DESIGN
2024

Addressing cultural inertias for co-design: exploring Chinese participants' perceptions of design games

Ziheng Zhang [1,✉], Rui Patricio [2], Tengjia Zuo [1], Wa An [1] and Ruoqing Huang [1]

[1] Guangzhou Academy of Fine Art, China, [2] Universidade Europeia, IADE, Faculdade de Design, Tecnologia e Comunicação, UNIDCOM/IADE, Unidade de Investigação em Design e Comunicação, Portugal

✉ ziheng.zhang.polimi@gmail.com

Abstract

Innovation-driven firms must adopt an open design strategy for competitiveness. Co-design games are recommended to foster an open, equal, and collaborative culture. However, most studies focus on the West. East-Asian countries, notably China, face unique challenges due to cultural disparities and inertia. This paper explores design games in the Chinese context through a case study with traditional workshops, revealing participants' perspectives and the potential impact on cultural inertia.

Keywords: co-design, design management, design games, East-Asian culture, cultural inertias

1. Introduction

Innovation can originate from diverse corners of the economic ecosystem; the sources of innovative knowledge are thereby widely distributed. This necessitates the imperative for companies to embrace an open, boundary-spanning innovation approach to innovation in order to ensure innovation sustainability. In contrast to the common impression of considering open innovation as a one-directional approach, where expertise and ideas are only imported from outside the firm, the open innovation strategy also emphasizes the flow of knowledge, including confidential knowledge, from inside to outside collaborators (West and Bogers, 2014). Complete open innovation occurs when these two flows happen sustainably.

As a result, organizations are increasingly adopting co-design methods that incorporate game-based tools such as design games to facilitate multi-sectors' collaboration (Albinsson et al., 2008). These approaches promote active involvement and engagement from both internal and external stakeholders, fostering a dynamic and interactive process (Steen, 2013). By leveraging the diverse perspectives and expertise of various contributors, firms can enhance their innovation capabilities and adapt to the rapid-changing market conditions. The design games, provide a structured yet flexible framework for generating and refining ideas, identifying potential applications, and exploring novel solutions. The interactive nature of these approaches encourages participation, creativity, and cross-pollination of ideas, often leading to more robust and innovative outcomes (Vaajakallio and Mattelmäki, 2014).

By embracing this holistic view of open innovation and utilizing co-design methods with design games, organizations are not only able to tap into a broader range of ideas, expertise, and resources but also overcome organizational inertia that might hinder openness (Gimenez-Fernandez et al., 2021). By providing a structured and engaging environment, these methods foster a culture of openness, creativity, and experimentation, challenging the status quo and encouraging teams to explore new possibilities. Through the facilitation by design games, organizational silos are broken down, and individuals from various departments and backgrounds come together to co-create and develop innovative solutions. This cross-functional collaboration brings fresh perspectives and diverse insights, energizing the organization

and promoting a mindset of continuous learning and improvement (Zhang and Zurlo, 2021). Additionally, the interactive and engaging nature of game-based tools helps to overcome resistance to change by creating a positive and stimulating environment. By making the innovation journey enjoyable and rewarding, employees become more motivated and willing to embrace new ideas and approaches (Patricio et al., 2020). However, it is important to note that while there have been numerous studies on design games, many of them have primarily focused on Western cultural contexts. In the East-Asian context, particularly in China, challenges and obstacles remain due to unique cultural inertias (Taoka et al., 2021). This exploratory study aims to address a micro-level question related to this challenge. The research question is: What are the perceptions of Chinese participants regarding design games, and how can design games mitigate cultural inertia and foster the sustainability of co-design and open innovation in East Asian countries? To answer this question, we first present a literature review on related work on design games and the unique barriers of East-Asian cultural influences. Afterward, we illustrate an open innovation case study in China where a design game was adopted in the co-design phases. Qualitative means of data collection have been carried out to support our conclusions.

2. Related work

2.1. Design games

The increasing need to involve stakeholders in open design participation has led to a growth in the number of methods for engagement. Among them, design games have become one of the most popular methods that have been widely adopted to engage various participants (Taoka et al., 2021).

The idea of applying game techniques for engagement purposes can be traced back to the early 80s when the video game industry first experienced a boom. Malone, who was inspired by games, first described his "heuristics for designing enjoyable user interfaces" (Malone, 1982). Carroll and Thomas also proposed the idea of redesigning everyday work to be more engaging and intrinsically motivating through the use of game-like metaphoric cover stories (Carroll and Thomas, 1982). As the importance of user experience research grew, researchers started exploring concepts such as game-based "motivational affordances," "playful and pleasurable products," "enjoyable technology," "hedonic elements," and more. Gradually, the idea of using games as a means of engagement became more mature, and the game-based approach gained popularity around the 2000s. Practitioners and researchers began repurposing and expanding the use of games beyond pure entertainment, consistently exploring their potential in various domains.

Given its inherent ability to engage people in accomplishing complex tasks, the use of a game & play approach has become increasingly popular for organizing co-design sessions, particularly during the 'fuzzy front-end' of open innovation. The literature describes such game-based methods as design games. They encompass a variety of approaches, including the use of board/card games, toy pieces, serious play, and role-playing. Brandt (2006) emphasizes that exploratory design games, employed in co-design, provide a valuable framework for engaging individuals with diverse expertise, interests, and professional languages (Brandt, 2006). Vaajakallio & Mattelmäki (2014) highlight the importance of a play framework in co-design, where design games serve as tools for designers, shaping the mindset of players and providing a guiding structure for game designers (Vaajakallio and Mattelmäki, 2014). Instead of being a well-defined method, the aforementioned scenarios emphasize the playful, exploratory, imaginative, creative, and empathic aspects of collaboration. In the context of design participation, most literature agrees that games have limitations when used for staging participation. Rules and tangible game pieces guide the design process, and there is less emphasis on competition and winning the game (Brandt and Messeter, 2004; Buur and Soendergaard, 2000; Iversen and Buur, 2002). Design games can create a more inclusive and collaborative environment, where diverse perspectives and expertise are valued and integrated into the innovation process. By engaging users in a shared experience, the approach encourages cross-disciplinary collaboration and the exchange of knowledge and insights. This collective effort helps to overcome rigid organizational structures and fosters a culture of openness and cooperation.

Despite scholars describing situations in which facilitators and participants incorporate game elements and mechanics to facilitate co-design for openness, there are very few studies exploring such relationship in an East-Asian culture context.

2.2. Cultural differences in co-design and open innovation

Culture is one of the significant factors that contribute to the success of open innovation strategy and related methods such as co-design. Culture tends to incorporate ideas from both the West and the East, emphasizing the essentialness of the human aspect (Pun *et al.*, 2000).

The Western (e.g., Anglo-American) and East-Asian (e.g., Chinese) cultural paradigms are two distinctly different yet highly respected and influential idealistic systems, each with its own set of influences. As Tse (1998) argues that no system is perfect and acknowledges that each has its flaws, these two cultural paradigms have their own barriers to innovation and openness (Tse, 1998). Based on the research by Hofstede & Bond (1988) and Martinsons (1996), Pun et. al listed nine pairs of key features that distinguish Western and East-Asian culture: (1) Rational inductive thinking versus intuitive holistic thinking. (2) Scientific versus aesthetic. (3) Individualistic versus family-oriented collectivistic. (4) Low power distance versus high power distance. (5) Seek to reduce uncertainty versus accept or tolerate uncertainty. (6) Explicit communication versus implicit communication. (7) Function-oriented expression versus relationship-oriented expression. (8) Systematic trust versus personal trust. (9) Diversified information networks versus Top-down information systems (Hofstede and Bond, 1988; Martinsons, 1996; Pun *et al.*, 2000).

The relationship between these cultural differences and design processes has been investigated by various studies associated with diverse methods like observations, questionnaires, interviews, etc. Researchers find that facilitating co-design sessions in Western countries is easier and more effective than East-Asian countries (Taoka *et al.*, 2021). This is due to a very obvious reason - the strategies of open innovation, methods and tools for co-design, and design games - were all invented by Western scholars. To some extent, these methodological inventions were created to overcome barriers influenced by Western culture. For instance, "seeking to reduce uncertainty" has been identified as one of the cultural barriers that hinders co-design and open innovation in the Western context. To counteract this barrier, many suggest that co-design activities in the early stages of open innovation should remain open to all possibilities and opportunities (Kim and Wilemon, 2002). Additionally, one of the reasons for utilizing design games is to address Western individualism through the rules of the game. Though East-Asian culture may not naturally align with today's co-design practices, certain cultural features are considered favorable for the implementation of co-design, particularly with design games. Yasuoka et al. discovered that, in comparison to Danish participants, Japanese participants tend to adhere more strictly to the rules of a design game, while Danes often disregard and interrupt others' speech more frequently (Yasuoka *et al.*, 2013). These positive disparities in performance can be attributed to the influence of East-Asian culture of collectivism.

However, we must acknowledge that there are more cultural inertias that may impede co-design and open innovation. At least there are noticeable cultural barriers that hinder the East-Asian co-design realities from aligning with the ideal scenario portrayed in Western literature. Table 1 provides a comprehensive list of the cultural barriers that have been identified in the literature as obstacles to co-design and open innovation. The following sections will present a case study that demonstrates how the implementation of a design game can effectively mitigate the impact of these inertias.

Table 1. East-Asian cultural influences on barriers to co-design

Culture barriers	Findings in literature that support the identification
High power distance	Participants with a high power distance score are reluctant to engage in active argumentation (Taoka *et al.*, 2021).
	East-Asian people are less comfortable expressing opinions with people in a higher hierarchical position openly (Taoka *et al.*, 2021).
Implicit communication	Less verbal utterances from East-Asian countries participants (Tran and Lee, 2009).
	Japanese sought implicit approval before talking (Yasuoka *et al.*, 2013).
	East-Asian people hardly disagree with the implicit conclusion of group discussion, which leads to less diversified discussion (Taoka *et al.*, 2021).
Relationship-oriented expression	East-Asian are reluctant to share their honest opinions with strangers in workshops (Taoka *et al.*, 2021).
Top-down information systems	More pivotal role of facilitator in the East-Asian group [26].

3. Methodology

This paper aims to tackle a micro-level question regarding the challenge of mitigating East-Asian cultural inertias in the adoption of design games for co-design and open innovation strategies. The micro-level analysis focuses on exploring the significance of small-scale interactions among individuals, conversations, and dynamics within small groups. Therefore, the key research question guiding this study is: What are the perceptions of Chinese participants regarding design games, and how can design games mitigate cultural inertia and foster the sustainability of co-design and open innovation in East Asian countries? To address this question, we conducted a preliminary investigation where a design game was implemented in co-design workshops as part of a real-world open innovation project.

3.1. Case backgrounds

The project was initiated by a Chinese world-leading home appliance company in collaboration with professors and Master's students from a Chinese renowned design school. The objective of this project is to discover new insights and opportunities in product and service design. This collaborative setup exemplifies a common approach to open innovation, known as the "Triple Helix model," which emphasizes the exchange of knowledge between the academic and industrial sectors. To facilitate this knowledge transfer, two co-design workshops were conducted. Two senior designers from the company, three professors, and Thirteen Master's students participated in the workshops (n = 18). The first workshop employed a conventional design thinking framework, while the second workshop utilized a design game called ideaChef®.

ideaChef® is a design game employed to devise targeted strategies, herein referred to as "recipes," that effectively tackle specific challenges, needs, or issues encountered within real-life scenarios, encompassing both internal operational frameworks and external marketplace dynamics. It was specifically designed to enhance user motivation and active participation during the 'fuzzy front end' of the open innovation process. It incorporates a blend of game dynamics, mechanics, and components. This approach has undergone rigorous scientific validation and market testing, cementing its efficacy in fostering idea generation, co-design, and co-creation (Patricio, 2017; Patrício et al., 2020; Patricio et al., 2020).

3.2. Data collection and analysis

3.2.1. Data collection

After the two workshops, we gathered the qualitative data from the participants through a series of semi-structured interviews. These interviews proved to be a valuable resource as the interviewees provided comprehensive insights into the participants' perceptions, reactions, and reflections on their experience of comparing ideaChef with another workshop. To ensure the appropriateness and validity of the interview questions, they were drafted and reviewed by multiple authors.

3.2.2. Coding

The thematic analysis technique was employed to code the data (Braun and Clarke, 2006). The authors coded several potential themes based on the literature review, research questions, and interview questions. The codes assigned by both individuals were compared and discussed, addressing any inconsistent interpretations and revising the codes until a consensus was reached. Subsequently, the coded themes were cross-checked with the data collection results, and relevant adjustments and modifications were made accordingly. Through multiple iterations of adjustment, analytical themes emerged along with representative data and corresponding participant quotes. In total, twelve codes were identified (Tab. 2).

Table 2. Codes and the representative quotations

Codes	Representative quotations
Work routine	I have previously participated in a very similar workshop where we engaged in design thinking-based co-creation on a large sheet of paper.
Enjoyment	There is no doubt that the second workshop was even more enjoyable; the entire experience was very positive.
External collaboration	In the second workshop, we sought more assistance from the personnel of the company.
Explicit communication	In fact, we didn't have much communication when we completed the design tasks in our own groups, but during the second workshop, we had frequent and extensive communication. It felt like the activities were promoting more interaction among us.
Feel free	The first workshop was a bit more free-spirited because there were fewer restrictions, whereas the second workshop, which was gamified, had some limitations.
Reaching consensus	The second workshop incorporated game mechanics that encouraged us to actively reach consensus, which is often difficult to achieve in traditional work settings.
Confusion	Occasionally, we would get stuck while playing the game because the instructions were not very clear, for example we were quite hesitant during the scoring phase of the game, as we were a bit unclear about the criteria and got stuck for a moment.
Follow instructions	We essentially followed all the rules of the game.
Relaxation	I feel that playing games while co-creating with unfamiliar people can really help us relax.
Novelty	The second workshop gave a sense of novelty, so it was quite interesting, but maybe not that interesting, haha. It was just slightly more interesting than the others.
High power distance	Because they are senior designers in the company, sometimes I worry that the difficulties we encounter might seem too trivial from their perspective. I'm concerned whether the things we ask them are considered necessary in their eyes. Additionally, we're not really familiar with them, and we don't have much interaction on a regular basis.
Low power distance	The second game is like forcing us to interact with them, but when we actually engage, we realize that they are all very nice and enthusiastic.

3.2.3. Data analysis

We employed the epistemic network analysis (ENA) method to visualize and interpret the coded data. ENA is a method that encodes data and represents them in dynamic network models. These models provide a visual representation of the connections and measure the strength of associations among elements in a network (Shaffer, 2016). They also quantify changes in the composition and strength of connections over time. Importantly, ENA allows for the comparison of networks both directly and through summary statistics, making it a valuable tool for exploring a wide range of qualitative and quantitative research questions, particularly in situations where meaningful patterns of association in data are hypothesized (Bressler et al., 2019).

The ENA model uses the moving stanza window method to involve the analysis of utterances coded by individual participants, where each line in the dataset represents such an utterance. The procedure begins by selecting a referent utterance, followed by examining subsequent utterances within a window of preceding utterances. Using the moving stanza window method, interconnections between codes within the referent utterance and the window, as well as within the referent utterance itself, are thoroughly investigated. After analyzing each utterance, the window transitions to the next utterance and the process repeats. The connections are visualized in a network diagram using qualitative codes as nodes. The ENA framework calculates the centroid of the polygon formed by the diagram, considering connection weights as in an object's center of mass. Connections between nodes are represented as lines in the diagram, with thickness or intensity indicating relative weights (Shaffer, 2016).

3.2.4. ENA results

We created an ENA model and compared the connections between participants' perceptions of the two workshops. Figure 1 displays the plotted points for the first workshop (red) and the ideaChef workshop (blue). The dots represent each participant, with red dots indicating the participants who attended the first workshop and blue dots indicating those who participated in the ideaChef workshop. The average of these points is depicted as a square with a 95% confidence interval, represented by the rectangular

outline for each dimension. This diagram illustrates the significantly different perceptions of participants regarding their experience in the first workshop and the ideaChef workshop.

Figure 2 presents a comparison between participants' perceptions of the first workshop and the ideaChef workshop through ENA analysis. The analysis results in two distinctive network diagrams. The red network diagram represents the connections between different perceptions within the students' understanding of the first workshop. It highlights various connected codes, including similar work routines, high power distance, explicit communication, and a sense of freedom. On the other hand, the blue diagram illustrates the network of participants' perceptions of the ideaChef workshop, emphasizing strong connections between a sense of enjoyment, explicit communication, external collaboration, following instructions, reaching consensus, novelty, and occasional confusion.

The network diagrams also incorporate weightings, where thicker and more saturated lines indicate stronger connections, while thinner and less saturated lines represent weaker connections. This feature enables a clear interpretation of the diagram. The thickness and saturation of a line are proportional to the frequency of interaction between the connected elements within the participants' perceptions, providing valuable insights into the relationships between different aspects of the workshops.
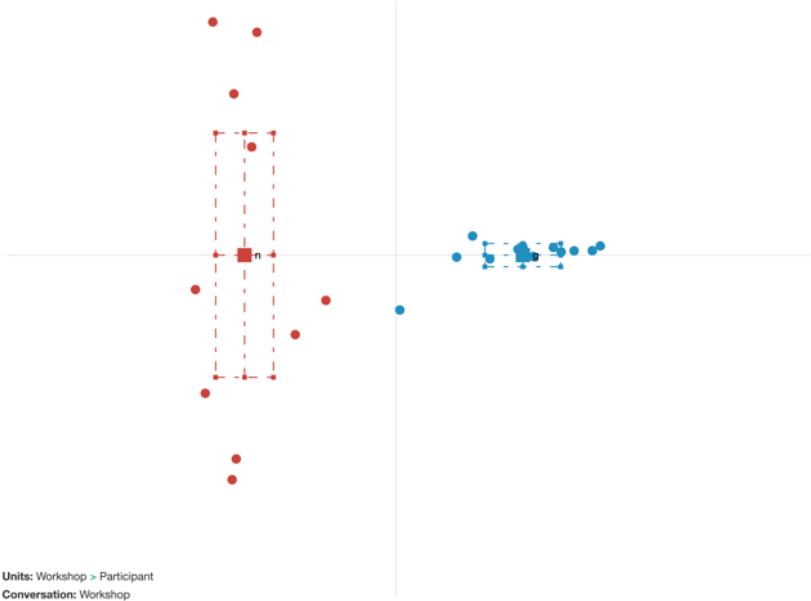

Units: Workshop > Participant
Conversation: Workshop

Figure 1. Comparison of the first workshop (red) and ideaChef workshop (blue) using plotted points and centroids
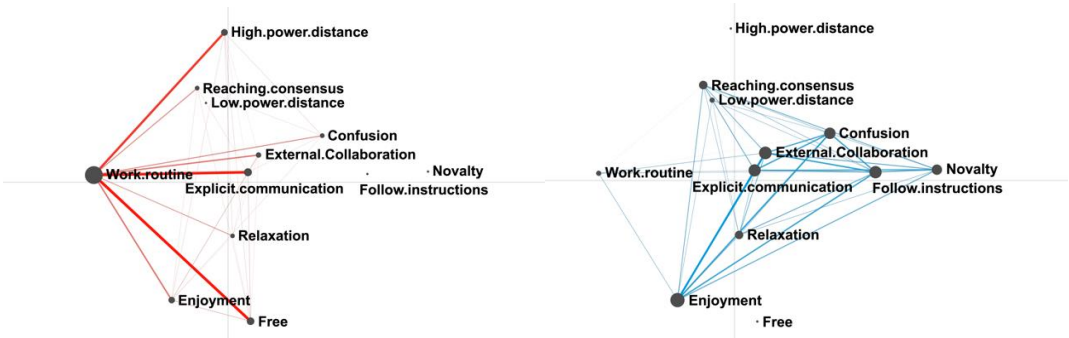

Figure 2. The comparison between participants' perceptions of the first workshop (red) and the ideaChef workshop (blue), demonstrated through ENA network diagrams

4. Finding: Chinese participants' perceptions of design game

This preliminary study investigates the potential of utilizing design games in open innovation practices within an East-Asian cultural context. Through the ENA analysis of data collected from a real-world

project and the authors' observations and reflections, we have gained valuable insights into the subject and drawn conclusions regarding the research question: What are the perceptions of Chinese participants regarding design games?

4.1. Novelty

It is noticeable that all the interviewees are novices in design games and other gamified applications for design activities. Only one participant claimed that the method of the ideaChef workshop is slightly closer to his work routines, while others confirmed that the first workshop is highly familiar to them and similar to their work routines related to co-design. This differentiation also manifests in their expression regarding the feeling of novelty. They frequently mentioned the idea of ideaChef, where game elements are used for co-design, is very novel to them, and such statements are often connected with the description of the playfulness of the method.

4.2. Playfulness

It is not surprising that our findings align with the literature indicating that playfulness is the primary perception among participants. The ENA diagrams revealed a significant contrast in the experience between the first workshop and the ideaChef workshop in terms of the sense of enjoyment. In fact, all the participants expressed their enjoyment very early on during the interview session. When we asked them to compare the level of enjoyment with the first workshop, only one participant stated that ideaChef was less fun than the first one, which had no game elements at all. The reason given was that ideaChef felt slightly more constrained.

4.3. Instruction and restriction

Feeling restricted is not an isolated case. The interviewees were asked to compare their reflections on two workshops, and many of them described the first one as a more open or free experience, while the ideaChef workshop was perceived as more restricted. This reflection is closely related to the fact that they closely followed the instructions in the ideaChef workshop. The instructions given to the participants are the tangible manifestation of game rules. It is emphasized that the game rules inject a playful and persuasive structure, augmenting the tension of the design process but weakening the degrees of freedom. The instructions also prescribed boundaries for the participants. Testimonials from participants indicate that the rules of ideaGardener establish a critical path to be followed, effectively defining clear boundaries that mitigate the potential for endless debates and tangents.

4.4. Promoting communication and consensus in external collaboration

The high frequency of oral communication and the segments for calling assistance outside the teams are made mandatory by the rules of ideaChef. Therefore, these reflections are both manifested in their testimonials. Besides that, every game has a winning condition, which is not a common concept in the design process. The participants reflect that they always have trouble reaching a consensus in design collaboration, especially when working with strangers. However, they claim that they can reach a consensus in ideaChef more easily because there are rules to guide the argumentation and criteria to decide the "winner."

4.5. Dynamic power distance

There are several interviewees who reflected a transformation from high power distance to low power distance caused by playing ideaChef. One participant stressed that the reason for having more implicit communication with external experts is that they perceive the opposite party as more professional, while they themselves feel somewhat naive in comparison. This finding perfectly coincides with Taoka and her colleague's surprising discovery that the presence of experts has the potential to hinder the co-design process in an East-Asian cultural background because the unbalanced power distance reduces people's communication (Taoka *et al.*, 2021).

5. Discussion

In section 2.2, we identified several cultural inertias that are considered obstacles to the sustainability of co-design in East-Asian areas, including high power distance within organizational structures, implicit communication, relationship-oriented expression, and top-down information systems. Based on our preliminary investigation, we have found that the use of design games can mitigate the negative effects of these inertias, thus having the potential to support a more sustainable co-design experience for East-Asian participants. Furthermore, in the concluding section, we acknowledge and address several constraints and limitations of the study.

5.1. The ludic drive that reduces power distance

In the context of fostering co-design sustainability, it's crucial to recognize that East-Asian countries (represented by China in this paper) exhibit a distinctive high power distance societal structure, even when engaging in collaborative and innovative endeavors like design collaboration (Pun *et al.*, 2000). We argue that this is probably one of the most significant differences between East-Asian and Scandinavian cultures, where the spirit of co-design originated. Can playing design games shape a less power-distanced organization? Our case indicates a positive but limited answer. By immersing stakeholders in the mindset of play and games, it appears that their power distances are blended and balanced. We suggest that the ludic drive is the mechanism behind this transition. Interest and enjoyment are universal psychological needs of human beings and can be described as intrinsic motivation, which is innate rather than the result of acquired learning, such as behavioral patterns in a high power distance society (de Jesus *et al.*, 2013; Sailer *et al.*, 2017). In our case, the ludic drive is strongly associated with a sense of relaxation and novelty, which coincides with studies conducted in a Western cultural context (Zhang *et al.*, 2022). However, only a small number of participants directly linked the ludic drive with a decrease in power distance. We suggest that future studies should adopt a diverse range of methodologies to examine this mechanism.

To advance our understanding of this mechanism and its role in promoting co-design sustainability, we suggest that future research should employ a diverse range of methodologies. This broader exploration will help shed more comprehensive light on how the ludic drive, rooted in fundamental human psychology, can be harnessed to minimize power distance within organizations engaged in co-design. In doing so, it can facilitate a more sustainable and equitable co-design process that bridges the gap between high power distance societies like China and the co-design principles that originated in Scandinavian cultures.

5.2. Amplifying communication through game rules

Implicit communication and relationship-oriented expression can be seen as a result of high power distance. The reduction of power distance may gradually mediate and transform these communication and expression patterns. However, such a long-term transition appears too slow in quick-iterative co-design sessions, which typically last only a few hours.

Nonetheless, we have found that design games, particularly the rules of ieaChef, can quickly change the communication patterns of Chinese participants. We believe the persuasive nature of the game rules is the reason behind this. As Bernard Suits claimed that the rules of a game prompt players to voluntarily overcome unnecessary obstacles (Suits, 2014). In a playful manner, ieaChef prescribes when and where a player should explicitly discuss a certain theme with the stakeholders inside or outside the team. While some participants experienced a sense of being pushed, they engaged in oral communication much more frequently compared to the first workshop. The authors also observed a shift from implicit communication to a more explicit communication pattern. In interviews, participants confirmed that they built trust with the experts from the company through playing ieaChef, which signaled a move away from an exclusively relationship-oriented structure.

Moreover, the cultural inertia of relying on "top-down information systems" no longer seems to be an obstacle when a design game is adopted. It has previously been identified as one of the cultural barriers to the implementation of co-design. Lee & Lee suggest that a more experienced and expert facilitator is the key to arranging co-design in the East-Asia area. These powerful facilitators form a command-and-control structure, where decisions and explanations are made at the top and passed down the hierarchy. However, the employment of design games breaks down this hierarchical system. The rules of the game are now at

the top, while the facilitators' roles gradually shift into coordinators. People used to a top-down information system seem more compliant with the rules of the game. This coincides with Yasuoka and colleagues' study which found the Japanese more strictly follow the design game rules than the Danes (Taoka *et al.*, 2021).

5.3. Drawbacks and limitations

The most significant drawback indicated by participants' testimonials is that the use of design games has caused a certain level of confusion. This confusion is evident in the design process, where several participants found themselves lost in the game board due to imprecise instructions. They admitted to having little exposure to any form of games, which further complicates the implementation of design games. Additionally, the confusion is also reflected in the participants' mindset, which appears to be more skeptical and critical of the idea of design games.

An expert from the company expressed her inability to comprehend the purpose of using ideaChef at all. She questioned whether the game served as an icebreaker or aimed to entertain. This situation is not unique, as even in Western countries like the USA, there have been reports of failed co-design sessions due to misunderstandings arising from different mindsets. The shift in mindset from task-oriented work to playing a game is crucial in implementing design games (Zhang *et al.*, 2022). However, cultural inertia has a significant influence on how smoothly this change can occur. Failed transitions in mindset often lead to resistance from participants. As Harrington and colleagues claimed that low-income older adults felt disrespected and disregarded when using playful and colorful toolkits in participatory design, considering them to be childish and naïve (Harrington *et al.*, 2019).

Another drawback pointed out by the interviewees is the sense of restriction, which can be seen as a side effect of the game rules. Many interviewees expressed experiencing varying levels of constraint, which are typically not present in non-gamified co-design sessions. This drawback shares similarities with the feeling of being manipulated while using many gamified applications (Kim and Werbach, 2016). We propose that further research should delve into the design strategies of design games and gamification to achieve a balanced and more liberated approach to the compelling structure.

Acknowledgements

References

Albinsson, L., Forsgren, O. and Lind, M. (2008), "Towards a co-design approach for open innovation", *Towards a Co-Design Approach for Open Innovation Lars*, pp. 1–5.

Brandt, E. (2006), "Designing exploratory design games: a framework for participation in participatory design?", *Proceedings of the Ninth Conference on Participatory Design: Expanding Boundaries in Design-Volume 1*, pp. 57–66.

Brandt, E. and Messeter, J. (2004), "Facilitating collaboration through design games", *Proceedings of the Eighth Conference on Participatory Design: Artful Integration: Interweaving Media, Materials and Practices-Volume 1*, pp. 121–131.

Braun, V. and Clarke, V. (2006), "Using thematic analysis in psychology", *Qualitative Research in Psychology*, Taylor & Francis, Vol. 3 No. 2, pp. 77–101.

Bressler, D.M., Bodzin, A.M., Eagan, B. and Tabatabai, S. (2019), "Using Epistemic Network Analysis to Examine Discourse and Scientific Practice During a Collaborative Game", *Journal of Science Education and Technology*, Journal of Science Education and Technology, Vol. 28 No. 5, pp. 553–566, https://dx.doi.org/10.1007/s10956-019-09786-8.

Buur, J. and Soendergaard, A. (2000), "Video card game: an augmented environment for user centred design discussions", *Proceedings of DARE 2000 on Designing Augmented Reality Environments*, pp. 63–69.

Carroll, J.M. and Thomas, J.C. (1982), "Metaphor and the cognitive representation of computing systems", *IEEE Transactions on Systems, Man, and Cybernetics*, IEEE, Vol. 12 No. 2, pp. 107–116.

Gimenez-Fernandez, E., Abril, C., Breuer, H. and Gudiksen, S. (2021), "Gamification approaches for open innovation implementation: A conceptual framework", *Creativity and Innovation Management*, Vol. 30 No. 3, pp. 455–474, https://dx.doi.org/10.1111/caim.12452.

Harrington, C.N., Borgos-Rodriguez, K. and Piper, A.M. (2019), "Engaging Low-Income African American Older Adults in Health Discussions through Community-based Design Workshops", pp. 1–15, https://dx.doi.org/10.1145/3290605.3300823.

Hofstede, G. and Bond, M.H. (1988), "The Confucius connection: From cultural roots to economic growth", *Organizational Dynamics*, Elsevier, Vol. 16 No. 4, pp. 5–21.

Iversen, O.S. and Buur, J. (2002), "Design is a game: Developing design competence in a game setting", *PDC*, pp. 22–28.

de Jesus, S.N., Rus, C.L., Lens, W. and Imaginário, S. (2013), "Intrinsic motivation and creativity related to product: A meta-analysis of the studies published between 1990–2010", *Creativity Research Journal*, Taylor & Francis, Vol. 25 No. 1, pp. 80–84.

Kim, J. and Wilemon, D. (2002), "Focusing the fuzzy front–end in new product development", *R&d Management*, Wiley Online Library, Vol. 32 No. 4, pp. 269–279.

Kim, T.W. and Werbach, K. (2016), "More than just a game: ethical issues in gamification", *Ethics and Information Technology*, Springer, Vol. 18 No. 2, pp. 157–173.

Malone, T.W. (1982), "Heuristics for designing enjoyable user interfaces: Lessons from computer games", *Proceedings of the 1982 Conference on Human Factors in Computing Systems*, pp. 63–68.

Martinsons, M.G. (1996), "Cultural constraints on radical re-engineering: Hammer and Lewin meet Confucius", *Journal of Applied Management Studies*, Vol. 5 No. 1, pp. 85–96.

Patricio, R. (2017), "A gamified approach for engaging teams in corporate innovation and entrepreneurship", *World Journal of Science, Technology and Sustainable Development*, Vol. 14 No. 2/3, pp. 254–262, https://dx.doi.org/10.1108/wjstsd-10-2016-0057.

Patricio, R., Moreira, A., Zurlo, F. and Melazzini, M. (2020), "Co-creation of new solutions through gamification: A collaborative innovation practice", *Creativity and Innovation Management*, No. November 2019, pp. 146–160, https://dx.doi.org/10.1111/caim.12356.

Patrício, R., Moreira, A.C. and Zurlo, F. (2020), "Enhancing design thinking approaches to innovation through gamification", *European Journal of Innovation Management*, https://dx.doi.org/10.1108/EJIM-06-2020-0239.

Pun, K.-F., Chin, K.-S. and Lau, H. (2000), *A Review of the Chinese Cultural Influences on Chinese Enterprise Management*.

Sailer, M., Hense, J.U., Mayr, S.K. and Mandl, H. (2017), "How gamification motivates: An experimental study of the effects of specific game design elements on psychological need satisfaction", *Computers in Human Behavior*, Elsevier Ltd, Vol. 69, pp. 371–380, https://dx.doi.org/10.1016/j.chb.2016.12.033.

Shaffer, D. williamson. (2016), "A Tutorial on Epistemic Network Analysis", *Journal of Learning Analytics*, Vol. 3 No. 3, pp. 9–45.

Steen, M. (2013), "Co-design as a process of joint inquiry and imagination", *Design Issues*, MIT Press One Rogers Street, Cambridge, MA 02142-1209, USA journals-info …, Vol. 29 No. 2, pp. 16–28.

Suits, B. (2014), *The Grasshopper-: Games, Life and Utopia*, Broadview Press.

Taoka, Y., Kagohashi, K. and Mougenot, C. (2021), "A cross-cultural study of co-design: the impact of power distance on group dynamics in Japan", *CoDesign*, Vol. 17 No. 1, pp. 22–49, https://dx.doi.org/10.1080/15710882.2018.1546321.

Tran, T.T. and Lee, K. (2009), "Multilevel Cross-Cultural Influences in User Experience Research: Focus on Discipline-Nationality Combination", *Proceedings of the 13th International Conference on Human-Computer Interaction (HCII), HCI International 2009*.

Tse, D.K. (1998), "Chinese cultural values and management: issues and implications", *Better Management*, Vol. 31, pp. 15–19.

Vaajakallio, K. and Mattelmäki, T. (2014), "Design games in codesign: as a tool, a mindset and a structure", *CoDesign*, Taylor & Francis, Vol. 10 No. 1, pp. 63–77.

West, J. and Bogers, M. (2014), "Leveraging external sources of innovation: A review of research on open innovation", *Journal of Product Innovation Management*, Wiley Online Library, Vol. 31 No. 4, pp. 814–831.

Yasuoka, M., Nakatani, M. and Ohno, T. (2013), "Towards a culturally independent participatory design method: Fusing game elements into the design process", *2013 International Conference on Culture and Computing*, IEEE, pp. 92–97.

Zhang, Z., Patricio, R., Carella, G. and Zurlo, F. (2022), "Supporting a Sustainable and Engaging Online Transition for Co-Design through Gamification", *Sustainability*, MDPI, Vol. 14 No. 11, p. 6716.

Zhang, Z. and Zurlo, F. (2021), "How game and game principles facilitate the co-design processes: reflections on two case studies", *Proceedings of the Design Society*, Cambridge University Press, Vol. 1, pp. 1745–1754.