a level playing field.

This creates a significant barrier: the risk of "losing face" (mianzi, 面子). If a game requires reflexes or technical skill, a senior risks failing in front of their grandchild, undermining their authority and dignity. Conversely, youth expect peer-style humor and equality in games. This tension makes "playful equality" feel risky for both sides: youth avoid it to prevent awkwardness, and elders avoid it to preserve dignity.

Beyond the kin-based dynamics, a deeper worldview barrier affects non-kin interaction. As Section 2.1.4 noted, most intergenerational play research assumes kin-based trust and shared history as defaults (De La Hera et al., 2017; Loos et al., 2019); when these are absent, intergenerational friendship outside the family simply has no cultural script. There is no recognized "reason" for a young stranger and an older adult to spend time together. The belief that "troubling others is worse than being lonely alone" discourages seniors from accepting help or companionship from people outside their family. Meanwhile, youth tend to engage with elders out of obligation (volunteering, duty) rather

than genuine desire. These worldview-level assumptions explain why even well-funded programs can fail: they provide the logistics of connection but not the cultural permission for it.

Figure 5 CLA Layer 3 - New Worldview: Reframing play, dignity, and intergenerational connection.

The reframing required at this layer is not merely structural but cultural. Under the old worldview, spending time on "unproductive" play with a younger person risks the elder's dignity; under a reframed worldview, choosing to be present and vulnerable in play is itself a form of 尊重 (*Zūnzhòng*, respect), signaling genuine care rather than dutiful compliance. For youth, the shift is equally important: engaging with an older stranger moves from "logging volunteer hours" to participating in a shared activity where both sides contribute something the other cannot provide. Play, in this reframing, is not the opposite of dignity but a new vehicle for it.

The design, therefore, must create a "failure-proof" safe space where the risk of losing face is minimized, and it must also provide the cultural legitimacy for non-kin connection by framing shared play in this reframed worldview, which is “play as mutual respect, rather than a awkward obligation”.

4.3.4 Myth & Metaphor: From “冷清”(Chilly and Silent) to “热闹”(Hot and Clamorous)

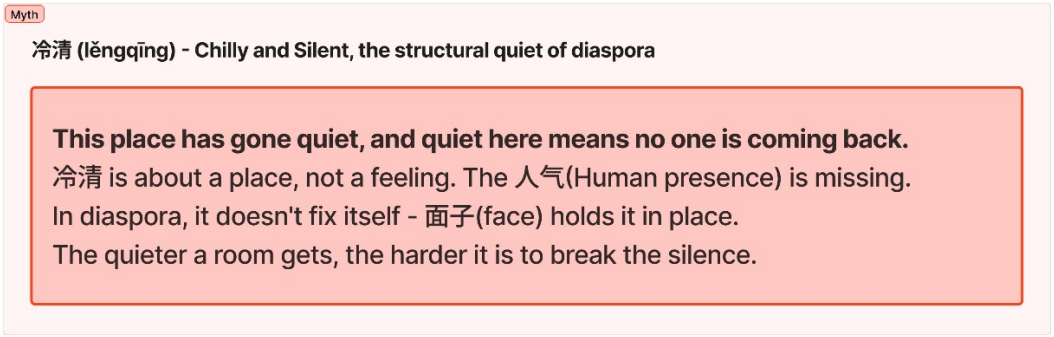

Figure 6 CLA Layer 4 - Myth & Metaphor: "冷清"(Chilly and Silent)

At the deepest level, the prevailing cultural metaphor for intergenerational disconnect is 冷清 (lěngqīng, literally "chilly and silent"): the structural quiet of a place drained of 人气 (rénqì, literally "human energy"), the palpable sense that a space is alive with human presence and social activity. 冷清 (lěngqīng) does not translate to "loneliness." Loneliness is a feeling inside a person. 冷清 (lěngqīng) is about a place: a room, a hallway, a community center on a Tuesday afternoon. It means the sense that people come and go, the warmth of human presence, is missing. In China, 冷清 (lěngqīng) tends to resolve itself through the density of daily life: Chinese New Year arrives, neighbors drop by, festival routines fill spaces back up. In the diaspora context, the structures that once generated warmth, multi-generational households, tight neighborhoods, dialect circles, festival routines, were severed by immigration. So 冷清 (lěngqīng) persists.

面子 (miànzi), the deeply rooted Chinese cultural concern for one's social reputation and public dignity, holds 冷清 (lěngqīng) in place. Elders withdraw from technology to avoid looking helpless; youth keep interactions surface-level to avoid awkwardness. Both sides fear making mistakes in front of the other, so neither initiates. The quieter a space becomes, the harder it is to be the one who breaks the silence. 冷清 (lěngqīng) reads as a cultural signal: "that place has no 人气(rénqì), don't bother." This dynamic is self-reinforcing. As 冷清 (lěngqīng) settles into a space, it discourages people from showing up; the resulting absence only deepens the quiet, which in turn makes the next person even less likely to initiate contact. One-off events cannot break this cycle because a single gathering does not generate enough accumulated warmth to tip the balance. Furthermore, elders caught in 冷清 (lěngqīng) become invisible: someone who is never visited stops expecting visits, and a space without visitors stops

signaling that anyone is welcome. Invisibility is not a side effect of 冷清 (lěngqīng); it is the mechanism by which it deepens.

The analytical significance of choosing 冷清 (lěngqīng) over Western constructs such as "loneliness" or "social isolation" lies in where it locates the problem. Loneliness, as operationalized in the well-being literature (Section 2.3.1), is an individual psychological state measured through self-report instruments. 冷清 (lěngqīng) names a condition of the environment rather than of the person. This reframing shifts the design target: if the problem were loneliness, the intervention would be psychological and directed at the individual; because the problem is 冷清 (lěngqīng), the response must be environmental, constructing the spatial, temporal, and social conditions under which 人气 (rénqì, literally "human energy") can accumulate. It is for this reason that the toolkit (Section 6) prioritizes place-based, repeated programming over individual outreach or one-time events.

For non-kin, 冷清 (lěngqīng) is total. There is no video call, no "say hi and bye," no starting point. The condition is built from both sides: elders do not expect strangers to care, and youth do not know such elders exist.

Figure 7 The proposed metaphor shift: from "冷清"(Chilly and Silent) to "热闹"(Hot and Clamorous).

This project seeks to shift the cultural metaphor to 热闹 (rènao, literally "hot and clamorous"): the emergent warmth that arises when people show up, again and again, until shared laughter accumulates into belonging. 热闹 (rènao) is not "community" in the programmatic sense. It cannot be forced by putting people in a room. It emerges when certain conditions align: shared cultural frequency (dialect, food, festival references), role fluidity (everyone has something to

contribute), low-stakes vulnerability (what games produce naturally), and repetition (showing up regularly, not just once). You cannot design 热闹（rènao）directly; you design the conditions, and it either happens or it doesn't.

Play is the mechanism that makes 热闹（rènao）possible between people who would otherwise stay polite and stay quiet. Inside a game, mistakes are funny, not shameful. Losing together is bonding, not humiliation. An elder who fails a puzzle laughs instead of losing dignity. If 冷清（lěngqīng）is held in place by 面子 (miànzi, face), then play is what loosens 面子 (miànzi), not by removing it, but by redirecting it. In everyday interaction, 面子 (miànzi) rewards withdrawal: staying silent preserves dignity, and refusing to try protects one's reputation. Inside a game, this calculus inverts. Showing up and trying becomes the face-preserving move; withdrawing becomes the face-losing one. This redirection is critical because it works with Chinese cultural logic rather than against it: the design does not ask participants to abandon their concern for face, but restructures what counts as face-preserving behavior within the bounded context of play. Moreover, choosing to spend unstructured, "unproductive" time playing with someone functions as a form of 尊重 (zūnjìng, respect), signaling genuine care rather than dutiful compliance. Play has no instrumental justification other than wanting to be present with another person, which is precisely what makes it a credible signal of connection in a culture where most intergenerational contact is framed by obligation.

The radical claim of this research is that 热闹（rènao）, traditionally a family phenomenon associated with gatherings such as 年夜饭 (niányèfàn, the Chinese New Year's Eve reunion dinner), weddings, and 满月酒 (mǎnyuèjiǔ, the one-month celebration banquet for a newborn), can emerge between strangers through culturally anchored, repeated, cooperative play without blood ties. Someone who shows up every week crosses a threshold from 客人 (kèrén, guest, someone who is politely welcomed but remains an outsider) to 自己人 (zìjǐrén, literally "one of our own people," someone accepted into an in-group), not through kinship but through accumulated shared experience. This transition is not declared; it is realized retrospectively. No one announces that a stranger has become 自己人 (zìjǐrén). It happens when a participant stops saying "my partner from the program" and starts saying "Auntie Chen."

Critically, this transition is bilateral. For the elder, 自己人(zìjǐrén) means being seen as a whole person rather than a service recipient. For the youth, an older

stranger offers something peers cannot: patience shaped by decades of navigating unfamiliar systems, cultural memory carried in dialect and gesture, and a perspective on time that reframes the urgency of student life - a form of relatedness that their own generation cannot provide (Ryan & Deci, 2000). The mechanism that separates 自己人 (zìjǐrén, literally "one of our own people,") from 客人(kèrén, someone who is politely welcomed but remains an outsider) is reciprocity: when both sides give and receive, when an elder teaches mahjong strategy and a youth teaches swipe gestures with equal legitimacy, the guest label dissolves. This distinguishes the proposed model from conventional volunteer programs, in which help flows in one direction and the elder remains permanently positioned as a recipient rather than a contributor. Where 冷清 (lěngqīng) feeds itself in a downward spiral, 热闹 (rènao) feeds itself in the other direction: warmth draws people in, people generate more warmth, and that warmth becomes a signal: "that place has 人气 (rénqì, literally "human energy"), go there." The design challenge is reaching the ignition threshold: enough repeated sessions, enough cultural resonance, to tip a space from self-sustaining 冷清(lěngqīng) into self-sustaining 热闹 (rènao).

4.4 Design Implications from Foresight

The CLA revealed that the barriers faced by intergenerational games are not merely technical or logistical; they are rooted in deep cultural worldviews and myths about aging, dignity, and the meaning of connection across generations. A purely technical solution, such as better applications or simpler interfaces, addresses only the surface litany and systemic layers while leaving the worldview and metaphor layers untouched. This section combines the four key tensions identified in the STEEPV cross-influence analysis with the four levels of CLA to outline the resulting design commitment.

The most immediate implication concerns material access. As Tensions 1 and 2 established, immigrant older adults face compounded economic constraints and a second-level digital divide, while the CLA's systemic layer identified age-segregated digital ecosystems that effectively exclude senior users. The design response is that any game must prioritize mobile compatibility and web-based operation, functioning within or alongside platforms already used by participants such as WeChat. However, platforms like WeChat are simultaneously essential community infrastructure and targets of geopolitical policy, so the game should treat messaging platforms as referral pathways rather

than host environments.

The second implication addresses dignity in play. To reduce the risk that any participant is exposed as less fluent or less confident in a particular task, gameplay should assign different but equally necessary contributions. Interface intensive actions can be handled by the player who is more comfortable with the device, while strategy, interpretation, memory, communication, or knowledge based decisions remain visibly necessary for progress. These roles should be assigned according to preference, confidence, and observed comfort. This protects dignity without turning collaboration into one way help.

A third implication follows from the litany layer of the CLA: both kin and non-kin pairs frequently describe having "nothing to talk about," and the environmental scan confirmed that remote intergenerational communication tends to collapse into brief routine exchanges, especially in geographically distributed families (J. S. Zhu & Zhao, 2025). These findings point to the need for scripted scaffolding: the game must provide structured communication prompts and shared tasks that move interaction beyond superficial check-ins. Rather than relying on organic conversation, the design should act as what the STEEPV synthesis termed a "digital broker," explicitly guiding players on what to say and do. These prompts should draw on shared cultural touchpoints, such as food, festivals, or dialect-specific expressions, so that even strangers can find common ground quickly. For kin pairs, such prompts can unlock deeper conversation; for non-kin pairs, they provide the initial social script that the relationship itself has not yet generated.

Finally, the deepest layer of the CLA, the myth and metaphor level, has implications for the temporal structure of the program.

Section 4.3.4 established that 冷清(lěngqīng) deepens through a specific mechanism: invisibility. Someone who is never visited stops expecting visits, and a space without visitors stops signaling that anyone is welcome. A single play session cannot reverse this because one gathering does not generate enough accumulated warmth to counteract the self-reinforcing cycle. The design must therefore construct a continuity system that addresses the three CLA mechanisms (invisibility, the 客人 (kèrén, guest)-to-自己人(zìjǐrén, literally "one of our own people) threshold, and 面子 (miànzi, face) at session boundaries) through corresponding structural commitments.

The first commitment is stable pairing, derived from the invisibility mechanism that sustains 冷清(lěngqīng). The CLA showed that elders caught in 冷清 become invisible not because no one cares, but because absence compounds: someone who is never visited stops expecting visits. A fixed partnership between one senior and one youth across sessions creates what might be called "specific absence" (牵挂, qiānguà): when one partner does not show up, their absence is noticed by a particular person, not by a program. For the senior, this directly counters the invisibility that sustains 冷清(lěngqīng). Being missed by a specific young person is the inverse of being forgotten by everyone. For the youth, the partnership provides narrative continuity with a cross-temporal perspective that peers cannot offer: a developing story with someone whose life experience reframes the urgency and insularity of student life. When one partner is absent, a temporary pairing with another available participant keeps the session running, but the primary partnership resumes when both return. This distinction signals to participants that their specific relationship is valued by the program, not just their attendance.

The second commitment is a cumulative cross-session goal, derived from the 客人(kèrén) to 自己人(zìjǐrén) transition identified in Section 4.3.4. The CLA established that the threshold between 客人 (politely welcomed outsider) and 自己人 (one of our own) is crossed not through declaration but through accumulated shared experience that is realized retrospectively. A multi-session arc operationalizes this transition by making joint history visible. For example, over six sessions a pair might collaboratively build a shared memory map (共同记忆地图): each completed round unlocks a location on a neighborhood map, annotated with content from their in-game exchanges - a recipe the senior described, a childhood memory the youth shared, a dialect word they taught each other. For the senior, this map is evidence of being remembered: their stories are recorded, their knowledge is literally mapped, and the artifact could not exist without their contribution. For the youth, it functions as a personal ethnography that peers cannot provide: a document of intergenerational exchange that has no equivalent in student social life. The shared artifact is the primary return incentive: progress is visible, incomplete maps feel unfinished, and the content is personally meaningful because it was generated from their own exchanges. The prototype developed for this project demonstrates the core interaction loop within a single session; the cross-session tracking system is specified as a design requirement in the toolkit (Section 6) and requires backend

infrastructure that falls outside the scope of a single-prototype MRP.

The third commitment is shared memory prompts at session boundaries, derived from the 面子 (miànzi, face) redirection mechanism. Section 4.3.4 showed that inside a game, 面子(miànzi) inverts: showing up and trying becomes the face-preserving move, while withdrawing becomes the face-losing one. But this redirection resets between sessions. The moment a participant must decide whether to return the following week, they are no longer inside the game's bounded context, they are back in the everyday world where 面子 (miànzi) rewards withdrawal. Session-opening prompts that reference the previous week's shared experience (e.g., "Last week you and your partner discovered that you both grew up near the same market in Guangzhou. This week's puzzle builds on that") serve to collapse the re-initiation cost: participants do not need to restart the social negotiation from zero, because the game remembers what they did together and re-establishes the bounded play context before awkwardness can set in. In community settings, facilitators can deliver these prompts verbally during the first minutes of each session, using a tracking template provided in the toolkit (Section 6). Over time, these accumulated experiences can shift the underlying metaphor from 冷清 toward 热闹, where the warmth of repeated shared play becomes self-sustaining. The toolkit's session-tracking components are designed to help facilitators recognize signals of this shift, for instance when participants begin arriving early, initiating conversation before the game starts, or referring to partners by name rather than by role.

Overall, these implications show that intergenerational digital play cannot be designed only as a matter of access, interface simplicity, or activity planning. The design must also address dignity, role balance, cultural permission, and the conditions that allow repeated interaction to become meaningful. These insights provide the basis for the toolkit and prototype described in Chapter 6, where the foresight analysis and workshop findings are translated into practical design tools, facilitation guidance, and prototype decisions.

5 Cross-Source Synthesis & Design Implications

This chapter presents the cross-source analytical findings that form the empirical core of the design decision-making experience for this project. While Chapter 2 synthesized existing research on intergenerational play, digital

divides, and well-being outcomes, and Chapter 4 applied strategic foresight tools (STEEPV and CLA) to examine the macro-level cultural and systemic forces shaping the design context, this chapter operates at a different analytical level. It works at an interactive scale, posing the question: what new insights emerge when the findings from the literature review and expert interviews are placed side by side? The analytical value lies in cross-source comparison: it does not repeat what any single source has already said, but rather identifies emerging patterns that only appear when independent data streams converge, complicate, or contradict each other.

5.1 Purpose and Analytical Approach

5.1.1 Analysis Pathway

This comprehensive analysis is built upon two independent data streams. Each stream was first processed using a structured affinity graph analysis procedure before proceeding to cross-source comparisons.

The first data stream was a literature review, generating 69 data points, which were then organized into 10 clusters (labeled A to J) using affinity graph analysis. These clusters summarized key conceptual patterns identified in the reviewed research on intergenerational play, the digital divide, communication in discrete communities, and well-being outcomes.

The second data stream consisted of three expert interviews with experts from complementary fields:

1. Psychology Expert: 97 data points

2. Game Design Expert: 103 data points

3. Gerontology Expert: 51 data points

These interviews yielded a total of 251 data points, which were organized into 18 clusters (numbered 1 to 18).

Therefore, the entire analytical corpus contains approximately 320 data points distributed across 28 clusters from two different source types. These 28 clusters were then subjected to cross-source comparisons, examining in which phenomena the findings derived from the literature and those observed by practitioners converged, complicated, or contradicted each other. This process

ultimately resulted in four meta-level groupings, representing higher-order analytical claims derived from integrating the clustering from the two data streams. Each group represents an insight that could not be generated independently from any single source.

The four resulting meta-level groupings are developed below and translated into design principles in Section 5.4.

5.1.2 Cluster Overview

To support reader traceability, so that any claim made in this chapter can be traced back to its constituent data points, the following two tables provide a compact overview of the clusters from each data stream.

At a deeper level, many of these clusters can be read as describing movement around two relationship states. A, C, D, E, H, and J are closer to the "冷清 (lěngqīng, chilly and silent)" condition, meaning interaction has not yet been ignited, the entry threshold is high, or the relationship still requires additional structure to maintain; while B, F, G, and I are closer to the "热闹 (rènao, hot and clamorous)" condition, meaning interaction begins to be organized, and a sense of participation, back-and-forth interaction, and shared investment gradually form. At the same time, these two states are not distinct categories, but rather more like different positions in a continuous process.

Table 5.1: Literature Review Clusters (A–J)

Cluster	Label	n	Grouping
A	Trust Must Be Designed, Not Assumed (The Family Evidence Trap)	8	1
B	Asymmetry Is a Design Lever, not a Flaw	6	3
C	Brokering Labor: Transferable but Emotionally Costly	6	2
D	Three Mismatches That Make Each Other Worse	8	2
E	The Steps People Must Clear Before They Even Start Playing	8	2

Cluster	Label	n	Grouping
F	Games as a Safe Space to Fail, but Two Generations Want Different Things	8	4
G	What Matters Is Feeling Connected, Not How Much You Play	7	4
H	WeChat Is Not Just an App, It Is Part of How People Live	8	2
I	Who Actually Has Power? (It Is Not Who the Theory Says)	4	3
J	Being Together Is Not Enough, You Need to Structure How	6	1

Table 5.2: Expert Interview Clusters (1–18)

Cluster	Label	n	Grouping
1	Loneliness ≠ Social Isolation: Subjective Experience Is Key	4	4
2	Different "Literacies" Create Invisible Gaps: It Is Not Inability, It Is Difference	4	2
3	Both Sides Need Dignity: Older Adults Resist Infantilization, and Youth Resist Being Reduced to Helpers	4	3
4	Both Generations Need a Reason to Join: No "Why" Means No "Willing"	4	4
5	Reciprocal Teaching Is the Best Way to Connect, Not One-Way Help	6	3

Cluster	Label	n	Grouping
6	Stereotypes Are Bidirectional: Both Generations Fear Being Looked Down Upon	6	3
7	Different Paces Can Be Reconciled: Asymmetric Design as a Bridge	5	3
8	Emotional Safety Is the Threshold for Participation: Safety Before Content Design	7	1
9	Support Should Build Agency, Not Dependence	3	3
10	Migration, Language, and Translation Labor Shape Intergenerational Participation	6	2
11	What Is Said ≠ True Feelings → Assess Behaviour, Not Just Words	7	4
12	Tech Anxiety Is a Genuine Barrier	7	2
13	Pairing Cannot Be Random: Power Structures, Interest Matching, and Participant Screening Determine Experience Quality	7	1
14	Sustained Engagement Must Be Designed: One Experience Is Not Enough, There Must Be a Reason to Return	4	1
15	Life Transitions Trigger	6	1

Cluster	Label	n	Grouping
	Loneliness Across Generations, Not Only in Later Life		
16	Product Sustainability Requires Institutional Alignment	4	Implementation Layer
17	The Designer Is Part of the System	4	3
18	Technology Can Amplify Connection	3	2

5.1.3 Knowledge Contribution Positioning

It is important to clarify how this chapter's contribution differs from the preceding analytical chapters. Chapter 2 (Literature Review) addresses the question " What has existing research established?" and synthesizes published findings on intergenerational play, digital divides, and well-being outcomes. Chapter 4 (STEEPV and CLA) addresses "What macro-level social, cultural, and systemic forces shape this design context?". This chapter asks a different question: "What new insights emerge when literature reviews, expert interviews, and workshop data from older and younger participants are placed side by side?"

The analytical value mainly lies in cross-source comparison. A single source can only identify a certain type of obstacle or pattern, while cross-source analysis can further show how different obstacles are interrelated, mutually reinforcing, and jointly constitute the key tensions in intergenerational interactions. Through such comparisons, this chapter has formed a more comprehensive analytical understanding.

5.1.4 Workshop data as the third analytical input

In addition to the literature review and expert interviews, workshop interview data is also included in this chapter as a third source of evidence. This data comes from recorded interviews conducted with senior and younger participants

after the game workshops. The interviews mainly focused on participants' game experiences, preferred mechanics, moments of confusion or engagement, cooperation with their partners, clarity of rules, and willingness to participate again.

The recorded interviews, after thematic analysis, revealed several recurring themes, including enjoyment, clarity of rules, time pressure, role division, communication, cultural familiarity, and willingness to participate again. The workshop data in this chapter is not presented as a standalone case study but rather used to provide an empirical foundation for cross-source comprehensive analysis and to supplement, revise, and refine the meta-hierarchical groupings established in Section 5.2.

Therefore, the primary function of workshop data in this chapter is analysis and integration, rather than simply reporting results. It helps connect conceptual models from literature review, practical judgments from experts, and feedback from participants in actual interactions, thereby forming a more experientially grounded and comprehensive understanding. The findings from these workshops are presented in Section 5.2, followed by cross-source analytical groupings in Section 5.3.

5.2 Workshop Consultation Findings

Two face-to-face consultation workshops were conducted in collaboration with the Yee Hong Caregiver Education and Resource Centre in Richmond Hill, Ontario, a community organization serving Chinese Canadian seniors and families. Each session paired Chinese university/college students with Chinese retirees aged 65 and above in non-kin pairs to play selected cooperative digital games, followed by structured observation and post-game interviews (see Section 3.2 for full methodology; workshop plans and questionnaires are included in the Appendix). The following sections present the key findings that emerged from this consultation process. Overall, the workshop data shows that intergenerational games can bring enjoyment, a sense of cooperation, and a willingness to participate again, but these effects depend on how the games are designed and organized. The data also indicates that outcomes are influenced by game type, pace, and participant pairings. The following sections elaborate on these patterns.

5.2.1 Clear Goals and Readable Rules

One of the most striking findings from the workshop data is that participants' engagement in games is highly dependent on the clarity of the goals and the ease of understanding the rules. Several older participants mentioned in interviews that they were more likely to engage in games with clear tasks, predictable outcomes, and visible progress compared to activities with open goals and vague completion criteria. Puzzle-like or task-oriented activities, in particular, provided a greater sense of accomplishment from "completing something." Conversely, when participants could not determine what they needed to do or to what extent they needed to complete the task, their interest significantly decreased.

This is particularly evident in open-world building activities like Minecraft. Some participants do not find these games "unfun," but rather struggle to determine their direction or when they have truly completed the task without clear goals and completion criteria. In other words, openness itself is not necessarily the problem; the issue lies in the lack of a sufficiently clear goal framework, making it difficult for participants to perceive the game as a achievable, evaluable, and rewarding activity. Feedback from young participants supports this. For games with numerous steps and complex rules, cooperation becomes even more difficult if the order of actions and the objective of the task are not clearly explained. Therefore, clear goals and readable rules are not merely interface-level usability issues, but crucial conditions that directly determine whether participants are willing to enter the game, maintain engagement, and feel they can understand and control the activity.

5.2.2 Onboarding as Part of the Experience

Workshop interviews also revealed that participants' performance in the first round was largely influenced by their familiarity with the game. Therefore, initial difficulties cannot be simply attributed to a lack of ability or a mismatch in design. Several participants explicitly stated that the first round was more about "learning the rules," while the second round was often much smoother, indicating that the familiarization process itself is an important part of the experience. In other words, the difficulties participants encountered early on did not necessarily stem from the game itself being too difficult; they might simply be due to a lack of understanding of the operational logic, interface feedback, and task structure. Younger participants also pointed out that if certain operations could be provided with more direct prompts on the interface, such as

how to rotate, move, or select objects, it would help older players get into the game more quickly. This also means that when interpreting participants' early performance, researchers need to distinguish whether these difficulties reflect problems with the game mechanics themselves or simply reflect the participants' initial unfamiliarity with the game.

5.2.3 Challenge Should Fit the Pair

Regarding time pressure and challenge, the workshop data revealed a clear divergence, indicating that the challenge itself is not the problem. What truly needs to be designed is the pace and intensity of the challenge. Some senior participants felt that the countdown timer brought tension and excitement, making the game more interesting and increasing the satisfaction of completing the task. However, one of the senior participants explicitly stated that this time pressure made them feel rushed and tense. Feedback from younger participants further illustrates that the countdown timer might disrupt cooperation, as both parties are more likely to miss information or misunderstand clues when pressed for time, thus affecting the quality of communication. Therefore, the workshop data does not support the idea that the stronger the challenge, the better, nor does it support considering "low pressure" as the only correct approach. A more reasonable conclusion is that the challenge needs to be adjusted according to the specific pace of pairing, comfort level, and familiarity. In other words, intergenerational games should not make a single choice between "too easy" and "too exciting," but should allow different pairs to find their own suitable way of engaging at different paces.

5.2.4 Collaboration Needs Clear Roles

Workshop interviews revealed that smooth collaboration depends not only on participants' willingness to communicate, but also on whether the game provides clear role divisions and information to discuss. In successful collaborative scenarios, communication is usually not just general "chatting," but revolves around specific clues. For example, one interviewee mentioned that when younger participants could describe symbols, shapes, or clues more specifically, older participants found it easier to follow the comprehension process, and collaboration became smoother. Other participants mentioned that in timed tasks, discussions about numbers, clue order, or which piece of information to use, centered around a common goal, made them feel more

clearly that "we are working together to accomplish the same task."

Conversely, when the game structure does not clearly distinguish the contributions of each participant, collaboration easily becomes a situation where one person dominates and the other watches. One older participant explicitly stated that if a game is mainly operated by one person while the other can only watch, then two-person collaboration feels awkward, even less natural than playing solo. In other words, the issue is not just "whether two people are present," but whether the game truly makes both people necessary.

Workshop data also shows that young participants easily and naturally assume the roles of "interpreter" or "facilitator," especially when the system itself lacks sufficient prompts. While young respondents felt capable of guiding, they also explicitly stated that if the interface provided clearer operational prompts, such as how to rotate, move, and understand the next step, then young people would not always have to act as teachers. This is crucial because it illustrates that the imbalance in collaboration does not solely stem from generational differences, but also partly from the system placing an excessive burden of explanation on the younger generation. Therefore, the workshop data supports a more specific assessment: effective collaboration is not about "youth leading senior," but rather about the game itself clearly allocating information, tasks, and operational support so that both sides can communicate around a specific object and have a visible place to contribute.

5.2.5 Re-engagement Needs Cultural Resonance

Workshop data shows that participants' willingness to re-engage with an activity depends not only on whether the game is "fun," but also on whether it feels culturally and socially worthwhile. Many older participants proactively mentioned mahjong, chatting, and familiar daily activities in their feedback, or explicitly expressed a desire for games to be more closely aligned with a Chinese context and their familiar cultural experiences. This indicates that cultural familiarity is not merely a superficial decoration, but a crucial resource helping participants understand the activity, build connections, and feel at ease. For some senior participants, games completely detached from their existing cultural experiences are more likely to feel alien, and they may even struggle to determine why it is worth continuing to engage with.

Meanwhile, many participants also emphasized the value of intergenerational

interaction itself. Some senior participants mentioned that playing with younger people made the activities more vibrant, while others said they never had such interactions with young people in a long time, making the experience meaningful. Youth participants understood the value of these activities more from the perspectives of "participation," "sense of accomplishment," and the different experiences brought about by cross-age interaction. It is worth noting that participants rarely described these activities directly as "solving loneliness" or "promoting connection". They more often used terms like "happy," "interesting," "novel," and "willing to play again." This precisely illustrates that the willingness to participate again is not driven by abstract social goals, but rather by playability, cultural accessibility, and the novelty and sense of meaning brought about by intergenerational interaction.

5.3 Meta-Level Groupings: Cross-Source Analytical Findings

Workshop observational data provides a third empirical stream for this chapter. As described in Section 5.2, the workshop analysis is integrated with the literature review and expert interviews to ground, test, and refine the following meta-level analytical groupings.

5.3.1 Grouping 1: Asking for Connection Is Culturally Off-Limits

Constituent clusters: A, J (literature); 8, 13, 14, 15 (expert interviews)

The central barrier to non-kin intergenerational interaction in the Chinese-Canadian community is not unfamiliarity between participants. It is the absence of a cultural script that permits initiating social connection with a stranger across generations. Existing literature typically frames the non-kin intergenerational gap as "family-based interaction minus trust" (Zhang and Kaufman, 2016; Loos et al., 2019), implying that the same relational dynamics operate but with a weaker foundation. Cross-cluster analysis reveals a fundamentally different problem: this type of relationship has no template in Chinese cultural practice. There is no social script, no implicit set of behavioural norms, and no shared understanding of what "success" in such an interaction would look like.

Cluster A (Trust Must Be Designed, Not Assumed) identifies this gap from the literature side: existing research on intergenerational interaction overwhelmingly draws on family relationships, treating the trust and familiarity inherent in kinship bonds as a baseline rather than as an affordance that must be actively constructed in non-kin contexts. Cluster J (Being Together Is Not Enough, You Need to Structure How) extends this observation by demonstrating that mere co-presence is insufficient; the interaction itself must be deliberately structured to produce relational outcomes.

The cultural value of not troubling others (不要麻烦别人) actively suppresses even the willingness to enter a situation where connection might occur. These are not individual personality traits but culturally structured dispositions that make the very act of seeking non-kin connection illegible. Critically, the scriptlessness is bilateral: youth in Chinese-Canadian diaspora communities equally lack a cultural template for meaningful engagement with non-kin elders. They may avoid such interactions out of uncertainty about appropriate behaviour, anxiety about seeming condescending, or simply having no precedent in their lived experience. The absence of a script is not a deficit on one side; it is a structural gap that affects both generations simultaneously.

The convergence between literature clusters (A, J) and expert interview clusters (8, 13, 14, 15) is what makes this grouping's claim possible. The literature identifies the absence of non-kin frameworks in intergenerational research (see Chapter 2, Section 2.1.4); the expert interviews specify the cultural mechanisms, rooted in 面子 (face), 含蓄 (reserve), and hierarchical propriety, that enforce this absence in practice. Cluster 8 (Emotional Safety Before Content Design) reveals that felt safety must precede any content engagement. Cluster 13 (Pairing Requires Deliberate Matching) demonstrates that pairing decisions carry power implications that can reinforce or mitigate the scriptlessness problem. Clusters 14 and 15 show that sustained participation requires designed reasons to return, especially when the initial trigger for social withdrawal is not aging per se but layered life transitions (loss of spouse, retirement, migration). Neither data stream alone would have produced the full picture: the literature provides the structural observation; the expert data provides the cultural mechanism.

The workshop findings in Section 5.2.5 ground this grouping in participants' own responses. Participants rarely described the activity as "reducing loneliness" or "promoting intergenerational connection." Instead, they more often described

it as “happy,” “interesting,” “novel,” and something they would be willing to try again. This supports the argument that the entry point for non-kin intergenerational play cannot rely on an explicit request for connection. Participation becomes more culturally acceptable when the activity is framed through playability, cultural familiarity, and a meaningful shared experience rather than through an open admission of social need.

This convergence reframes the first design challenge. If scriptlessness is the structural barrier, then the design response cannot begin at the level of game mechanics. It must begin at the level of arrival: constructing a reason to show up that does not require acknowledging social need. The activity must be recruited under the frame of play, learning, or cultural exchange, never under "reducing loneliness" or "intergenerational connection." Section 5.4.1 formalizes this finding as Principle 1: "Entry Without Admitting Need."

5.3.2 Grouping 2: Mismatches Don't Add Up, They Multiply

Constituent clusters: D, C, E, H (literature); 2, 10, 12, 18 (expert interviews)

Language barriers, interface difficulties, and cultural misperceptions are commonly discussed as a checklist of separate obstacles (Hargittai, 2002; Van Dijk, 2017). Cross-cluster analysis reveals that they function not as independent items but as a self-reinforcing feedback loop with a precise mechanism. A participant encounters tech anxiety or interface difficulty (Cluster 12: Tech Anxiety Is a Genuine Barrier); this difficulty is compounded by language barriers related to migrant status (Cluster 10: Migrant Status + Language = Double Isolation); the combined effect is misread by others as social disinterest or cognitive limitation (Cluster D: Three Mismatches That Make Each Other Worse); the misperception confirms pre-existing age stereotypes; the participant withdraws further; and reduced engagement makes future attempts less likely. Critically, the loop has multiple entry points: any of the constituent barriers can trigger the same downward spiral, but the trajectory always converges.

The workshop findings in Sections 5.2.1 to 5.2.3 reflect a similar compounding pattern in practice. Participants’ difficulties were not caused by one isolated factor. Engagement declined when vague goals, unreadable rules, unfamiliar operations, and time pressure occurred together. First round confusion often improved in the second round, suggesting that early difficulty could reflect onboarding rather than ability. Timed challenges also had uneven effects: some

participants found them exciting, while others felt rushed, and younger participants noted that time pressure could disrupt communication. These findings show how rule clarity, onboarding, pacing, and confidence interact with one another and can either stabilize participation or accelerate withdrawal.

Overall, the literature, expert interviews, and workshop findings add two points to this analysis. First, it reveals the *structure* of the interaction between barriers: they are not additive (solve one, the total decreases by one) but multiplicative (each barrier amplifies the others). Cluster D articulates this compounding logic from the literature; Cluster 2 (Different "Literacies" Create Invisible Gaps) specifies from the expert side that the mismatch is not about ability but about *different* kinds of competence, a distinction that reframes the design challenge from remediation to bridging. Second, the analysis identifies that the most commonly discussed solution, intergenerational brokering (Cluster C: Brokering Labor, Transferable but Emotionally Costly), is itself burdened by emotional cost (Subramoney et al., 2025; Le et al., 2024), meaning that the "obvious" fix creates its own sustainability problem.

Three precise intervention points emerge from the loop analysis:

1. **Leverage existing platforms to bypass the motivation threshold.** Cluster H (WeChat Is Not Just an App, It Is Part of How People Live) and Cluster E (The Steps People Must Clear Before They Even Start Playing) together identify that the initial decision of whether to participate is the first node where the loop can be preempted. Using platforms participants already have, such as WeChat for distribution with a web-based game for play, eliminates the "should I even try?" decision. Cluster 18 (Technology Can Amplify Connection) reinforces this by demonstrating that technology, when leveraged correctly, can serve as a multiplier for social outcomes rather than a barrier.
2. **Turn shared tutorials into shared experience.** If both players encounter a new interface together, confusion becomes collaborative discovery rather than individual failure. This reframes a usability problem as a bonding moment, directly interrupting the path from tech anxiety (Cluster 12) to stereotype confirmation (Cluster D).
3. **Embed explanation into game mechanics.** If "translating" or "explaining" is designed as an in-game role rather than an interpersonal

favour, the emotional tax of brokering (Cluster C) is absorbed by the game structure. Explanation becomes a valued contribution, not a burden.

These three intervention points target the loop at structurally distinct nodes: the decision to participate, the first encounter with the interface, and the ongoing cost of intergenerational communication.

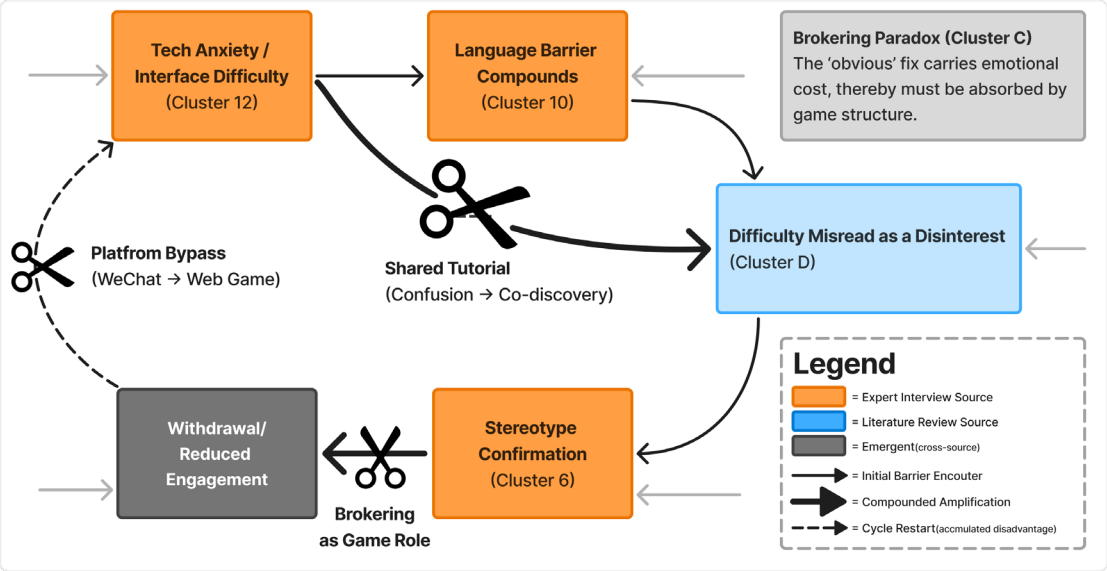

Figure 8 : The Exclusion Spiral: Compounding Barriers and Intervention Points

Section 5.3.2 formalizes them as Principle 2: "Precise Interruption of the Exclusion Spiral."

5.3.3 Grouping 3: How to Help Without Making People Feel Helped

Constituent clusters: I, B (literature); 3, 5, 6, 7, 9, 17 (expert interviews)

Every design decision that accommodates older participants' limitations risks transmitting a signal that the participant requires accommodation. This is the accommodation paradox: the act of helping undermines the dignity that the help is meant to preserve.

Cluster 3 (The Fear of Being Treated Like a Child) places dignity and autonomy as non-negotiable preconditions for participation. Cluster 6 (Stereotypes Are Bidirectional) reveals that this dynamic operates in both directions: youth fear being perceived as patronizing just as much as seniors fear being perceived as incapable. Cluster 9 (Teach Them to Be Self-Reliant, Not to Do Things for Them)

articulates the practical implication that sustainable support must build capacity rather than create dependency.

The literature on participatory design promises equality of participation (Cluster I: Who Actually Has Power?; Pirinen, 2016; Loos et al., 2019), yet empirical accounts consistently show that older adults are positioned at later stages of the design process, in testing and evaluation rather than in shared ideation (Liaqat et al., 2021). The rhetoric of "teaching independence" (Clusters 5, 9) implicitly positions younger participants as teachers and older participants as learners, even when the explicit framing is egalitarian. This creates a dignity risk not only for older adults, who may be infantilized, but also for youth, whose role is narrowed into that of helper, tutor, or emotional broker rather than equal participant. Asymmetric role design (Clusters 7, B) can validate different forms of expertise, but if roles are fixed rather than rotated, they encode hierarchy rather than dissolve it. In this sense, youth also need a participatory structure that does not lock them into one-way support roles, but allows them to enter as learners, collaborators, and contributors in their own right. Cluster 17 (The Designer Is Part of the System) adds a reflexive dimension: the designer's own positionality and assumptions shape the power dynamics of the interaction, and failing to account for this reproduces the very asymmetries the design claims to address.

The workshop findings in Section 5.2.4 reflect this dignity risk in practice. Young participants often became interpreters or facilitators when the game system did not provide enough operational prompts, such as cues for rotation, movement, or the next step. However, this pattern should not be read simply as a generational difference in ability. It also shows that the system had transferred the labour of explanation onto the younger participant. When support is built into the interface, task structure, and role design, collaboration becomes less about one person helping the other and more about both players contributing to a shared task.

When these clusters are examined together, a gradient of dignity risk becomes visible across three modes of support:

High dignity risk: person-to-person direct help. The help is visible, the power asymmetry is legible, and the recipient is marked as needing assistance.

Moderate dignity risk: system-to-person environmental compensation. The

accommodation is present but not attributable to another person; the environment compensates. Examples include automatic difficulty scaling, adaptive text sizing, and context-sensitive hints delivered by the game system.

Low dignity risk: person-to-person reciprocal exchange. Both parties give and receive, so neither is positioned as the sole recipient of help.

The gradient reveals a clear design directive: when full reciprocity is not achievable in a given interaction, shift accommodation from the interpersonal level to the system level. The environment, not another person, should compensate for differences in ability or familiarity. When reciprocal exchange is possible, it must be designed so that both contributions are genuinely necessary, not merely politely tolerated. Section 5.4.3 formalizes this finding as Principle 3: "Shifting Support from Interpersonal to Environmental."

5.3.4 Grouping 4: Connection Is a Byproduct, Not a Goal

Constituent clusters: F, G (literature); 1, 4, 11 (expert interviews)

No participant will say "I came because I am lonely." Loneliness is subjective and culturally mediated (Cluster 1: Loneliness ≠ Social Isolation; Hawkley and Cacioppo, 2010), self-report instruments are unreliable in populations where emotional restraint is a cultural norm (Cluster 11: What Is Said ≠ True Feelings), and the Chinese value of 含蓄 (reserve) makes direct expression of social need particularly unlikely.

When these measurement and expression barriers (Clusters 1, 11) are combined with the meaning-making imperative identified in Cluster 4 (Meaning Is a Precondition for Engagement), the conditions for safe failure in gameplay (Cluster F: Games as a Safe Space to Fail, but Two Generations Want Different Things; Gee, 2004), and the evidence that felt connection can emerge through structured cooperative play (Cluster G: What Matters Is Feeling Connected, Not How Much You Play; Kahlbaugh et al., 2011), a design positioning principle emerges. The surface-level motivation ("this game is fun") and the deeper effect (social connection) operate on parallel tracks. They are not in a means-ends relationship. The game does not "deliver" connection as a hidden payload inside entertainment; rather, connection emerges as a natural byproduct of sustained collaborative engagement, of solving problems together, laughing at shared failures, and building joint competence over time.

The workshop findings in Sections 5.2.4 and 5.2.5 reflect this mechanism at the level of play. Participants were most engaged when the game gave them concrete shared work, such as interpreting clues, discussing task order, completing puzzles, or making visible progress toward a shared goal. As noted in Grouping 1, participants described the activity as “happy,” “interesting,” “novel,” and something they would be willing to try again, rather than as “solving loneliness” or “promoting connection.” In this grouping, the same language matters for a different reason: it shows that connection emerged through playable tasks, cultural familiarity, and shared accomplishment rather than through an explicit invitation to bond.

This distinction has consequences for both design and evaluation. On the design side, the game's core loop must be independently engaging; it must be fun on its own terms, not merely a vehicle for social engineering. This bilateral engagement standard is the test: if either generation finds the game uninteresting without the "intergenerational" framing, the mechanics need strengthening. Cluster F complicates this by noting that the two generations may want different things from "safe failure," requiring the game to accommodate divergent play motivations within a single cooperative loop.

On the evaluation side, it means that structured behavioural observation, tracking what participants do (laughter, spontaneous conversation, voluntary return, proximity shifts, post-program contact), will be more valid than self-report instruments that ask what participants feel. This is not a general methodological preference; it follows specifically from the finding that cultural restraint (含蓄) produces systematic underreporting of social and emotional effects in this population.

Overall, these findings establish a dual requirement: the game must be independently engaging, and the evaluation must be designed for a population where self-report systematically undercounts social effects. Section 5.4.4 formalizes this as Principle 4: "The Game Must Stand on Its Own."

Note: Cluster 16 (Product Sustainability Requires Institutional Alignment) was not assigned to any meta-level grouping. Its content pertains to the systemic conditions required for program implementation, including funding, organizational partnerships, and policy-level support structures, and will be incorporated directly into the toolkit's implementation layer in Chapter 6.

5.4 From Groupings to Design Principles: Bridging to the Toolkit

This section translates the four analytical groupings from Section 5.3 into specific design principles. These principles function as the bridge between the analytical findings and the design toolkit (Chapter 6). Without this translation step, the toolkit would lack empirical grounding; without the toolkit, the principles would remain abstract.

A brief note on positioning is warranted. Section 4.4 derives system-level design commitments from foresight analysis, addressing platform selection, multi-channel deployment, temporal structure, and long-term adaptability. This section derives interaction-level design principles from affinity mapping, addressing game mechanics, role structures, onboarding sequences, and evaluation methods. The two layers operate at different scales but converge in Chapter 6, where they are integrated into a unified toolkit specification.

5.4.1 Principle 1: Entry Without Admitting Need

Derived from Grouping 1 (Section 5.3.1): Asking for Connection Is Culturally Off-Limits

Core logic. If the culture contains no script for proactively seeking intergenerational non-kin connection, then the first design task is not game mechanics but entry framing. Participants need a reason to arrive that does not require acknowledging a social deficit.

Operationalization. Activities should be recruited under the frame of "playing a game," "trying something new," or "cultural exchange," never under "reducing loneliness," "intergenerational bonding," or "helping seniors." All onboarding language and materials must be audited for implicit signals that participants are being "helped" or are assumed to be lonely. The threshold for initial participation should be as low as possible: no extensive intake questionnaires, no framing that implies the participant has a deficit. The game itself must be a sufficient reason to show up. In the Chapter 6 toolkit, this principle informs the design of recruitment language templates, activity naming guidelines, and the onboarding sequence for Phase 1 (first session).

5.4.2 Principle 2: Precise Interruption of the Exclusion Spiral

Derived from Grouping 2 (Section 5.3.2): Mismatches Don't Add Up, They Multiply

Core logic. Barriers to participation form a feedback loop, not a checklist. Any entry point, whether language, interface, or perception, can pull a participant into the same downward spiral. The design must intervene at the loop's critical nodes rather than addressing barriers individually.

Three intervention points:

1. Platform bypass. Use platforms participants already have (e.g., WeChat for distribution, a web-based game for play) to eliminate the motivational gate. The decision "should I try?" is the first node where the loop can be preempted.
2. Shared tutorial. Design the onboarding tutorial as a two-player cooperative task before the main game begins. When both players encounter a new interface together, initial confusion becomes shared discovery rather than individual failure.
3. Brokering as game role. Build explaining, translating, and navigating into the game as a designated role (e.g., "the navigator" who interprets clues for the team). The emotional cost of brokering is absorbed by the game structure; explanation becomes a contribution, not a favour.

In the Chapter 6 toolkit, this principle informs the platform selection decision tree, cooperative tutorial design specifications, and in-game brokering role templates.

5.4.3 Principle 3: Shifting Support from Interpersonal to Environmental

Derived from Grouping 3 (Section 5.3.3): How to Help Without Making People Feel Helped

Core logic. Default support should be embedded in the interface, task structure, or hint system before it requires one participant to help the other directly.

Three-tier support model (ordered by dignity risk):

1. Person-to-person direct help (high dignity risk). Minimize or eliminate. Never design a core mechanic that requires one player to explicitly "assist" the other.
2. System-to-person environmental compensation (moderate risk). Preferred default. Examples include automatic difficulty scaling, adaptive text sizing, and context-sensitive hints delivered by the game system rather than by a partner.
3. Person-to-person reciprocal exchange (low risk). Ideal design target. Each player contributes something the other cannot provide, whether cultural knowledge, strategic reasoning, or interface fluency, and both contributions are visibly necessary for task completion.

When reciprocal exchange is implemented through asymmetric roles, role rotation is essential. If the same player always fills the "helper" role, the asymmetry calcifies into hierarchy. Rotation ensures that each participant experiences both contributing and receiving, preventing any fixed status assignment. In the Chapter 6 toolkit, this principle informs asymmetric role design standards (with rotation schedules), adaptive difficulty system specifications, and the environmental compensation checklist.

5.4.4 Principle 4: The Game Must Stand on Its Own

Derived from Grouping 4 (Section 5.3.4): Connection Is a Byproduct, Not a Goal

Core logic. The game's surface motivation ("this is fun") and its deeper effect (social connection) operate on parallel tracks. The design and evaluation framework must both respect this structure.

Design-side operationalization. The game's core loop, that is, the repeating cycle of action, feedback, and reward, must stand on its own as a satisfying play experience. A useful test: if the game were stripped of all "intergenerational" framing, would it still be engaging? If not, the mechanics need strengthening. Connection should emerge through the natural dynamics of cooperation, including shared problem-solving, complementary roles, and joint achievement, rather than through explicit "bonding activities."Evaluation-side operationalization. Treat self-report instruments as supplementary, and use structured behavioural observation as the primary indicator set. Key behavioural

indicators include:

- Laughter and spontaneous conversation during play
- Voluntary return for subsequent sessions
- Proximity shifts (participants moving physically closer together)
- References to partner by name rather than by role
- Evidence of extra-program contact (e.g., exchanging WeChat contacts)

Self-report instruments remain useful as supplementary data but should not be treated as the primary measure of program impact. In the Chapter 6 toolkit, this principle informs core loop design criteria, the evaluation tool selection guide, and behavioural indicator tracking sheets.

5.4.5 Cross-Layer Convergence

Several of the interaction-level findings presented in this section converge with the foresight-derived insights from Chapter 4. The face-driven avoidance cycle identified through CLA (Section 4.3.3) parallels the accommodation paradox surfaced through cross-cluster synthesis (Grouping 3, Section 5.2.3). The need for culturally legitimate entry points identified through STEEPV (Tension 3, Section 4.2) echoes Grouping 1's finding that asking for connection is culturally off-limits (Section 5.2.1). This convergence between two independent analytical pathways, foresight and affinity mapping, serves as a form of analytical triangulation, strengthening confidence in the resulting design commitments.

6 Design Toolkit / Prototype Description

6.1 Toolkit Overview

6.1.1 Purpose and overall structure

By Chapter 5, the study has produced four design principles, but principles alone do not tell designers what to build or how facilitators should run a session. This chapter translates those findings into two deliverables with different levels of detail: an intergenerational game design toolkit for designers and community partners, and a playable prototype for participants. The toolkit offers a reusable framework for planning, facilitation, and evaluation. The prototype, “Across the Table” or “对桌”, shows how the same principles can take shape in one concrete

game. Together, the two outputs bridge the gap between analytical insight and practical design action.

6.1.2 Main toolkit components

The toolkit includes three main groups of components. The first group focuses on participant fit and interaction structure. It includes player profile tools, digital readiness screening, pairing guidance, and power balance checks. These resources help designers and facilitators decide who should be paired together and how roles can remain reciprocal during play.

The second group focuses on gameplay implementation. It includes mechanic pattern cards, asymmetry tools, accessibility specifications, platform guidance, onboarding templates, and cultural framing guidance. These resources support decisions about role structure, input simplicity, interface demands, session naming, and early session flow. Together, they reduce technical and social friction and make intergenerational play easier to enter.

The third group focuses on assessment and continuity. It includes observation sheets, interview prompts, baseline questionnaires, session tracking templates, and memory prompts for later sessions. These components help facilitators evaluate not only whether the game functions, but also whether communication, comfort, and continuity improve over time. The full version of the Intergenerational Game Design Toolkit is provided in Appendix C and is available online at: https://intergenerationalgame.static2.website/DesignToolkit_Apr24.pdf

6.1.3 Relationship between the toolkit and research findings

The toolkit structure reflects the main findings of the study, and the four design principles can be traced across both deliverables. "Entry Without Admitting Need" shaped the toolkit's recruitment and framing guidance, which avoids deficit language, and it shaped the prototype's neutral puzzle premise, where two players solve a shared problem instead of joining an activity openly framed as intergenerational help. "Precise Interruption of the Exclusion Spiral" informed low-barrier platform choices, large controls, simple onboarding, and no-login access. "Shifting Support from Interpersonal to Environmental" informed the use of information asymmetry, so neither player can simply teach while the other passively receives help. "The Game Must Stand on Its Own" informed both

the evaluation criteria and the prototype's emphasis on enjoyable puzzle-solving even when the intergenerational goal is not stated directly.

For this reason, the toolkit should not be read as a summary appendix. It functions as the practical framework produced by the project, while the prototype acts as one instantiation of that framework. The prototype is not presented as the only solution. It is a worked example that shows how the principles can become mechanics, interface decisions, and session structure.

6.2 Game Prototype Design

6.2.1 Core concept and gameplay

The prototype developed in this project is titled “Across the Table” or “对桌”. It is an asymmetric cooperative puzzle game in which two players must work together to discover a four-digit password and unlock a box. One player, the Screen Player, explores a room on a mobile device, while the other, the Manual Player, uses a printed notebook containing written clues and password rules. Neither player can solve the task alone. The Screen Player can see the objects but does not know how to interpret them, while the Manual Player understands the rules but cannot see the room. This creates a play structure in which verbal communication is necessary for success.

The core gameplay loop is simple. The Screen Player taps an object, describes what is visible, and the Manual Player compares that description with the notebook to identify the correct digit. This process repeats until the pair constructs the full password and enters it. The prototype is set in an ordinary Chinese household storage room in the GTA, with clue objects such as a calendar, glass jars, a family photo, and an old radio. This setting presents culture through familiar daily objects rather than decorative symbols. It also helps the game avoid announcing itself as an intergenerational intervention. The invitation is to solve a puzzle together. The full game design and playable prototype, *Across the Table* (对桌), are provided in Appendix D and available online at: https://acrossthetable.itch.io/across-the-table. The bilingual game manual, including digital and ready to print versions in Chinese and English, is provided in Appendix E.

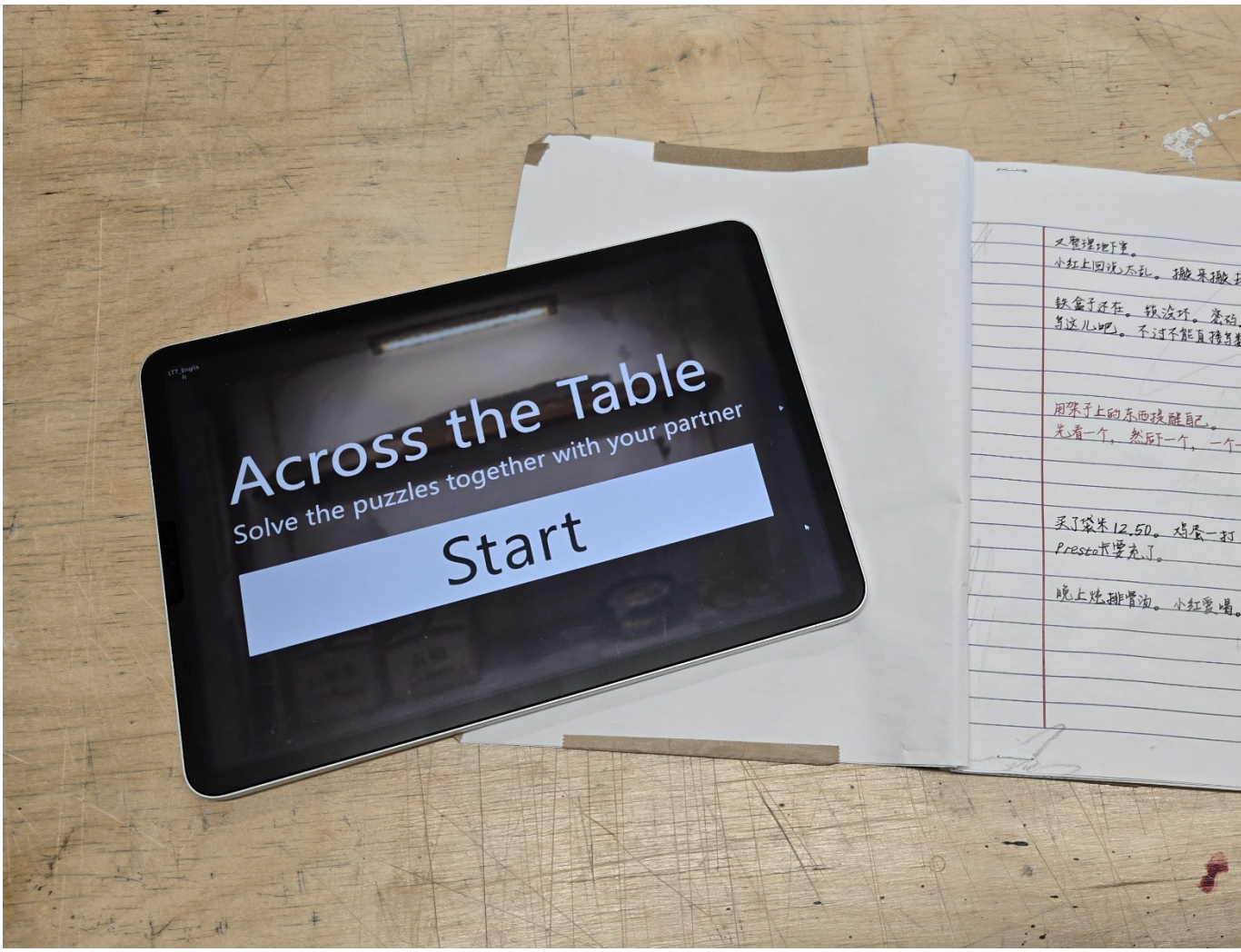

Figure 9 Across the Table opens with a neutral puzzle invitation and a shared start state rather than explicit intergenerational framing.

6.2.2 Interaction mechanics and technical structure

The prototype includes several mechanics designed to support intergenerational play. First, it uses information asymmetry so that both players hold unique and necessary information. This reflects the toolkit's emphasis on asymmetric but reciprocal roles, since digital skill alone cannot determine success. Second, it includes a role swap in Round 2, allowing both participants to experience different forms of contribution and preventing one player from remaining permanently in the more active role. Third, some clues include limited ambiguity, which encourages discussion rather than silent task completion. This turns interpretation into a shared activity instead of an individual one. The prototype also includes a thirty-second hint system and a limited attempt

structure, so support is built into the game environment before facilitator intervention becomes necessary. The prototype includes several mechanics designed to support intergenerational play. First, it uses information asymmetry so that both players hold unique and necessary information. This reflects the toolkit's emphasis on asymmetric but reciprocal roles, since digital skill alone cannot determine success. Second, it includes a role swap in Round 2, allowing both participants to experience different forms of contribution and preventing one player from remaining permanently in the more active role. Third, some clues include limited ambiguity, which encourages discussion rather than silent task completion. This turns interpretation into a shared activity instead of an individual one. The prototype also includes a thirty-second hint system and a limited attempt structure, so support is built into the game environment before facilitator intervention becomes necessary.

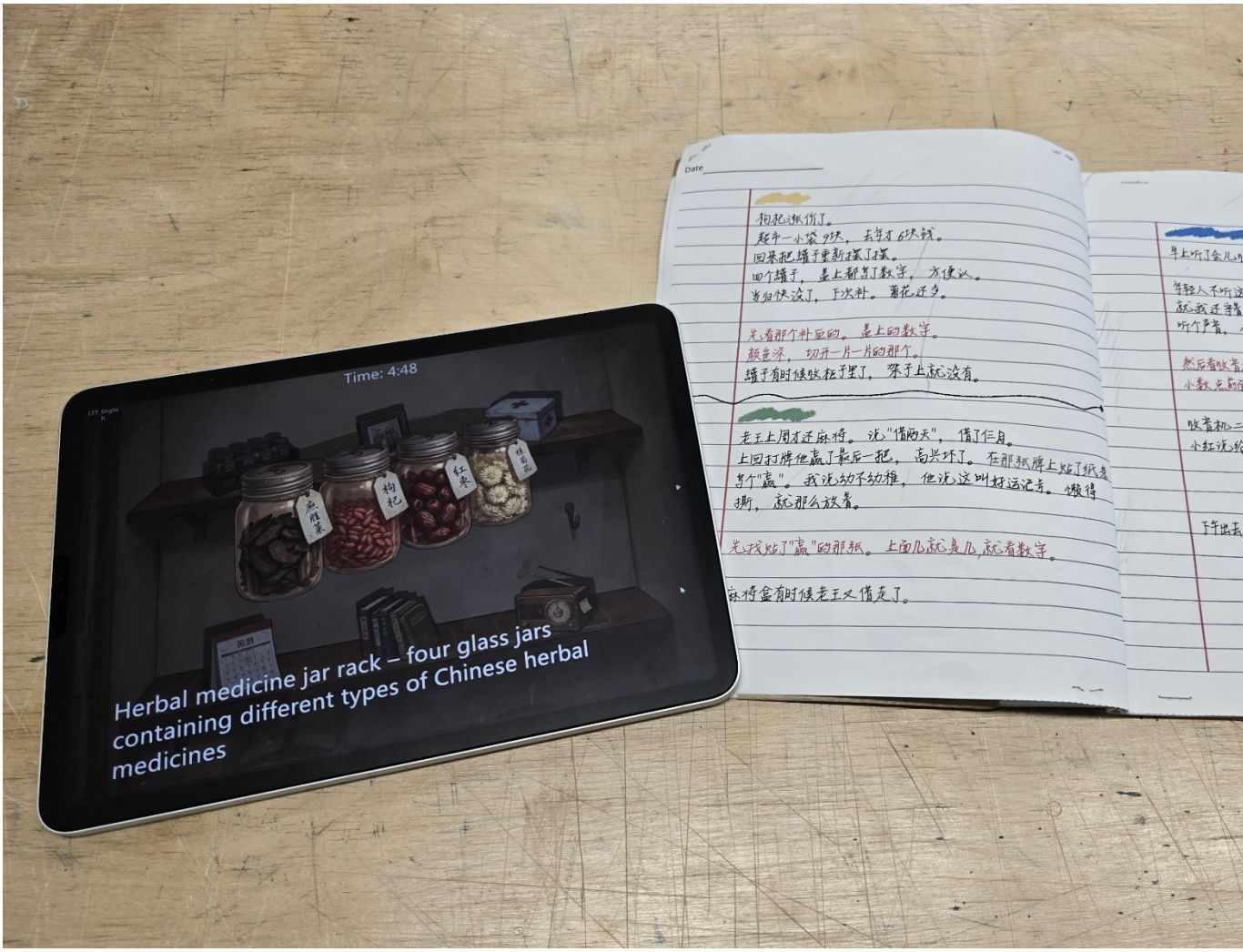

Figure 10 The prototype's asymmetric setup distributes clues across the tablet interface and printed notebook, requiring verbal coordination between players.

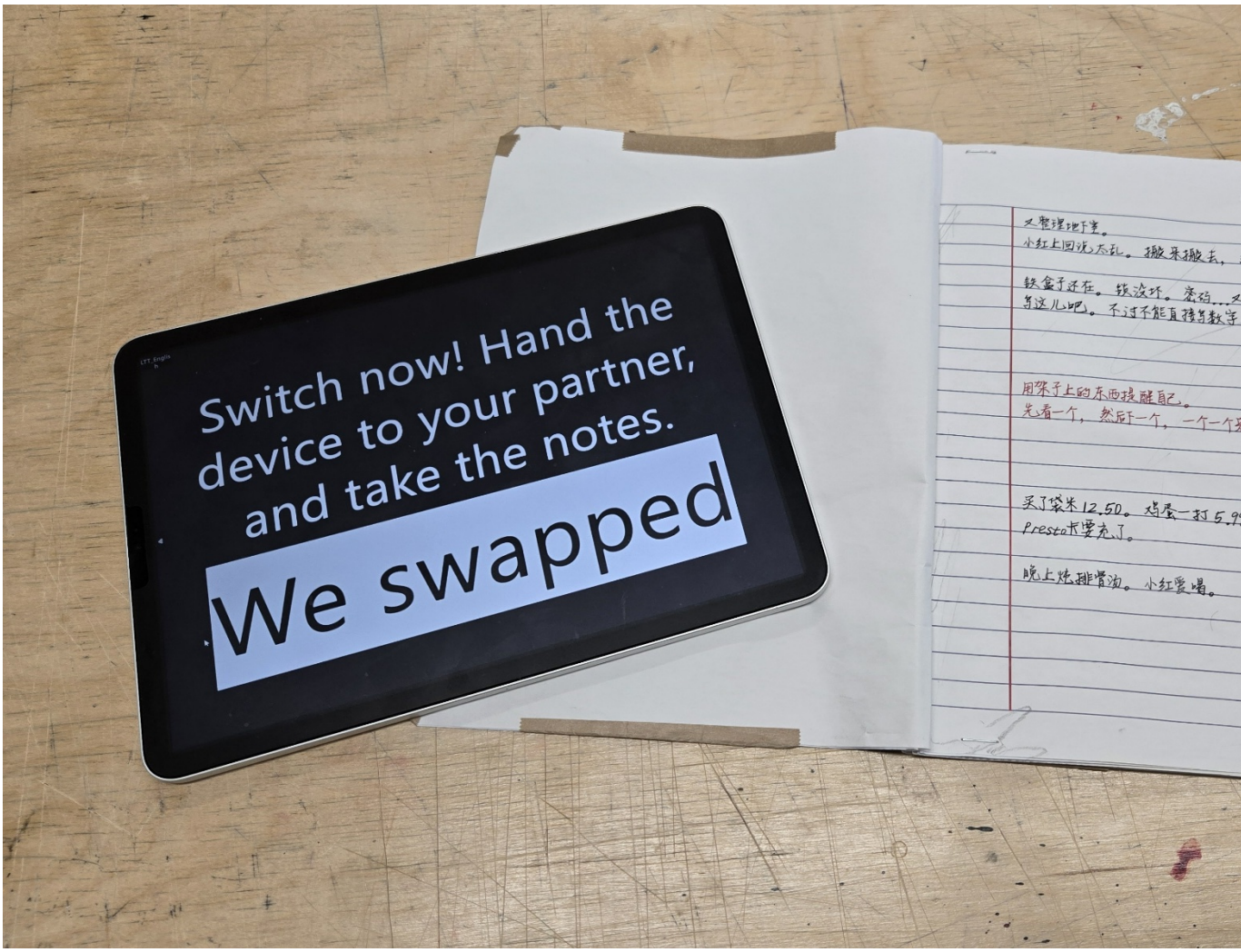

Figure 11 The Round 2 role-swap prompt redistributes agency so neither participant remains permanently in the more active position.

From a technical perspective, the prototype was designed as a low barrier and modular build. It runs offline on a single device, uses tap only input, and avoids login or network dependency. The current structure combines a room-based play scene with UI overlays for close up viewing, password entry, and feedback screens. It also uses modular puzzle configurations so that clue sets and passwords can be changed without redesigning the entire system. These choices support both accessibility and future iteration. The single device plus printed manual structure reduces technical friction while preserving strong role differentiation, and the everyday household environment supports cultural familiarity without relying on stereotypical visual markers. In this way, the prototype does not simply present a playable concept. It translates the project's toolkit principles into a concrete interaction format.

6.2.3 Scope boundaries of the prototype

One session is all the prototype can reasonably hold. Stable pairing, cumulative memory prompts, and the gradual shift from polite distance to "自己人" (zìjǐrén, one of our own) all operate across repeated sessions, so they cannot be fully demonstrated inside a short playtest. A playtest can show whether the first hour installs the conditions for later trust, turn-taking, and shared attention. It cannot prove accumulated warmth, because that effect depends on repetition by definition. For that reason, the toolkit carries more of the longer-timescale mechanisms, while the prototype handles the session-zero problem.

6.3 How Foresight Informed Design

6.3.1 STEEPV as a source of design criteria

The STEEPV analysis helped turn the project's broader context into concrete design decisions. At the social level, Chapter 4 showed that intergenerational connection, especially in non-kin settings, cannot rely on one short session. This is why the toolkit includes stable pairing, cross-session tracking, and memory prompts for later sessions. These tools support repeated contact and gradual familiarity rather than one-time interaction.

At the technological and economic levels, Chapter 4 showed that many older immigrants face uneven digital confidence, limited access to support, and possible platform dependence. For this reason, the toolkit emphasizes low barrier access, simple input, and flexible platform choices. The prototype follows the same logic. It runs offline on a single device, uses tap only interaction, and does not require login or network access. These choices reduce setup difficulty and make the activity easier to enter.

At the values level, Chapter 4 identified a tension between egalitarian play and hierarchical intergenerational norms. It also showed that non-kin pairs often lack a clear cultural script for why they should gather. This shaped both the toolkit and the prototype. The toolkit avoids deficit framing and instead supports reciprocal roles, cultural familiarity, and respectful entry points. The prototype applies this through its asymmetric structure, where both players hold necessary information, and neither player is reduced to a passive learner.

6.3.2 CLA as a source of deeper design logic

CLA helped the project move away from seeing the problem as an individual lack of skill. Instead, it treated the problem as a result of relationship conditions, cultural expectations, and the design of the environment.

At the litany and system levels, Chapter 4 identified visible barriers such as language gaps, digital confidence differences, unstable pairing, and onboarding friction. These findings informed practical tools in the toolkit, including participant profiling, screening, pairing guidance, and onboarding support. In this way, the toolkit responds to the actual conditions around play, not only to the game itself.

At the worldview level, CLA showed that intergenerational interaction should not be designed as one-sided help. This directly shaped the toolkit's focus on power balance, reciprocal contribution, and shared participation. It also shaped the prototype's role structure and Round 2 role swap, which prevents one player from staying permanently in a more active position.

At the myth and metaphor level, Chapter 4 reframed the issue from individual loneliness to the wider condition of 冷清, and proposed 热闹 as the desired shift. This was especially important for the toolkit. It explains why the design includes continuity tools, session tracking, and prompts that help pairs reconnect over time. The prototype reflects this logic in a smaller way through face-to-face cooperation and a familiar household setting. The toolkit extends further by supporting longer term relationship building across sessions.

Overall, foresight shaped the project in two ways. STEEPV identified the main external conditions the design needed to respond to. CLA showed the deeper cultural logic behind those conditions. Together, they helped the project develop not only a playable prototype, but also a toolkit that is more culturally grounded and more adaptable to future use.

7 Discussion

7.1 Interpreting the Findings

Our findings are broadly consistent with existing research on intergenerational

play and social connection. The literature generally supports the view that games can create conditions for social interaction, and this is reflected in studies by De La Hera et al., Kahlbaugh et al., and related researchers. The use of asymmetric roles to manage differences in player skills is also not new. Loos et al. (2019) have already discussed this issue in detail. More recent HCI work, such as Jiang et al. (2025), also shows that culture is increasingly being taken seriously in design research, which aligns with the direction of this project. Therefore, the contribution of this study does not lie simply in confirming that games can support intergenerational connection. Its main value lies in where it differs from existing research.

These differences can be understood through three points. The first is the question of who plays with whom. Liaqat et al. (2021) focus on immigrant families, *My Home Path* examines second generation Chinese children, and Sun, Zhao, and Liu (2025) study family dyads. These studies are all situated within family contexts. In contrast, this project deliberately shifts the setting away from the home and away from kinship. In doing so, it shows that within Chinese cultural contexts, non-kin intergenerational connection often lacks a ready-made social script. This absence exists on both sides: young people and older adults may both be uncertain about how to interact meaningfully with a stranger from another generation.

The second difference concerns the role of culture in research. Many studies mention culture, but culture often remains at the descriptive level. In this project, culture is treated as something that can shape the mechanics of design. The direction represented by Jiang et al. (2025) is close to this project, but culture in this study is not only a category of analysis. It also informs how game tasks, roles, prompts, and interaction structures are designed. The third difference is that the method and design are closely connected. The evidence chain draws on both behavioural observation and interview data, so interpretation does not rely only on what participants say or only on what researchers observe. These three differences together define the specific contribution of this research.

These differences point to a gap in non-kin, cross cultural, and mechanism level intergenerational game research. Previous work has often remained within family settings, treated culture as background, or separated research methods from design development. This project brings these three concerns together

because, in this context, they are difficult to separate. The scale of the study is limited, and the findings should not be overstated. Even so, the project demonstrates one possible path for designing intergenerational play where non-kin relationships and culture informed mechanics are treated as central design concerns. The next section explains how these contributions translate into design practice.

7.2 Theoretical & Practical Contributions

7.2.1 To Intergenerational Design Research

First, scriptlessness must be addressed before interaction design. If mechanics are designed before a social script exists, players may not understand why they are expected to cooperate. Incorporating culture into mechanics means that elements such as dialect, food, and festivals should directly shape what players do, rather than serving only as background detail. The simplest way to include culture is to add it as visual decoration, but that approach does not affect the actual interaction. For example, an older adult could describe an ingredient in dialect while the younger participant searches or interprets based on what they hear. If the older adult does not speak, the game cannot move forward. In this case, cultural knowledge becomes part of the mechanic itself. Once the script and cultural role of the interaction are established, the next issue is how both generations can be motivated to continue.

7.2.2 To community practice

Older adults and young people may enter the activity with different motivations. Older adults may want to be recognized as whole participants rather than treated as service recipients. Young people may be willing to stay because the interaction offers a form of connection that peer relationships cannot provide. The first step is to establish a meaningful point of connection, where the interaction itself becomes rewarding. The second step is to connect multiple sessions through a cumulative task, so visible progress becomes a reason to return. At the beginning of each session, the system or facilitator can refer back to what the pair did previously, reducing the social effort required to start again from zero. This three-stage template provides a practical framework, and the next section offers five more specific guidelines for implementation.

7.2.3 Implementation Guidelines for Community Programs

The three-stage template is most likely to encounter problems in the following five areas when implemented. When the three-stage template is implemented in practice, there are five areas that are most prone to problems.

First, use behavioral indicators for assessment, not self-reporting scales. The reason is straightforward: 含蓄 (hánxù, Reserve) is a long-standing way of expression in the Chinese community, making people tend to underreport their feelings and judgments. The numbers collected from the scales are inherently distorted from the very beginning.

Second, participate at least six times. This number was not chosen randomly. From being regarded as "客人 (kèrén, Guest) " to being considered as "自己人 (zìjǐrén, One of Our Own) ", the qualitative change in the relationship occurs around this point. Additionally, six weeks is also a relatively realistic period - it is within the common funding cycle and is also a reasonable length for a leader to continue presiding without losing connection.

Third, use a fixed device, but can use two channels. This mechanism itself is not bound to any specific application. Setting up two channels is to prevent one channel from completely failing due to platform policy changes or application discontinuation.

Fourth, the leader is only responsible for controlling the pace, not intervening in the content itself. Once the leader starts explaining or commenting on the content, participants are likely to shift from active participants to being cared for objects, and this transformation occurs very quickly.

Fifth, when submitting a continuation application, there are specific writing orders. First, explain the relationship of this project to the previous round of inheritance, then clearly state who will take over in the next round, where the operation manual is stored, and how the data of this round is transferred. Finally, describe what this round has done. Many people are accustomed to writing the activity content first, but the records filled out this way are such that the person taking over later has no idea where to continue from when they receive them.

These five points are the fundamental prerequisites for sections 7.2.1 and 7.2.2

to hold true in actual implementation. The next question is: If this model continues to operate for five to fifteen years, what form will it evolve into?

7.3 Three Horizons Framework

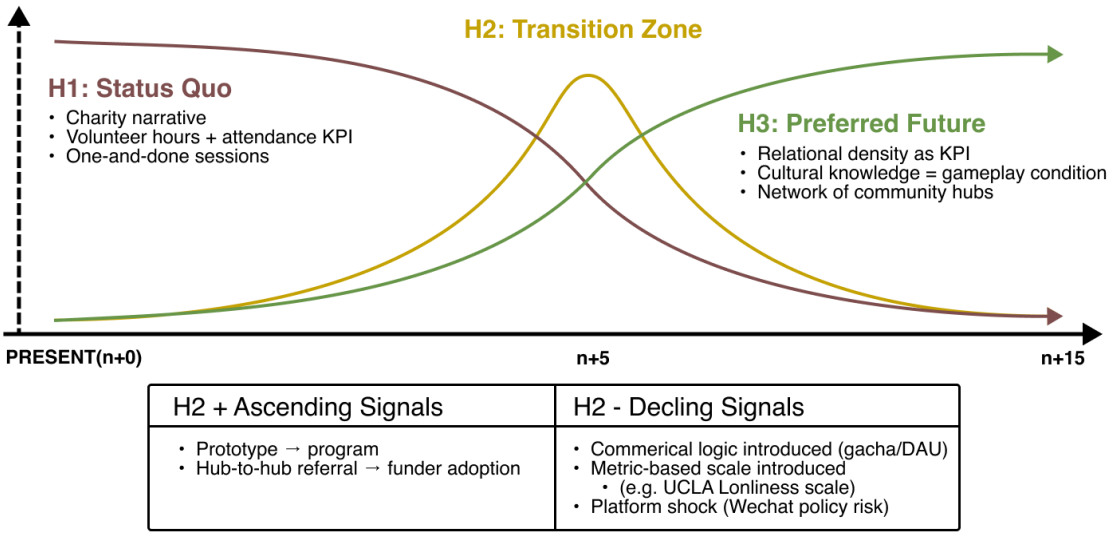

Figure 12 Three Horizons Analysis: Intergenerational Digital Play in the Chinese Canadian Diaspora

7.3.1 Framework and H1: Current Default

The Three Horizons framework originated from Bill Sharpe and the International Futures Forum. This framework describes changes as three concurrent curves: H1 represents the current system that still dominates but is beginning to lose its effectiveness; H3 represents the target state that this project is attempting to achieve; H2 represents the transitional zone between the two, where the forces maintaining the status quo and those promoting change operate simultaneously, with opposite directions. This study focuses on the time window of five to fifteen years into the future.

Regarding H1, most of the intergenerational projects of GTA still follow the charity model: the elderly are the beneficiaries, and the young are the volunteers. The project's effectiveness is measured by volunteer hours, attendance rates, and the number of events, and the behavioral changes shaped by "含蓄" (hánxù, reserve) - such as who starts to speak up first and who starts to respond to others - are almost not within the scope of these assessment indicators. The activities are often one-time events, with no accumulation

mechanism between events, and the continuous design required for this framework has no place here. Therefore, the core problem of H1 is not just a lack of resources, but structural: the roles are fixed before the activities begin, and changing the volunteers or the funding source will not change the operational logic at all.

7.3.2 H3: Preferred Future

H3 describes the future state that this project aims to facilitate. Within the next five to fifteen years, cross-generational play will no longer be merely an occasional special event, but will become a regular practice within the GTA community center.

In this perspective, the role of "面子" (miànzi, face) has undergone a fundamental transformation. In the existing intergenerational projects, face often acts as a hindrance. Participants may worry about not performing well, making mistakes in front of strangers, or losing their dignity, thus choosing not to participate. The design logic envisioned by H3 is to transform these concerns into a continuous participation motivation. When a person is willing to consistently appear, engage in activities, and return again the next time, this behavior itself is no longer just participation, but rather a demonstration of commitment and "尊重" (zūnzhòng, respect). In other words, face is no longer just a reason for people to retreat; it can also become a reason for them to stay.

Consequently, the measurement method for the project also needs to be changed. Success should not be judged solely by the number of attendees, the hours of volunteer work, or the number of events held, but rather by observing changes in the density of relationships. For instance, who starts to address the other person by name, who arrives early, who takes the initiative to contact after the event, and who is willing to return again without being reminded.

In H3, the concept of cultural embedding takes on a more specific meaning. It does not merely incorporate Chinese elements as superficial decorations into the activities; instead, it ensures that cultural knowledge truly becomes a necessary condition for the interaction to occur. For instance, language, diet, festival memories, local experiences, and intergenerational life knowledge can all be incorporated as part of the game tasks and communication mechanisms.

Therefore, at this stage, the criterion for judging the success of the model is not merely whether a certain project runs smoothly, but rather whether there is a

mutual referral of participants among multiple GTA community hubs, and whether cross-generational co-play can continue to operate as a stable and sustainable community practice.

7.3.3 H2: Transition Zone and Its Fork

H2 is not a definite execution plan, but rather a transitional stage with an unstable direction. For the same project, it may gradually move towards H3 or be pulled back to H1. The key lies in who takes the lead during the actual execution process and by what standards the project's success is measured.

The signs of development towards H3 can be divided into two levels. The first level is that the project shifts from a one-time pilot phase to regular operation. That is to say, the community center can independently and completely operate the entire mechanism without the continuous intervention of the research team, and can repeat this process, not just completing one round of activities. The second level is that multiple community hubs start to refer participants to each other, gradually forming a cross-institutional network. At this stage, the funding agency also begins to recognize this networked model in the grant conditions and evaluation standards, rather than only focusing on the number of participants or the number of activities of a single project.

However, there is still a risk of the project being pulled back to the H1 stage. This risk mainly manifests in three aspects. First, commercial game logic may seep into the project. Although this project contains elements of game design, if mechanisms such as card drawing (A game mechanism that drives repeated participation through random rewards), daily login, interactive data dashboards, etc. become the core, the process of establishing real interpersonal relationships may be replaced by mere data growth, and thus the "热闹" (rènao, hot and clamorous) may not be truly accumulated. Second, the pressure of quantitative assessment may regain dominance. Once the project's scale, participation numbers, and quantifiable indicators become the main assessment criteria, the community shaped by "含蓄" (hánxù, reserve) may appear less active in terms of data, and thus will be overlooked again in resource allocation. Third, sudden changes in platforms or policies may disrupt the continuity of the project. Community organizations need time to adapt to changes. If the external environment changes too rapidly, the activity rhythm and participation relationships that have been established are likely to be disrupted, and it will be difficult to connect them later.

Therefore, H2 is simultaneously pulled in three directions: the assessment indicators set by the funding party, the policy direction of the platform, and the designer's insistence on the relational logic of "热闹" (rènao, hot and clamorous). This tension cannot be fully resolved in this section but needs to be carried forward and dealt with in future work.

8 Conclusion & Future Work

8.1 Summary of Key Insights

This study began from a narrow but overlooked combination: non-kin older adults and younger Chinese participants, face-to-face digital play, and community settings in the GTA. Existing literature tells us far more about grandparent-grandchild relationships within families than about strangers from different generations meeting through play in community space. Methodologically, the project also took a specific path. Two rounds of researcher-led workshop evaluation were read alongside expert interviews and interpreted through STEEPV and CLA so that design principles could be cross-checked across behavioural, interview, and foresight-based sources.

Returning to the primary research question, the answer is a cautious yes. Face-to-face digital games can support intergenerational connection and help reduce conditions of social isolation, but only under clear conditions. The design has to account for "面子" (miànzi, face) and "含蓄" (hánxù, reserve) instead of assuming participants will directly state their needs. The role structure has to prevent older adults from being placed automatically in the learner position and younger adults in the helper position. Finally, the contact has to be repeated. One successful session may open the door, but it cannot by itself move a pair from polite unfamiliarity toward "自己人" (zìjǐrén, one of our own).

Put differently, this project is less about treating individual loneliness than about changing the temperature of a shared space. "冷清" (lěngqīng, chilly and silent) describes the absence of "人气" (rénqì, human energy) in a tea house, activity room, or community centre. "热闹" (rènao, hot and clamorous) describes what builds when people return, recognize one another, and accumulate shared presence over time. In that framing, face-to-face digital play is not a cure. It is a low-threshold ritual for helping a space become livelier again.

8.2 Limitations

Several limitations of this study need to be clarified. First, the research team consisted of two Chinese male designers who received higher education in Canada, which introduced specific perspectives. Besides potentially making it more difficult to fully identify intergenerational interaction issues with gender differences, as researchers closer to the youth and familiar with digital products and gaming culture, we may have unintentionally regarded our own habitual interaction rhythms, interface logic, and gaming experiences as more "normal" ways of participation. Second, the sample composition also limits the scope of conclusions this study can draw. The participants in this study primarily came from groups willing to participate in community activities and try digital games, making it difficult to cover the older generation who are most resistant to, least familiar with, or hardest to reach in digital activities. Furthermore, there were relatively few older male participants, and this imbalance cannot be compensated for solely by subsequent analysis.

Furthermore, the fieldwork for this study was primarily conducted at the Yee Hong Caregiver Education and Resource Centre in Richmond Hill. While this setting offered high accessibility and relevance for the research, its organizational environment, participant composition, and activity conditions also meant that the findings were better understood as interim conclusions based on a specific community collaboration context, rather than directly generalizable to all Chinese senior communities or other types of intergenerational projects. Furthermore, the toolkit has not yet undergone broader institutional validation, and the prototype has not been tested in multiple long-term community projects. Therefore, the design principles, toolkit, and prototype proposed in this study are better understood as interim results with a clear empirical foundation and design potential, rather than stable models that have undergone long-term implementation and extensive validation.

8.3 Future Directions

Future work can be understood across three time scales. In the short term, the most practical step is to produce a Chinese version of the Intergenerational Game Design Toolkit together with a facilitator handbook, so that staff at Yee Hong and organizations such as CICS can use the material without first

translating academic English. In the same period, the prototype should be refined into a version suitable for public demonstration, whether through itch.io or a local exhibition, so that families and community participants outside the research setting can try it.

Also in the short to medium term, a pilot run with Yee Hong Richmond Hill would be especially valuable if their own facilitators, rather than the research team, run the session using the toolkit. The researchers have planned a meeting with staff and seniors to demonstrate the research outcomes, toolkit and game prototype. Staff adoption would show whether the toolkit can function without researcher presence and where facilitators encounter friction. Beyond one site, the mid-term goal is to test and refine the toolkit across Chinese community organizations with different dialectal backgrounds and operating scales.

In the longer term, the methodology itself and the toolkit will be developed into a conference paper for venues such as CHI (Conference on Human Factors in Computing Systems), HCII (Human Computer Interaction International) or CSCW (Conference on Computer-Supported Cooperative Work and Social Computing), so the work can be tested against broader HCI debate. The existing mock-up of an online matching system also points to a possible next stage. Once trust has been built through repeated face-to-face interaction, the question of how to extend those ties online becomes much more meaningful.

8.4 Closing Thought

At this stage, the next step is not to decide from above what else the community needs. The next step is to let participants, facilitators, and partner organizations answer back. The toolkit needs to be used, adapted, and criticized by the people who actually run intergenerational activities. If people are willing to sit down on a Wednesday afternoon, solve a puzzle together, and return the week after, that repeated co-presence already carries a form of "挂念" (guanian, specific concern). It is more credible than a polite hello, and it is strong enough to survive a second and third return.

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Appendix A

Research Instruments and Workshop Materials

This appendix includes the data collection instruments used during the participatory design workshops with intergenerational participants.

Session 1a Pre-Questionnaire. Pre-session questionnaire administered to participants prior to the first workshop. September 2025. File: AppendixA-Session1a_Pre-questionaire.pdf (PDF).

https://openresearch.ocadu.ca/id/eprint/5030/2/AppendixA-Session1a_Pre-questionaire.pdf

Participant Interview Questions (Session 1b). Semi-structured interview guide used during post-session participant interviews. September 2025. File: AppendixA-Session1b_Participant_Interview_Questions.pdf (PDF). https://openresearch.ocadu.ca/id/eprint/5030/4/AppendixA-Session1b_Participant_Interview_Questions.pdf

Session 1b Observation Sheet Template. Structured observation template used by researchers during workshop sessions. September 2025. File: AppendixA-Session1b_Observation_Sheet_Template.pdf (PDF).

https://openresearch.ocadu.ca/id/eprint/5030/3/AppendixA-Session1b_Observation_Sheet_Template.pdf

Appendix B

Expert Interview Script

This appendix contains the semi-structured interview guideline used for expert interviews conducted as part of the research.

Expert Interview Script (Guideline). Interview script used to guide semi-structured interviews with domain experts in gerontology and game design. September 2025. File: AppendixB-Expert_Interview_Script.pdf (PDF). https://openresearch.ocadu.ca/id/eprint/5030/5/AppendixB-Expert_Interview_Script.pdf

Appendix C

Intergenerational Game Design Toolkit

This appendix presents the full version of the Intergenerational Game Design

Toolkit developed through this research.

Intergenerational Game Design Toolkit (Full Version). A design toolkit providing frameworks and guidelines for creating intergenerational games. April 2024. File: AppendixC-Design_Toolkit.pdf (PDF).

https://openresearch.ocadu.ca/id/eprint/5030/6/AppendixC-Design_Toolkit.pdf

Appendix D

Game Prototype: 对桌 (Across the Table)

This appendix provides access to the playable game prototype developed as part of this MRP.

对桌 (Across the Table). Digital game prototype designed to facilitate intergenerational play between Chinese seniors and university students. March 2024.

https://acrossthetable.itch.io/across-the-table

Appendix E

Game Manual

This appendix contains the game manual for 对桌 (Across the Table) in both digital and ready-to-print versions, available in Chinese and English.

Digital Version:

Game Manual, Digital Version (Chinese). Digital version of the game manual in Simplified Chinese. March 2026. File: AppendixE-GameManual_Digital_ZHCN.pdf (PDF).
https://openresearch.ocadu.ca/id/eprint/5030/31/AppendixE-GameManual_Digital_ZHCN.pdf

Game Manual, Digital Version (English). Digital version of the game manual in English. March 2026. File: AppendixE-GameManual_Digital_EN.pdf (PDF).

https://openresearch.ocadu.ca/id/eprint/5030/30/AppendixE-GameManual_Digital_EN.pdf

Ready-to-Print:

Game Manual, Ready-to-Print (Chinese). Print-ready version of the game manual in Simplified Chinese. March 2026. File: AppendixE-GameManual_Print_ZHCN.pdf (PDF). https://openresearch.ocadu.ca/id/eprint/5030/33/AppendixE-GameManual_Print_ZHCN.pdf

Game Manual, Ready-to-Print (English). Print-ready version of the game manual in English. March 2026. File: AppendixE-GameManual_Print_EN.pdf (PDF).

https://openresearch.ocadu.ca/id/eprint/5030/32/AppendixE-GameManual_Print_EN.pdf

Appendix F

Causal Layered Analysis

This appendix presents the Causal Layered Analysis (CLA) conducted to examine the status quo and envisioned futures of intergenerational connection.

Causal Layered Analysis (Status Quo + New). CLA framework mapping the current state and proposed future of intergenerational engagement through game design. February 2026. File: AppendixF-Causal_Layered_Analysis.pdf (PDF).

https://openresearch.ocadu.ca/id/eprint/5030/10/AppendixF-Causal_Layered_Analysis.pdf