


Article

Game for Complete Care: A Means of Connecting ‘User-Centered Design’ with Sustainability

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Abstract: This paper addresses sustainability and gaming from an interior design education perspective, emphasizing the importance of understanding the meaning of ‘complete care’ and raising the awareness of care among design students. The four-step inquiry was adopted as a methodological framework. The theoretical model of ‘complete care’ was proposed and the interactive game ‘Ideal Home’ was developed to raise the awareness of care in design. The game imitated a conversation activity between the interior designer and the client at the early stage of the design process and assisted ‘designers’ to ask meaningful questions from ‘clients’ so as to develop a better understanding of their care needs. Six postgraduate students with interior design backgrounds played the game, and they were observed and interviewed. The results suggested that the participants’ understanding of care improved after they played the game and they were able to identify more issues and detailed needs through the conversations. The significance of the research is that it proposes a theoretical framework to explain the meaning of ‘complete care’ in the design process, and also develops a practical tool (i.e., the game) to educate designers about care.

Keywords: sustainability; care; interior design; game; education

1. Introduction

We live in a human-made artificial world, which can be called ‘a Designed World’ [1] (p. 66). As a unique human ability, design is involved in all of the changes that we consciously impose on our living environments. Design both ‘creates’ and ‘destroys’—these two aspects are intertwined and coexist [2] (p. 291). If we view design as an act of creation, everything created requires something else to be changed. Insufficient attention to the destructive aspects of this process can lead to problems and crises.

A common problem is that ‘user-centered design’ is often disconnected from sustainability, resulting in environmental damage. Preoccupied with satisfying our immediate desires as a result of human self-centered collective behavior, we often lack empathy towards the ecosystem-centered approach [3] (pp. 54–55). A research gap exists between user-centered design and sustainability. In this paper, we propose the concept of ‘complete care’ and an educational game as a means of connecting ‘user-centered design’ with sustainability.

2. The Lack of Care in Design

2.1. The Problem of ‘User-Centered Design’

‘Critical care: architecture and urbanism for a broken planet’ outlines today’s prevalent practice: Architecture and urbanism are capital-centric, speculation-driven, and investment-dominated [4]. The climate crisis has rendered the planet vulnerable, even uninhabitable.

If we regard architects, urban planners, and interior designers as ‘care-givers’ who exhibit care for people (e.g., clients) and environments through designed things (Figure 1), we can see that unsustainable development is linked to the lack of care for the environment in human-centered design. Taking interior design as an example, the reasons may be threefold:

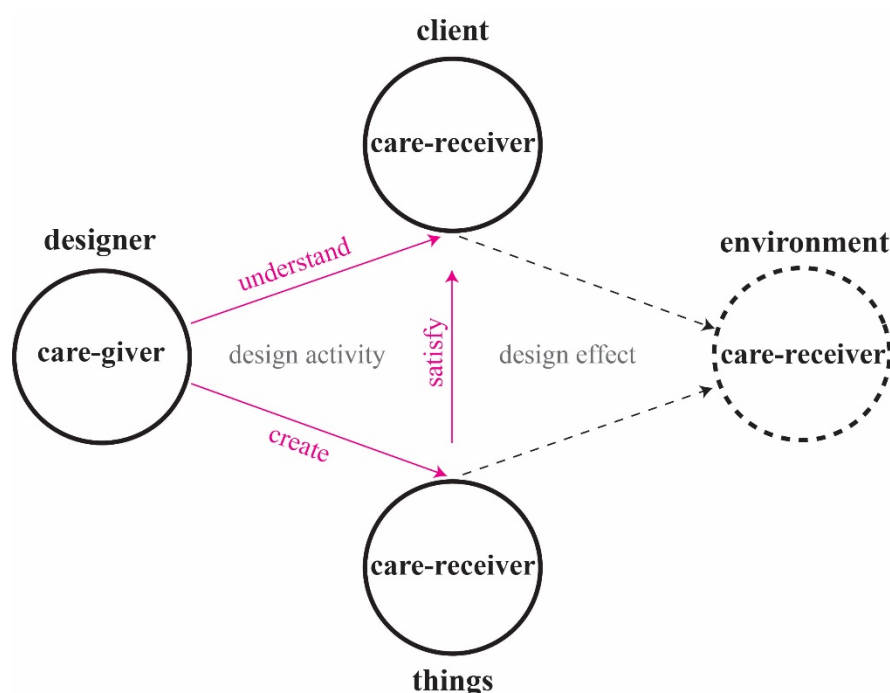


Figure 1. Lack of care for the environment in ‘user-centered design’ (represented by the dotted lines) (drawn by the first author).

(1) The design purpose: User-centered design often drives designers to care for clients’ ‘wants’ rather than ‘needs’. Designers have been trained in the ‘user-centered design’ concept, the purpose of which is to understand the requirements of the client or user. In design education, young designers acquire and apply knowledge, technologies, and methods, all of which have a demand mode [5] (p. 42). Nigel Whiteley analyzes the problem of consumer-oriented design [6]: The design process ends with meeting clients’ requirements, while the broader effect of the outcomes, beyond the satisfaction of the client, might be ignored, which could lead to environmental unsustainability. For example, in satisfying a client’s ‘wants’ for new materials and latest products, interior designers may cause more resource consumption and less reuse.

(2) The design process: Designers tend to care for the ‘design activity’ rather than the ‘design effect’. ‘The design activity’ implies that designers create things to satisfy people. ‘The design effect’ concerns the consequences of design activities on the ability to maintain a sustainable future. A design process has to consider both the design activity and the design effect. Christopher Jones (1970) introduces the assessment of product impact: ‘Seeds for Human Futures’. He argues that if design can change the world, designers must be able to foresee the possible impact of their proposed designs [7] (p. 6). This is not achieved if meeting the client’s requirements is seen as the ultimate goal of the interior designer, without considering the impact on the environment.

(3) The design manner: Designers' care for people is mediated through a practice focused on care for things. For example, interior designers care for space (creating good designs) and let space care about clients (satisfying people's requirements). If their design (e.g., using unsustainable materials) brings negative impact on the environment, the deterioration of the ecosystem will influence the health of clients and other people. If we believe that the design profession should be responsible for sustainability, designers have to take care of both people and environment. In addition, things and clients should be involved in the process of caring for the environment (the dotted lines in Figure 1). All elements (the designer, the client, things, and environment) together form a complete care system.

However, it is difficult to achieve the ideal situation: complete care. As individuals, we cannot care for the entire environment, and we often can only take care of people and things around us, at best. To care for the entire environment requires the active participation of everyone and everything. In the design context, if designers aspire to contributing to sustainability, they have to turn more people and things into care-givers.

2.2. The Problem of 'Design for Sustainability'

Design for Sustainability (DfS) has helped as an approach of incorporating design into Sustainable Development. DfS emerged in the 1960s and late 1970s when Packard (1963) [8], Papanek (1971) [9], Bonsiepe (1973) [10], and Schumacher (1973) [11] began to criticize unsustainable development and point out the negative impact of design [12] (p. 3). The second wave of DfS occurred in the 1980s and early 1990s. Manzini (1990) [13], Burall (1991) [14], Mackenzie (1991) [15], and Ryan (1993) [16] began to call for radical changes in design [13] (p. 4). By reviewing the evolutionary route of DfS [17], DfS approaches can be categorized into three critical levels: Product-focused approaches, service-focused approaches, and people-focused approaches.

(1) Product-focused approaches focus on achieving environmental sustainability by improving things (product design and manufacture) by using low-impact materials and energy sources (e.g., Green Design, Ecological Design).

(2) Service-focused approaches focus on addressing the design problem from the perspective of the intangible service system (e.g., Product-Service System Design) rather than creating things. It can alleviate unsustainable ways of producing, using, and disposing of products that may impact on environment.

(3) People-focused approaches promote sustainability through radical changes in people's consumption patterns (e.g., Design for Social Innovation, Design for Sustainable Behaviour). Users, along with other stakeholders, are involved in solving problems and creating value.

Half a century has passed since DfS was first put forward, and some improvements have been made. On the one hand, designers have created things with sustainable characteristics so that these things 'care for' the environment (Figure 2), such as green design and ecological design. On the other hand, designers have provided customers/clients with some sustainable lifestyle choices in their selection of products or services, such as 'design for sustainable behaviour'.

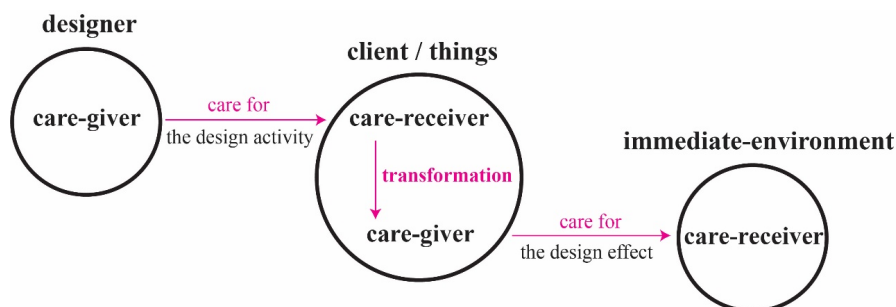


Figure 2. Model of 'complete care': Transforming 'care-receivers' to 'care-givers' (drawn by the first author).

However, ‘current practices and products of “sustainability” just cannot displace the sheer mass of the unsustainable’ [18] (p. 146). For the same reason, cultivating people’s sustainable behaviour by limited products and services will not create a widespread condition of sustainability. To address the unsustainable consequences of design, we should not only look at products and users, but also at designer’s awareness of, and ability to, care.

3. Theoretical Framework

We hypothesized that a comprehensive understanding of ‘complete care’ by designers could help resolve unsustainable design issues. Here, ‘complete care’ is based on the ethics of care, as defined by Fisher and Tronto [19] (p. 40): ‘On the most general level, we suggest that caring be viewed as a species activity that includes everything that we do to maintain, continue, and repair our “world” so that we can live in it as well as possible. That world includes our bodies, ourselves, and our environment, all of which we seek to interweave in a complex, life-sustaining web’.

In the model shown in Figure 2, ‘complete care’ can be regarded as a process of transformation. The designer, things, and the client all could play critical roles in the design process. The designer can be seen as the care-giver who cares for the client and for things. Things are designed with care and used to care for the immediate environment. The client receives designers’ care and has the opportunity to become a care-giver to affect their immediate environment to make it sustainable. Designers’ care attitudes and behavior could affect stakeholders’ attitudes and sense of responsibility regarding their roles in the world. Here, the immediate environment refers to the people/things/eco-system that can be directly influenced by the client and the things designed for them. Ideally, the designer ‘transforms’ his/her attention to the real needs of the immediate environment through the client and designed things, and ‘transforms’ the client/things from ‘care-receivers’ to ‘care-givers’ (Figure 2) through co-design activities (e.g., deliberation, engagement, participation [4]) i.e., the designers’ care has the potential to be further passed on by the client and things to care for other people and things. In this way, the impact of designers’ care is maximized and pushed beyond the designed artifacts. Thus, designers with the awareness of ‘complete care’ have the potential to turn people from an unsustainable ‘ego-centric’ mentality to one in which they consider others and the environment, leading to more sustainable design and development.

The concept of ‘complete care’ can help solve the unsustainability problem in three aspects: The design purpose, the design process, and the design manner. Firstly, the design purpose of ‘user-centered design’ will transform to ‘ecosystem-centered design’; satisfying users’ ‘wants’ will be replaced by meeting people’s (including clients) ‘needs’. Secondly, in terms of the design effect, designers have the opportunity to transform clients and things from ‘care-receivers’ to ‘care-givers’. Thirdly, when designers consider impact on the environment, they will care about the real needs of people.

In design education, some scholars have conducted research on improving designers’ care ability. For example, Tony Fry has taught courses around the world about ‘Design Futuring’. He proposes ‘care as an ontological structure of being’ [20] (p. 28). Ian Robert Coxon has developed university courses based on Care Studies. He advocates ‘a new field of theory and practice called an Ecology of Care’ [21]. The concept of care provides a new approach of rethinking the role designers and clients play in sustainable development.

4. Methodology and Methods

The methodology is based on Dewey’s ‘Theory of Inquiry’ [22], as introduced by Richard Buchanan into design research and design practice. He believes that the process of design research is also a ‘pattern of inquiry’ [23] (p. 5). The mode of inquiry is to achieve the determined situation from the undetermined situation, to ‘start with contradictions and conflicts, seek a unified concept and a large background, in which differences can be overcome in theory and practice’ [24] (p. 55–58). Specifically,

Buchanan’s model of design research consists of four stages: Problem, hypothesis, development, and significance [25]. They correspond to four types of questions: Whether, what, how, and why (Table 1).

Table 1. The pattern of inquiry in the context of this study.

Stages	Logic	Questions	Research Methods
Problem	revealing reasons	Whether: Whether unsustainability is caused by the lack of care in design?	Literature review (Section 2)
Hypothesis	Proposing a suggested idea	What: What is the possible solution to tackle the problem?	Theoretical model (Section 3)
Development	Examining the idea	How: How to raise designers’ awareness of care?	Game design, observation, interview (Section 5)
Significance	Drawing conclusions	Why: Why is ‘complete care’ important and meaningful?	Evaluation and discussion (Section 6)

This study focused on interior design rather than larger-scale architectural design or urban planning, as the stakeholders in interiors projects are easier to identify and engage. Often, the client is the user of interior design.

4.1. Games for Teaching Sustainable Design

Games have proved to be effective in communicating sustainability concepts, especially when they are made relevant to real world context and practice [26]. Interior design education is by nature as transdisciplinary as sustainability education and it may provide a valid prototype for a sustainability education-focused curriculum [27].

Since the advent of the Civil Rights Movement, the approach of ‘participation design’ has emerged in the designing and planning community, with various theories, methods, and techniques. Since the late 1960s, the fun-but-serious game as a participatory method has been employed and debated by many leading practitioners and researchers, such as Duke (1966) [28], Sanoff (1979) [29], Alexander (1987) [30], Portugali (1996) [31], Brandt (2008) [32], Tan (2016) [33], and Brković Dodig and Groat (2019) [34]; these have helped designers and stakeholders to understand complex processes and negotiate practical solutions.

The best ‘instrumental design’, like a good game, may be nothing more than a set of well-thought-out, interesting questions that the learner wants to answer, possibly with a set of tools to help answer them [35].

In order to examine whether the ‘complete care’ model (Figure 2) is useful for interior designers and can help them to transform clients from care-receivers to care-givers concerning their immediate environment, we developed a game to teach ‘complete care’ to interior designers, with questions and tools to help them in conducting conversations.

4.2. Materials and Methods

We believe that student designers can best grasp the essence of ‘complete care’ when they are dealing with familiar environments (such as their home) and familiar people (such as their family members). The game, entitled ‘Ideal Home’, presents typical scenarios of daily living. ‘Home’ was selected as the immediate environment because we have the opportunity to care for each other at home [36] (p. 393); and people not only feel and receive care, but also learn how to care at home [37]. The game comprises three tools (Figure 3): An interior layout map (presenting a space plan and collecting various needs of family members), a set of colored labels (representing family roles), and daily activity cards (Figure 4) (prompts for discussing the needs of different activities).

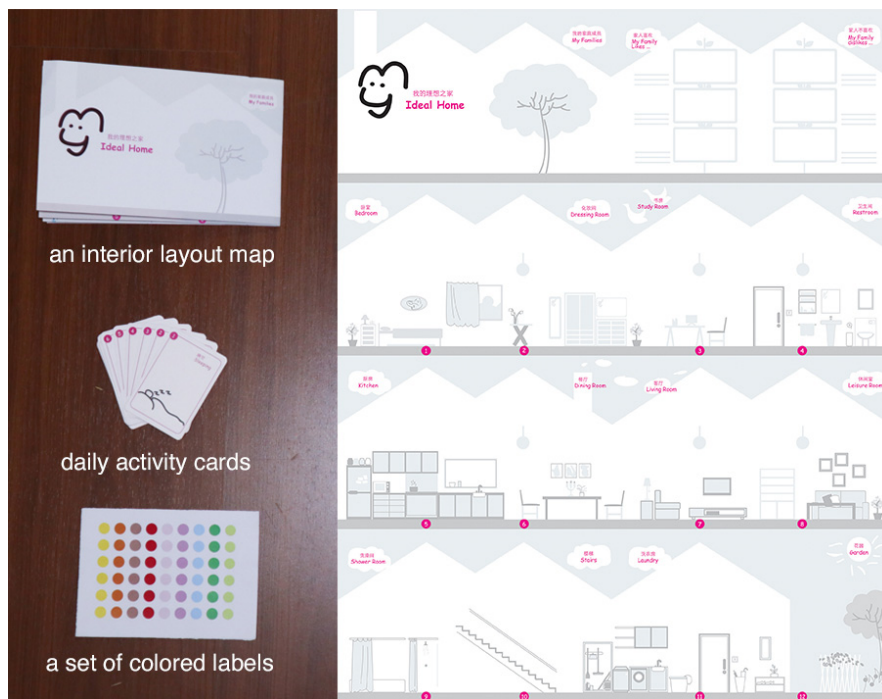


Figure 3. The components of the game (designed by the first author).



Figure 4. Daily activity cards (designed by the first author).

The ‘complete care’ model (Figure 2) was adopted as the theoretical framework for designing this game and the questions are focused on care. Designers not only have to care for clients’ needs, but also need to encourage clients to care for their immediate environment. We applied the method of designers ‘asking for needs’ to enable clients to care for people around them (Figure 5). In this way, clients could proactively transform to the care-giver role through communicating with designers.

For qualitative research on usability or user experience, five users are often considered sufficient to identify the majority of problems [38]. In total, six postgraduate students from Tongji University were recruited, all with interior design as their undergraduate major. Their age range was from 26 to 32. The participants were divided into three pairs. In each pair, one student played the role of the interior designer and asked questions, and the other played the role of the client and answered the questions. The research received ethics approval from the University.

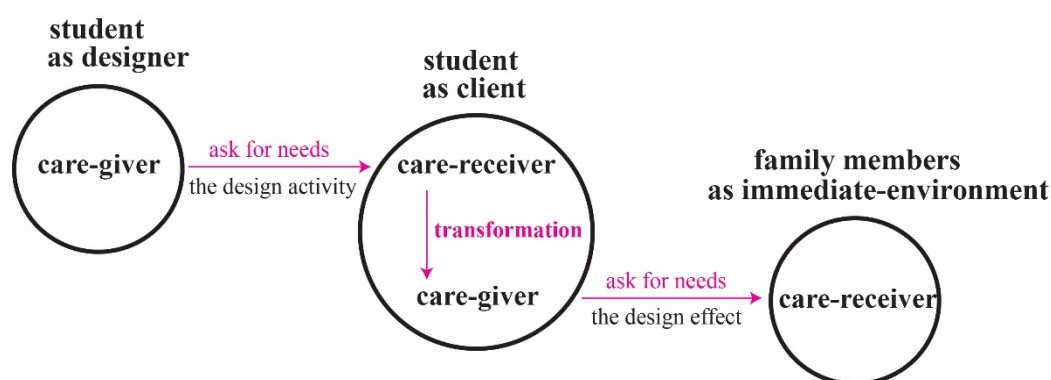


Figure 5. The theoretical framework of the game (source: [39]).

4.3. Process

The objective of the game is to help the designers identify their clients’ needs through conversations, and to raise their awareness of caring for the clients’ immediate environment (e.g., their family members’ needs). The winning condition is the designer’s identification of as many care needs as possible (reflected by notes and/or sketches in the home map).

The interactive process of the game was conducted in a workshop, involving two stages: The preparation stage and the playing stage. In the preparation stage, the participants were introduced to the rules of the game and the method of play. The students who played the role of the clients were asked to fill- in their family members’ basic information and to place colored labels accordingly on the family tree provided, with each color corresponding to one family member. In addition, they were also asked to briefly record each of their family members’ habits and ‘likes and dislikes’. In the playing stage, each pair was asked to pick an activity card in turn until each student had half of the whole set of cards in his/her hand. Then, one student drew a card from their paired other, and started to have a conversation over the specific activity displayed on the card (Figure 6).

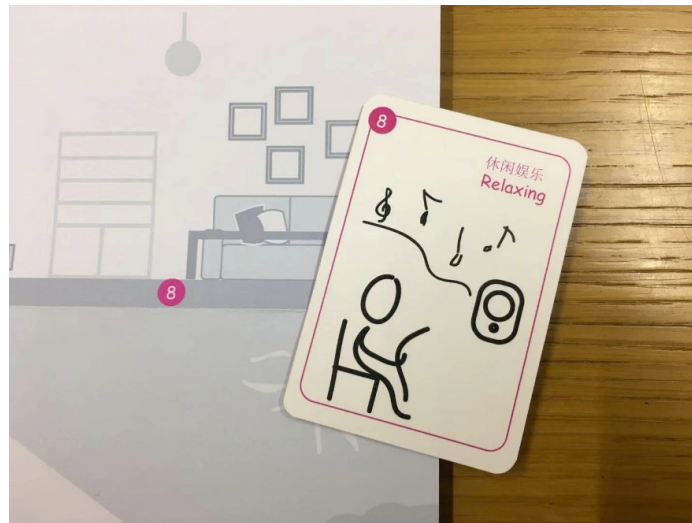


Figure 6. The daily activity card is discussed in relation to the interior space (source [39]).

The ‘designer’ would place the colored label on the map according to the family member’s needs and requirements, and then record the needs in text (Figure 7). If the ‘designer’ had any inspiration or concepts, he/she would be encouraged to sketch on the map. After the conversation and the recording, another card would be drawn and the same procedure repeated. Through this process, the needs were fully discussed for an ‘ideal’ home design conceptualization.

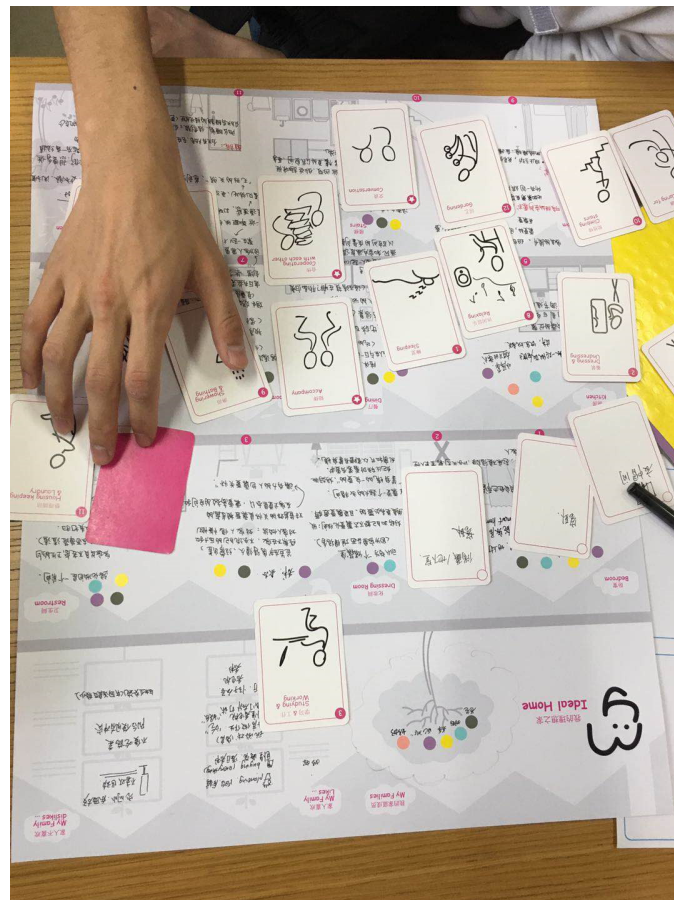


Figure 7. The ‘designer’ recording the needs of the ‘client’ (source [39]).

Before playing the game, the participants were interviewed about their understanding of care, e.g., What is the meaning of care? How do you care for your families? During the game, each pair of students was observed through video recording (with their permission) and note-taking. The recording included the conversations between the participants, their interaction during the game, and their text notes and sketches. For example, Figure 8 shows the recorded interaction of one group, and their map at the start of the game (i.e., almost empty) and near the completion of the game (i.e., almost full). The conversations were fully transcribed and marked with key time and keywords for further analysis. In-depth interviews with textual and visual notes helped give insights into the effectiveness of the game.

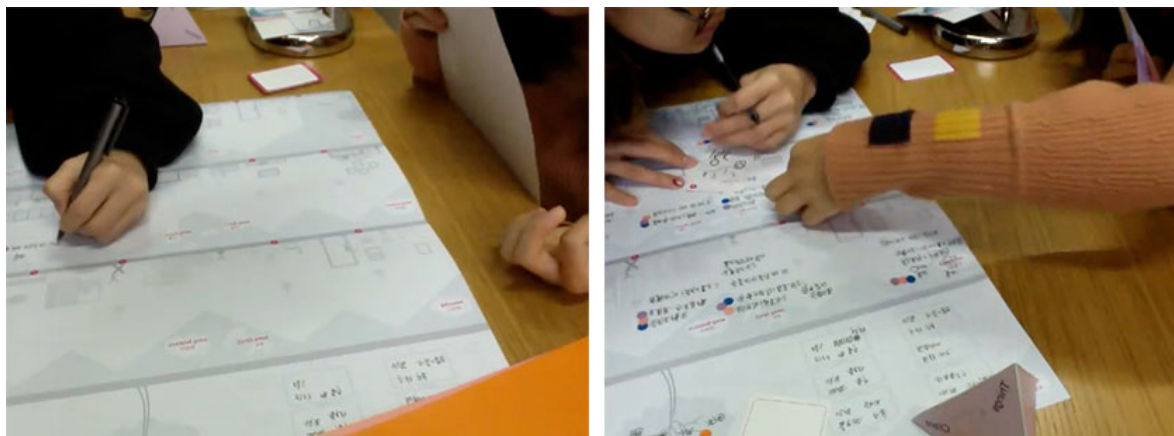


Figure 8. The map was filled up during the game play (source [39]).

After playing the game, the participants were interviewed to check whether they felt that their understanding of care had been enhanced through playing the game. Questions included:

- (1) Does your understanding of care change after playing the game?
- (2) What is your understanding of care after playing the game?
- (3) Does the game help you become more aware of care?

Those who reported an improvement were asked further questions (to understand why). The interviews before and after the game were voice recorded (with permission) and fully transcribed. The text transcriptions were emailed to the participants for checking of accuracy.

In the 'Ideal Home' context, 'complete care' was simulated by the client (played by an interior design student)'s consideration of other people's space-relevant needs (as part of their immediate environment). The method triangulation, i.e., pre- and post- interviews, observations of the game-play process, and the outcome of the game (e.g., the filled-up map) enabled assessment of the effectiveness of the game.

5. Analysis

The three groups all played the game successfully and completed the associated tasks, utilizing all the tools provided. The analysis reveals three types of conversations:

- (1) Conversations about family members' habits.
- (2) Conversations about needs.
- (3) Conversations about desires.

At the beginning of the game, the 'designers' asked the 'clients' about their family members' habits, likes, and dislikes, to help prepare the designers to design the interior space according to real needs. Table 2 gives an instance of such a conversation, highlighting the family member's habit of 'buying a lot of things'.

Table 2. An example of a conversation about habits (source [39]).

Group 3	Extracted Conversations [0:11:56–0:16:07]
Student X	Does your mum often have complaints about the space?
Student Y	Yes. My mum wants to have a lot of storage space at home. She likes to buy loads of things, including clothes, decorations, and all kinds of fruits. When she feels that she cannot store these things separately, she stacks the boxes, and the stack rack becomes higher and higher. There is never enough storage space for her.
Student X	Urban people generally have this kind of problem: they tend to buy a lot of things, and then find there is not enough space at home for storage.
Student Y	My mum wants to organize things neatly, and tries to make the home space appear bigger.
Student X	Is your mum dissatisfied with other spaces at home?
Student Y	If we are still talking about the kitchen, my mum thinks the space is small.
Student X	Your mum feels that the overall size is small.
Student Y	Our kitchen is full of stuff. Almost all the spaces are utilized: the space under the table or the space above the fridge: she stores stuff everywhere.
Student X	It seems that your mum likes cooking?
Student Y	Not really.
Student X	Your kitchen is full simply because your mum likes buying a lot of things?
Student Y	Yes. She REALLY likes buying things. For example, you may buy fruits using a plastic bag, and my mum will buy fruits using several boxes.

The design needs were discussed according to each card. As the activities displayed on the card took place in specific spaces at home (this was facilitated by placing the card on the map and labelling the family member—see Figure 6), it enabled contextual conversations with great detail, as show in Table 3.

Table 3. An example of a conversation about needs (source [39]).

Group 1	Extracted Conversations [0:35:23–0:42:16]
Student A	Do you often watch TV in the sitting room?
Student B	I seldom watch TV, and only occasionally watch it with my wife. I like lying on the couch while my wife likes sitting on the chair next to the couch. My grandmother, like me, watches TV from the couch. My kid watches TV on a small stool. After 9 pm, it will only be me and my wife left in the living room.
Student A	What else do you do in the living room?
Student B	Talking, having a conversation.
Student A	What feature do you prefer for your living room? What needs improvement?
Student B	I prefer brighter light.
Student A	Does your home have a large window?
Student B	Although there is a floor-to-ceiling window, I still feel it is not bright enough as the north-south depth of the room is relatively large. I need a brighter place.
Student A	You might need artificial lighting to supplement natural light.
Student B	This is what I like, but my wife doesn't like it. My wife likes using the floor lamp. When we watch TV after nine o'clock, we switch on the floor lamp, the only one in the living room. The lights in the room are actually very dim.
Student A	So your wife prefers a dim interior environment, while you prefer brightness.

Once the habits and needs were discussed, the ‘clients’ were asked about their expectations, which often related to the desired design, as illustrated in Table 4.

Table 4. An example of a conversation about desires (source [39]).

Group 3	Extracted Conversation [0:22:48–0:26:22]
Student X	Now we go on to talk about what you want, not necessarily what you already have in your home. What are your wants?
Student Y	If we are talking about the bedroom, I want a huge carpet. When I do not want to stay in the bed, I will choose to lie on the floor if it is warm enough. I can do a lot of things on the floor.
Student X	Have you ever considered keeping a pet at home?
Student Y	Not really, we are afraid of animals.
Student X	So keeping a pet is not your ideal life.
Student Y	I would rather have smart devices at home. For example, if I want to switch on the light but the switch is beyond my reach, then I will use a remote control, a smart home device.
Student X	OK, smart home.
Student Y	I would like to have a smart home. I would also like a programme which can help me cook. It can have a conversation with me while I am cooking, and guide me step-by-step.
Student X	Like those cooking programmes? An interactive board?
Student Y	Yes. I also want to cook together with my family members, for example making dumplings.
Student X	You are suggesting that family needs get-together activities relevant to cooking.

The analysis of the video and the completed maps suggests that the conversations were translated (by the ‘designer’) into either text notes or sketches on the map. Many of the verbal conversations between the paired participants were recorded on the map as text notes. The notes cover family members’ habits (as summarized descriptions based on the answers), their current use of the spaces at home (as syntheses between the answers and the designers’ analysis), and their needs and design concepts (the ‘clients’ idea or the ideas inspired by the conversation between the ‘clients’ and the ‘designers’). Figure 9 shows an example. Participants A and B were discussing about family watching TV in the living room. Participant B introduced his family’s habits of watching TV, while Participant A recorded on the map ‘watching TV with the wife and son’ and the typical time for such activities ‘till 9 pm’. When Participant B mentioned that he preferred a bright interior but his living room was relatively dark, Participant A made a note ‘likes/needs brightness’, and the potential design concept ‘supplement of light’.

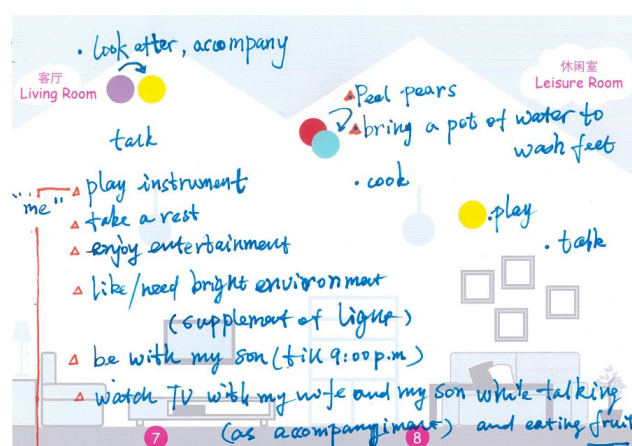


Figure 9. An example of how designers captured needs using text notes on the map (source [39]).

Some complex issues were better captured using sketches rather than texts, as shown in Figure 10. Participant C (the ‘client’) introduced the kitchen layout at her home: ‘on the left there is a water sink and an oven; and on the right is the preparation desk and the cooker.’ Participant D (the ‘designer’) recorded this information using a sketch illustrating the actual layout of the kitchen.

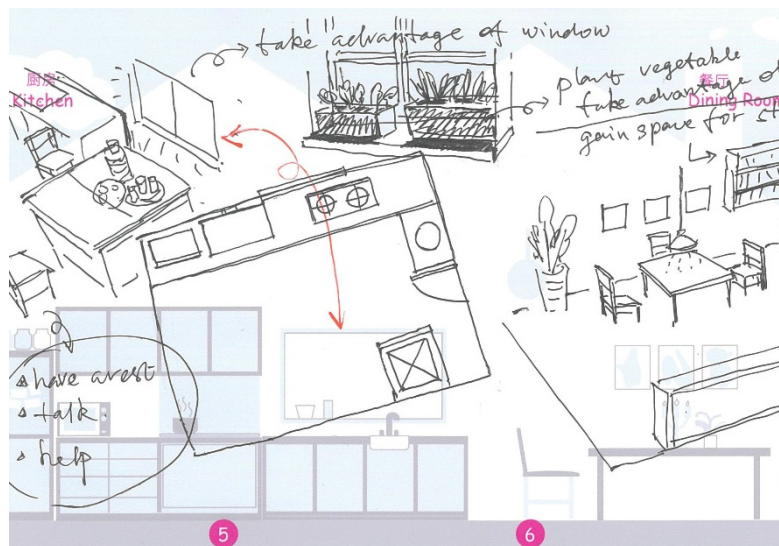


Figure 10. Sketch capturing key information from the conversation regarding the kitchen layout (source [39]).

6. Results

The results are summarized in terms of ‘changes’, ‘how changes happen’, and ‘how to care more’.

6.1. Changes

The comparison between the interviews before and after playing the game suggests that four out of the six participants (A, D, X and Y) had an enhanced understanding of care after playing the game.

The types of changes are threefold: changes in the ‘subject’, the ‘scope’, and the ‘context’.

- Change of the subject of care: From ‘artefacts’ to ‘people’.

Before playing the game, Participant D regarded ‘care’ as designers’ providing convenience to people’s lives through their designs. After playing the game, she started to understand care as caring for people; and design as not only providing convenience to people but also helping to improve people’s relationships.

Before playing the game, Participant D said:

‘I think care is to provide convenience to people and maintain individuals’ dignity, e.g., the barrier-free ramp allows disabled people to maintain their dignity, and it also provides convenience to the general public.’

After playing the game, Participant D stressed:

‘The key of care is people, and the relationships between people are most important. Spaces are supplementary. The ultimate goal for care should be people, and all the designs or scenarios of care should aim to bring people closer together. So caring design is to serve for people.’

- Change of the scope of care: From ‘special groups’ to ‘all’.

Before playing the game, Participant X thought the subjects of care were disadvantaged groups such as disabled people, the elderly, or children. After the game, he realized that everybody needs

care and that the subjects of care should be understood more broadly than special groups and should include all.

Before playing the game, Participant X said:

‘We talk about care because we take care of special groups. Disabled people are limited in their capabilities; for example, some need to use wheelchairs, so we design for them, and create barrier-free design, both for interior and public spaces. Designers need to meet these special groups’ needs.’

After playing the game, Participant X said:

‘Everybody needs care. I used to think only special groups needed care, but actually strong people also need care, and this is a new inspiration for me. Some people may appear strong and often take care of others, but they actually also need care from others. While you care for other people, you are also the subject of care, and your needs should be recognized and met.’

- Change of the context of care: From ‘designing’ to ‘living’.

When the student participants were asked about their understanding of care, they tended to answer this question from the perspective of design, and to interpret care from their knowledge of design. After playing the game, they tended to understand care within the context of the home and the ‘living’ environment.

Participant Y, before the game, thought that everybody should be taken care of by design, and that such care could be embodied in many minor details. After the game, her focus was switched to caring for her family members, and she further reflected that she had not taken sufficient care of her own family members.

‘Everybody needs care, to a large or small degree. Care is to meet people’s needs. The designer’s role is to discover unarticulated inconveniences in people’s lives, and to understand people’s living details through observation. Perhaps the care that designers give to others is just a little bit, but this is also fulfilling, like some minor design interventions that can touch people. For example, when you walk along the road, feeling low; if you suddenly see something very interesting, you will appreciate it even if it is not something big. Every small detail helps.’

6.2. How Changes Happen

Becoming more caring is a process of transforming one’s state, which requires conditions to make this happen. According to the summary of the interviewees’ feedback, turning to care is a process of gaining awareness through ‘mutual learning’. It is the interactive communication between the ‘designer’ and the ‘client’ that enables ‘reference’, ‘reflection’, and ‘motivation’ to take place. ‘Reference’ is the external condition that helps students to perceive other people’s caring models. ‘Reflection’ is an internal condition that makes students realize that they have not cared enough. For both the questioner (designer) or the questioned (client), once they realize that they have not cared enough, they will have the ‘motivation’ to care more.

When the ‘designers’ in this study asked the ‘clients’ about the needs of their family members, they came to understand other people’s care stories and experiences. This caused the ‘designers’ to associate past events between themselves and their own family members, and then realize that they had not cared enough for them or should pay more attention to them. This is a change of attitudes, an indicator of the improvement of care awareness, and also a motivator for future action. Participant C said: ‘when I ask questions, I think about my experiences as well. Through this game, we reflect on how much we are cared-for and how little we have cared-about’.

When asked about how they should take care of their family’s various needs, the ‘clients’ often recalled examples of their family member caring for themselves. Participant D said: ‘In the process of playing this game, I have the feeling of caring for my family. I find many things that I am used to, and many occasions when my parents helped me. I receive too much and give too little. But I don’t usually realize that. I did not think much about it.’ Once they realized that they had not cared enough

for their family members, they would have the idea of caring more. This change from recognizing that they could care more is a psychological transformation process (Figure 11).

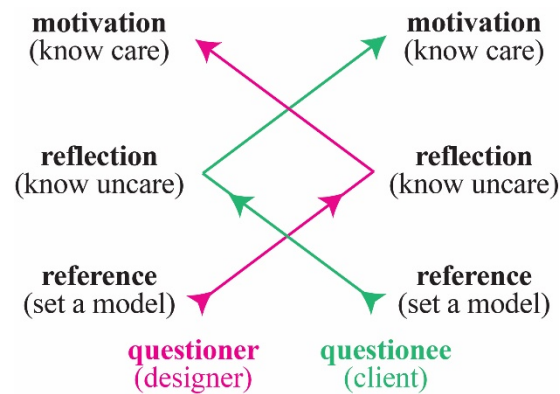


Figure 11. The process of mutual learning.

6.3. How to Care More

In the game, the students used the familiar home environment to discuss care. They could easily recall examples of family members taking care of each other.

The boundary of ‘home’ is flexible. When one’s definition of home expands, more people and things could become targets of care. For example, if one regards home as kinships and properties, he/she will focus on caring for relatives and personal belongings. If one believes that home includes other people and other things, his/her care will extend to the needs of neighbors, friends, and even the community environment. For instance, student B made it clear that ‘my caring objects are family members’. When asked further about whether the interior design should care for other people’s needs, he focused on his son, wife, and parents. He explained, ‘We have very few guests. We seldom invite guests to our house. The south custom is not the same as in the north [People from north China like to invite guests home].’ Student X extended his definition of home to neighbors and friend as they are very close. He believed that interior design should consider needs of neighbors and friends who visit frequently, as ‘sometimes they will cook dishes and share with us. They also give gifts and various things to us.’ In both cases, the ‘Ideal Home’ game triggered in-depth discussion on people’s relationships facilitated by the home environment, leading to taking care of more people and environments.

7. Discussion

The study has indicated that the game, the primary instrument of this research, was able to increase the designers’ awareness of complete care (e.g., taking care of the spatial needs of the clients and their family members in the home environment) and to expand their understanding of care beyond design practicalities. The relationship between home and care, and between care and sustainability, will be further discussed in this section.

7.1. The Relationship between ‘Complete Care’ and Home

It was hypothesized that care is best learned from the home. When discussing care in home environments, student participants were found to be naturally empathetic: It was very easy for them to recall care scenarios between family members, and to quickly recognize their lack of care in everyday details, or the need to be more caring for their family members. This awareness is the first step towards learning care.

The participants’ concept of home determines the scope of their understanding of care. If one regards home as the combination of a group of related people and their privately owned items and spaces, then the discussion of needs will be confined to issues of family members and items in the home;

however, if one regards home as an extended concept (e.g., including neighborhood and community spaces), then they will consider the needs of neighbors, friends, and community members. Therefore, in order to enhance the students' understanding of care based on 'home', it is important to expand their understanding of 'home'. If the boundaries of 'home' are extended, then more people, artefacts and environments will be included and consequently they will become the subjects of care. As a result, 'my home' can become 'our home'.

7.2. The Relationship between 'Complete Care' and Sustainability

In the Introduction of this paper, we identified the lack of connections between 'human-centered design' and 'sustainability'. Designers typically care about meeting users' requirements but do not necessarily care about environmental consequences; designers care about design activities but not necessarily about the design effect; designers care about things and make things to care for people, but do not necessarily care about all people in the wider environment.

The concept of 'complete care' provides a possibility to achieve sustainability. It reminds designers to focus on the environment in addition to the 'user-centered approach'. The model (Figure 2) proposes a complete design process including the design activity and the design effect, by establishing a care relationship between designers, clients/interior space, and the immediate environments. It also helps designers to take care of all people in the environment. The model of 'complete care' suggests that designers can be the starting point for transferring care to the entire environment. In giving care to their clients and the designed interior spaces, designers enable these clients and spaces to become 'care-givers' to care about their immediate environment. Through their caring design, more people and environments will benefit and gain the potential to become care-givers to others and their immediate environment. As more and more people and designed things become 'care-givers', the possibility of a truly sustainable environment, composed of a myriad of immediate environments of many design interventions, will emerge.

7.3. Originality and Contribution to Knowledge

Care is less well associated with the design of the built environment, and there is a question as to how professionals might define care in ways whereby it is realizable in design practice [40]. This study has proposed the original theoretical framework of 'complete care', which features four elements: Designers, clients, (designed) things, and immediate environment, and the key function of 'transformation': turning clients and things from 'care-receivers' to 'care-givers' in order to care for the immediate environment. In 'Critical care: architecture and urbanism for a broken planet' [4], architects, urbanists, political theorists, and specialists in sustainability and economic geography discuss interactions among people, things, and values and explore what care means as it relates to architecture and urbanism. However, it does not answer the question of what architects should care about, nor does it resolve the question of whether architects can meaningfully intervene in ethical issues and concerns. Our study, however, not only investigates the meaning of care and its relevance to interior design, but also provides a practical tool (the game 'Ideal Home') for positive care intervention.

Similar to the suggestion of viewing buildings and cities not simply as objects but as collections of relationships [4], our study suggests that the game 'Ideal Home' has helped interior designers to better understand their relationships with others in the home (which can be broader than one's family), through the lens of care. Users are often underrepresented in architectural design practice, and knowledge about user experience is seldom made explicit and is largely based on presumptions and self-reference [41]. The game used in this research has helped make user needs and experience more explicit. Abstract sustainable design knowledge has been integrated into a participatory teaching tool. Students can improve their awareness of care through playing the game. The game also helps designers and clients to carry out co-design activities and jointly create an ideal home environment map.

Design for sustainability has been innovated from the product level to the system level, and there is a need to developing theoretical insights and practical tools to link micro-innovation with

macro-innovation [42]. Our study has provided preliminary theoretical insights and practical tools to make this needed link. The 'complete care' concept works well at the 'product' (things) level as well as the 'system' (the student-family member relationship) level.

8. Conclusions

This study followed the methodology of design inquiry (Whether, What, How, Why): It established the 'problem' through a literature review: The paradox of design and unsustainable development. It then proposed the 'hypothesis': Care (as in the 'complete care' model) may help resolve the problem. The 'development' involved the design and evaluation of the game, 'Ideal Home', which used visual aids to facilitate in-depth conversations between the designer and the client, so that subtle relations between people, things and their environment could be identified and taken care of. The 'significance' of the study is twofold:

(1) This study suggests a direction for sustainable design education: Making student designers more aware of their role as care professionals and improving their ability to fulfil this role. It provides a game to help improve designers' awareness of care, so as to transfer care through their interaction with the client, the designed things, and the wider environment. The game as a participatory teaching tool offers the opportunity of learning care and carrying out co-design activities.

(2) It proposes a theoretical model to understand 'complete care' in the context of interior design (Figure 2). To achieve a sustainable environment, the study redefined the roles of designers, interior spaces, and clients: All as 'care-givers'. The 'complete care' concept and the game have made the connection between 'User-Centered Design' and sustainability. When discussing 'Ideal Home' using questions and prompts, designers were facilitated to pay attention to meeting shared needs and caring for the immediate environment.

There are some limitations of the study. The sample size was small; the six postgraduate students were all from the same university and were not representative of interior designers in general. However, valuable insights were gained. The game could be further developed to engage architects and urban planners, and to tackle other issues in product-service systems, spatio-social systems, and social-technical systems.

The researchers are planning to introduce the game into interior designers' real-world projects. On the one hand, the game will help interior designers to communicate with their clients more effectively and make it easier to transfer care from the designer to the client and the interior space, and consequently to the immediate environment. On the other hand, this will provide opportunities to further evaluate and refine the game. It is also worth testing whether the game can be used beyond interior design and benefit other design disciplines.

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