Expanding Design Thinking with Methods from Futures Studies. Reflections on a Workshop with Chinese User Experience Students

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Abstract. Design thinking can be seen as a fundamental premise to approach solving a problem in an innovative way [1]. It is especially valuable at situations in which challenges are complex and ambiguous. Design thinking includes two distinct approaches: diverging and converging. It requires both a flexible way of understanding, to come with various ideas, and know-how to make informed decisions. These opposing activities are poured into an explanatory model. However, a rigorous design thinking process might be considered as a limitation on creative thinking. Also, the promise of a straightforward all-in-one solution for complex problems seems rather unrealistic [1]. Futures studies exceed design thinking on the aspect of the acceptance of plausible options by freeing the apparent certainties [2]. This is primarily useful at the early phase of a design thinking practice when the problem should be explored. Whether a focus on the future context of a designed product could be recognized as added value, must still be inquired. This is a reflective paper on a two-day workshop developed for User Experience students in China that applied techniques from futures studies combined with design thinking and narrative techniques. In particular, the participants were design thinking newbies used to operate in an educational context with focus on traditional lecture-based pedagogy [3].

Keywords: Design thinking · Practice · Novices · Creativity

1 Introduction

In 2016 a new master program titled ‘User Experience’ (UX) was founded at Beijing Normal University (BNU). A rising number of students (119 in 2016 and 225 in 2017) with different undergraduate degrees apply for the entrance exam of the exclusive program each year. However, no more than seventy students are admitted. This first UX training in China has - for Chinese education tradition - an innovative approach: interactive, practice-oriented and project-based learning [4]. In contrast to other Chinese educational institutions, BNU claims to recognize the role of design pedagogy, the increasing importance of an internationalized perspective and the teaching of

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critical and creative thinking [3]. In this framework, the first author of this paper, who would be named 'workshop leader' thereinafter, was invited to facilitate a workshop that took place in the first weeks of the students' induction to the program during fall semester in 2017. The existing cooperation between the universities, the reputation of Gent University (UGent), and the workshop leader's experience in both academic and industrial contexts formed the ground for this invitation.

The workshop is based on a design process framework, and by doing so, on design thinking. Literature posits that the open-endedness makes design suited to the inculcation of creativity in newcomers [5]. Besides designing material objects, design thinking can contribute to achieving an organic flow of experience in concrete situations, making experiences more intelligent, meaningful, and satisfying [6]. The workshop was supposed to open the mind of UX students, to bring them out of the comfort zone of their current knowledge domain and situations they are facing today. The future was defined as the main topic and students were free to imagine how that future would look like, and encouraged to work on a subject they are genuinely interested in. This was done in order to augment students' motivations, a requirement for any type of a creative act [7].

Three qualitative futures studies methods were carefully selected to enrich the design workshop. The use of trends and the extrapolation of historical and present events could inspire action towards a certain direction in the unknown future. Thirdly, extreme scenarios of an utopian and a dystopian future image could stipulate a detailed story. Undoubtedly, storytelling lies at the heart of scenarios' building, but also for creativity and design practices, narrative is central [8, 9]. Indeed, the creative insights of students who currently lack the experience or knowledge necessary to fully express their ideas may be undermined in favor of the few students who can more effectively communicate their ideas [7]. Another argument for the use of narratives is that it makes the workshop accessible for non-design students, because historically all people are seen as natural storytellers, who constantly create and maintain their identity by constructing and telling the stories of their lives [10].

The main question of this work-in-progress research is: how do methods from futures studies help non-design students in a design thinking process? This paper serves as a reflection tool to learn what worked well in this specific context and what can be improved in the future.

2 Background

2.1 Design Thinking

Design thinking has been defined as a fundamental premise to approach solving a problem in an innovative way [1]. The methodology behind design thinking is also highly needed in non-design disciplines such as, human resources management and business strategy, contexts in which problems are complex and ambiguous [6, 11, 12]. The traditional way of analytical thinking has not been sufficient [13]. Many models have been proposed to explain the process that often is seen as a magical intervention [1]. The Double Diamond Model of Design Thinking proposed by the British Design

Council makes a distinction between four complementary, yet necessary, sequential phases: Discover, Define, Develop and Deliver, known as the 4-D approach [14]. Design thinking offers multiple tools that allow people to reframe the way in which they understand a problem and to develop ideas from a variety of perspectives (Discover) [15, 16]. A similar flexible way of thinking, divergent thinking, is vital in the Develop-phase where a variety of concepts, that have addressed the initial problem, are generated. Equally valuable in the design process, are the moments where all gathered information is filtered (Define) and where the concepts are launched and prepared to receive feedback (Deliver). The willingness to take intellectual risks is among others a characteristic cognition during these decision-making steps; the umbrella term is convergent thinking [16]. Designers are thus concerned with invention as well as judgment [6].

The workshop aimed at using creativity techniques to come to a product concept. During the workshop the students went through different activities that characterize the front end of innovation: opportunity identification, idea generation, idea selection and concept development. However, the 4-D approach runs the risk of overly simplifying the complex practice that lies underneath [16]. Such a scheme makes the innovation process transparent both for designers and their stakeholders who follow the progress. It also gives a clear view on the characteristics of each step of what should be done. But there is no such a thing as a success formula of how to reach superior innovation.

Novelty, originality, imagination and usefulness fall under the most important features of creativity. People believe that creativity should be attributed to the individual human mind [17]. In our opinion, creativity can be both: all people are creative by nature, and also can improve their creativity through training [16]. Moreover, different cultural contexts may have an impact on the understanding of creativity. The Eastern perception differentiate on the fact that moral goodness, i.e. not only satisfying his own needs but also devote himself to other people and the interests of society as a whole, is a necessary feature of creativity [17].

2.2 Futures Studies

Predicting the future lies in the heart of any product development [18]. Since the mid-twentieth century, the acceleration at which the changes have occurred at the social, cultural, economic and technological areas has become more apparent [19]. These evolutions influence the context that is the frame of reference on which all design decisions are based and thus exploring this context should be the first step in a design process [20]. Just like design thinking, the discipline of futures studies focuses on solving the increasingly complex problems we face [2]. While design thinking is closely related to user-centered design [1], futures studies focus on the context of the user. While consumers relate back to what they know and are a valuable source for incremental user-centered design, radical innovation of meaning is not pulled by the market but results from a vision about a possible future [14]. Futures studies exceed design thinking on the aspect of the acceptance of plausible options, by freeing the apparent certainties [2]. Over the last decade many new practices of design were formed which included scenario-based design. Its speculative aspect, often combined with narrative representation strategies, has found ways of probing alternative futures

and their impact on society [21]. Design pedagogy can benefit from methods of futures studies, as a tool for helping students as they engage in creative discovery. No scenario is exhaustive, so it can be fleshed out creatively with some details [22].

2.3 Narrative

Storytelling bridges analysis with synthesis [23] and is applicable to train both divergent and convergent thinking. Stories can be useful tools in several activities of the design process, including the actual development, the design communication or documentation and in evaluation [23]. Over the last three decades there has been a growing focus on narrative in psychology and in the social sciences [10]. Just as futures studies, narrative has only been linked to design practice recently.

Storytelling is a well-known method in futures studies. Futures are stories we tell ourselves, in which we constantly blend aspects from of our current life [24]. Considering that the created stories should not be random, different foresight methods are used to argument their directions: literature review, expert panels, interviews and scenarios are the four most widely used [19].

2.4 Educational Contexts

Project-based learning and learning-by-doing are considered in the Western part of the world as a standard in many design curricula [25]. These kinds of learning environments are highly collaborative and less formal, which might help students feel more comfortable with sharing their ideas [26]. While this practice is commonplace in UGent design studies, in China, active, student-based discovery and involved pedagogy is not often conducted. Instead, content knowledge is more included as a primary focus in the Chinese curriculum, in which students are used to traditional lecture-based pedagogy in large groups [27].

3 The Workshop

The outcome of the workshop was to create artifacts for the future. These artifacts definitely provide concrete materializations of devised ideas and are highly suited as a means for design communication [28]. However, students started with a look into the future context and afterwards they delved into the interactions and objects that could be encountered in that prospected world. This sequence could just as reasonably be regarded as a descent from chaotic environments to the unity provided by an object [6]. Hekkert also performs this approach in his book ViP-Vision in Design [20]. In this paper we use the terms ‘method’, ‘technique’ and ‘tool’ interchangeably to describe specific instruments we gave the participants of the workshop. Also, the focus of the workshop was on the design thinking mindset and less on the realization of a design piece. The initiators of the workshop, the teaching staff of BNU, were convinced that the students had to be instructed a methodology which could broaden their mind and inspire them to tackle problems differently instead of having a narrow and rigid view on problem solving. As the participants of the workshops were non-experienced, the outcome of each technique

should be achievable for the intended audience. Exploration through visualization [15], for example, was implemented in different ways: drawing a storyboard, telling a story through given images, prototyping or filming and editing a video. As a consequence of working in groups, the students were able to divide the effort among them. Indeed, there is a thin line between challenging students and creating a culture of intimidation and insecurity.

The level of uncertainty that surrounds the students must be counterbalanced with assistance in building a belief in themselves and their work [29]. We therefore mold the workshop in a step-by-step-assignment, but even so, most introduced methods leave space for individual interpretations for further use of them after the workshop.

The framework of the workshop (see Fig. 1) builds on the 4-D approach of the Double Diamond Diagram of Design Thinking. Although we were only operating in the front end of innovation, it is important to go through the different steps of which design thinking consists. Some help to diverge, others to make decisions or communicate through the process. Importantly, students should first have a clear understanding of the future context, and therefore the emphasis lays on the first D, the Discover-phase. The students get the chance to unfold their capacity for empathy and enrich their perspective on situations, so they would see opportunities instead of limitations and challenges instead of problems. Essential in the Discover-phase are idea generation and exploration for opportunities [30].

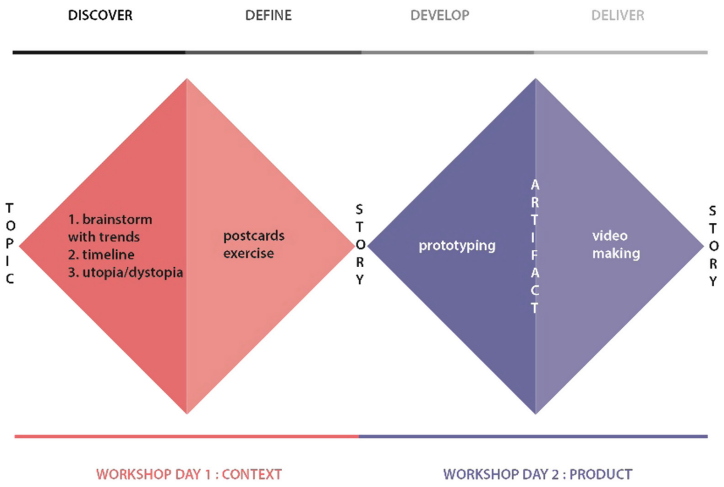

Fig. 1. Overview of the workshop. Model adapted from the 4-D approach of the double diamond diagram of design thinking [14].

Fifty-four students participated in the two-day workshop between nineteen and thirty-one-years old. Thirty-three participants were female and twenty-one male. Only four participants had a background in design. The students were divided in groups of

four to six students. All groups had multidisciplinary teams (i.e., with different undergraduate degrees, such as psychology, biology and finance), and two groups had a homogeneous gender composition.

3.1 Discovering: Curiosity About the Future and First Story

Right at the start of the workshop and before students were split in groups, they were asked to use their imagination and formulate an answer on the question: what they think about the future. This question addressed their intuition, which is similar to the Wishful Thinking Technique. Wishful Thinking Technique challenges analytical thinkers to give alternative solutions in terms of a wish or fantasy before these wishful statements are converted into more practical ones [5]. The teams were formed around the topics that they brought forward. By doing so, we tried to augment the engagement of the participants, a condition for successful brainstorming afterwards [31]. Also, perception of competence is a prerequisite for sense making, which leads to sustained interest and the desire to explore [32].

After dividing the students in teams, they presented to each other favorite objects that they were supposed to bring to the workshop. Clearly, objects manifest how we experience the world around us, how we think, and which values we hold dear [33]. By explaining why the object is important to them, the students already created their first story, which reveals information to the listener. The objects had no relation to the topic, which was not yet known at the moment of the call to bring an object. This small episode can be seen as a way of getting to know the other team members.

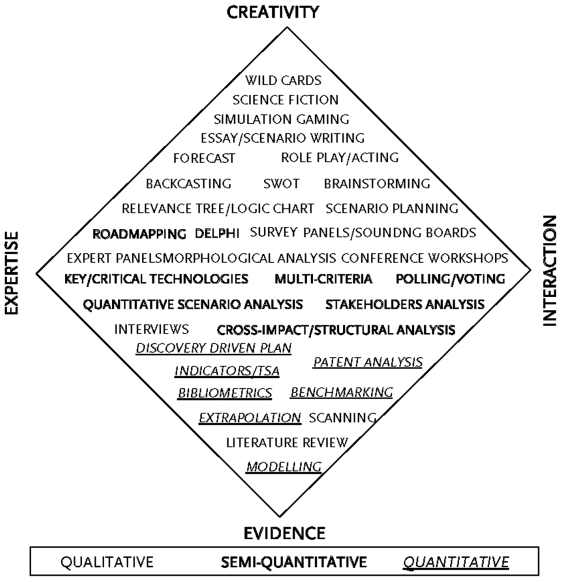

Fig. 2. Taxonomy of futures research methodologies [34].

Once the topic was known, we guided the students through the Discover-phase. Almost the entire first day of the workshop was assigned to the exploration of the chosen topic. Before the students ended the day with a story, the result of all impressions passed through a filter, three different futures studies techniques were applied. A trend injected brainstorm, an experiential extrapolation, and a scenario exercise were selected because they are either interactive or because they challenge the creative skills of the participants [34] (See Fig. 2). The aim at this part of the workshop is to develop as many, and as diverse ideas as possible. The students had to make some decisions about which direction their imagination would take. Although the three techniques could have been implemented independently, the order in which they used them was the workshop leaders deliberate choice. At first the concept of a trend was launched. Trends identify today the seeds of what might affect future products, human behavior and organizations, and are therefore a useful tool [1]. Each team was appointed to brainstorm on three different trends. In the next assignment, students had to formulate the seeds, or predictive signs, they noticed themselves and relate them to fictional facts. Their subsequent job was creating entire fictional scenarios.

3.2 Brainstorming: Matching Subject with Trends

As a team creativity tool, brainstorming is perhaps the most popular and commonly used. Brainstorming is an approach to consciously leave team members unfettered, to identify opportunities and challenges, to choose a variety of issues, as well as, it is a way to generate ideas. This approach advocates producing derivative ideas and inconsistent thoughts [35]. The different perspectives (undergraduate degrees) of the team members to look at problems would offer more space and potential for creative ideas. The limitations the students were confronted with were their own knowledge, the topic they decided to work on and the available time. Brainstorming does not ensure that all facets of the problem have been addressed [5]. Therefore, after a first exploration on their own, some trends, selected from a trend map composed by Richard Watson [36+ see Fig. 3], were introduced to the teams. The students were asked to reflect on the combination of this trend, which was either a broad societal evolution (e.g., a shift from ‘me’ to ‘we’) or a technical innovation (e.g., surveillance drones) and their topic. Although it was our intention to enrich the groups’ ideation process with the trends, some were mostly confused. As seen in Table 1, the trends were not chosen by reason of their evident link to the topic. Rather they had to challenge the students to think out-of-the-box and let uncommon associations trigger their mind. McFadzean [24] explains that it is advised to not confront newbies with the complexity of introducing new elements into a brainstorm session. The limited time spent by the workshop leader at explaining what trends are, how you can spot them, and why these particular trends are chosen for their topic could be another argument for the students misunderstanding of this exercise (Fig. 4).

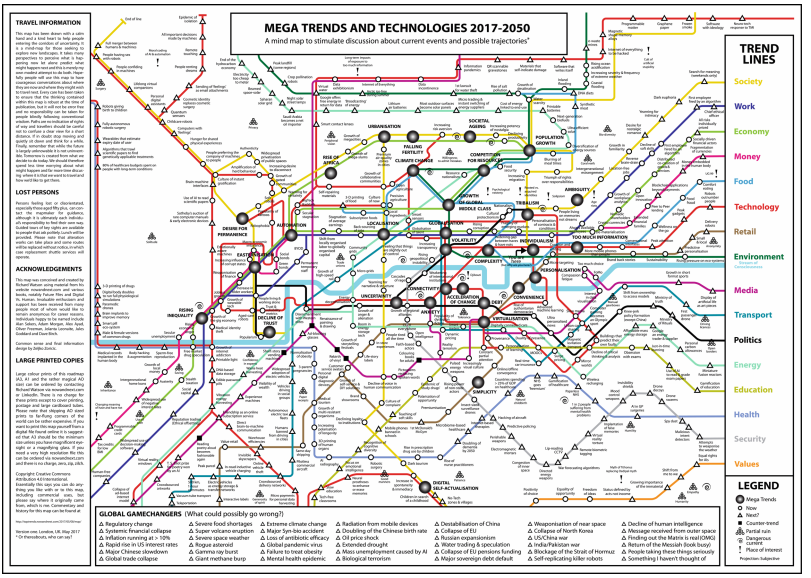

Fig. 3. Trend map [36].

Fig. 4. Example of a completed brainstorm template (topic: housing).

Table 1. Overview of trends assigned to the different teams.

Topic	Trend 1	Trend 2	Trend 3
Education	Permanent temporary staff	Shift from 'me' to 'we'	Mobile phones banned in schools
Housing	Growth in familiarity	Surveillance drones	Hacking
Communication	Speed	Growth of megacities	Open vs. closed
Healthcare	Increasing risk aversion	People living and working alone	Normalization of obesity
Beauty	1 in 2 people suffering from mental health problems	Desire for nostalgic romance	Male and female versions of common drugs
Time	Desire for nostalgic romance	Possibility of choice	Convenience
Social robot	Search for meaning (weekends only)	Equality of opportunity	Sending of 'feelings' as email attachments
Music	Peer-to-peer lending	Convenient access	Fear of missing out
Family	Population growth	Recognition of cognition diversity	Food security
Environment	Consumer choice	Growth of gated communities	Service replaces product
Social change	Doubling of dementia	Peer-to-peer lending	De-materialization
Robot at work	Volunteering	1 in 2 people suffering from mental health problems	Desire for nostalgic romance

3.3 Timeline with Facts and Fiction: Extrapolation

The contemporary context of the society we live in, describes a set of considerations that underlie existing products. The process of de-construction helps uncover them. The future context is the one the designer builds as the foundation for a new design. They can partly overlap, but it is optional [20]. Therefore, in the next assignment, the students were asked to write down past and present factual events that might influence the forthcoming position of their topic. Just like the trends, recalling important past issues or actions happening nowadays could inspire the students. In order to do this, students completed a timeline, which became a starting point to see where the world might move. One third of the timeline is reserved for fictional events, examples of this future setting.

We observed only few difficulties with this assignment that was quite straightforward. One group defined 'past' as 'their' past, and noted events they could remember themselves and not a more general memory. However, other teams referred to the common past of China, i.e., to different dynasties, or described an evolution from ancient times until eternity. As time was the only indication, the transformations vary in feasibility but remained without substantive direction (Fig. 5).

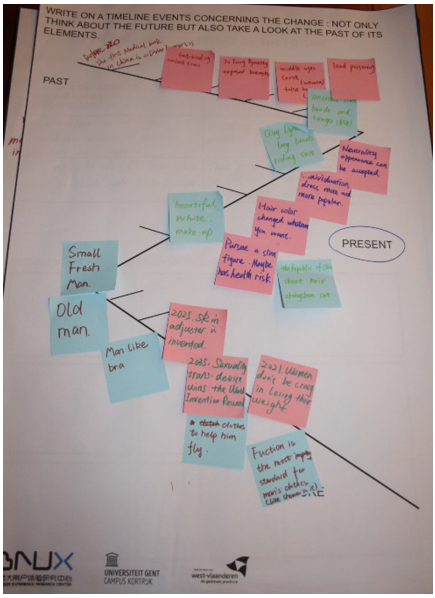

Fig. 5. Example of a completed extrapolation template (topic: beauty).

3.4 Quadrant Matrix: Utopian vs. Dystopian Scenarios

In order to take into account, the various directions our society could go from now on, a quadrant matrix diagram was given to the students. Their objective was to examine the interaction of two progressions of their choice, which was a crucial step in the scenario building [8]. The students developed scenarios for each of the quadrants and imagined four different future contexts [37]. They have been asked to regard these evolutions in either a highly positive or a very negative way. Hence the students created a best-case scenario (utopia) and a worst-case scenario (dystopia) for their future situation. The word utopia, meaning 'no place' in Greek, seems to be a good term for forecasts that neither want to tell truths nor point out causes [38]. Authors of utopias/dystopias often want to offer critiques about the society they live in, and sometimes indicate mechanisms behind a social development that they want to give warnings about [38].

We realized that the job's deadline was too tight, one team did not even finish the matrix, and that the groups faced difficulties in naming the axes of the matrix. Furthermore, a variation can be done without the focus on 'good' and 'bad'. That would leave more room for participants to form their own value judgments [37] (Fig. 6, Table 2).

The scenario assignment closed the Discover-phase. The students now were ready to build an image of a future context in which their topic has evolved. Their curiosity and empathy have been activated and many rough ideas were collected. The techniques applied in the three remaining phases, Define, Develop and Deliver, will be discussed less extended because they are not specific futures studies methods.

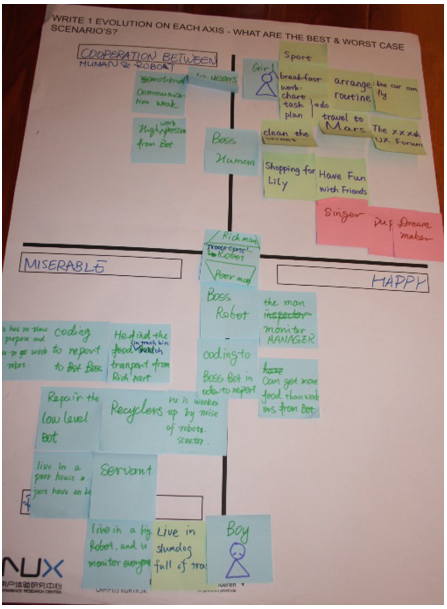

Fig. 6. Example of a completed matrix template with on the X-axis the range from 'miserable' to 'happy' on the Y-axis the zone from 'the cooperation between human' and robot rules' (topic: robot at work).

Table 2. Overview of characteristics of the utopian/dystopian scenarios of the different teams.

Topic	Dystopian scenario	Utopian scenario
Education	Inefficient & traditional	Efficient & digital
Housing	Low familiarity & not safe	High familiarity & safe
Communication	Closed & standard	Open & divers
Healthcare	Not important & dissatisfaction	Important & satisfaction
Beauty	Unhealthy & aesthetic uniformity	Healthy & aesthetic variety
Time	Inconvenient & not likeable	Convenient & likeable
Social robot	/	/
Music	Passive & inconvenient	Active & convenient
Family	Individualistic & unethical	Collectivistic & ethical
Environment	Not taking responsibility & no respect for nature and each other	Taking responsibility & respect for nature and each other
Social change	Unordered & property concentrated	Ordered & property average
Robot at work	Feeling miserable & robot rules	Feeling happy & cooperation between human and robot

3.5 Define a Vision of the Future: Building a Story on Postcards

At the end of the first day of the workshop, the first insights were reviewed, selected and discarded [30]. The participants had to select three images out of more than 150 postcards. Through this experiential encounter they had to tell a compelling and detailed story [22]. Stories are both a form of design communication that allows us to judge and an exercise of imagination that contributes to the process of composition [23].

The students had to mutually agree, which postcards mostly represented the scenario they had been working on. You could either adapt a story to the cards you found and that inspired you, or, with a clear story in mind, have looked for matching illustrations. Both an intuitive and a rational approach were possible [5]. The postcards belong to the personal archive of the workshop leader and show either photos or drawings. Curry and Ward [39] wrote an article about postcards as 'doorways'. They say that constructing a story around images feels safe, because it provides neutrality and a means for difficult truths to be conveyed, or personal offerings to be risked with reduced vulnerability. They also state that the multiple possibilities from combining and recombining stretch the imagination of the participants [39]. The postcards helped to narrow the thoughts of the students. It is important to have convergent techniques in the workshop process, which tell the participants when the search for new ideas is over [20] (Fig. 7).

Fig. 7. Example of both the postcards and the prototyped artifact (topic: healthcare).

3.6 Prototyping an Artifact for a Prospected Society

As the second day of the workshop started, we entered the Develop-phase with a 'quick-and-dirty' prototyping session. The students were challenged to create the best possible object with a limited amount of material. In this Develop-phase, the students learned how to think with their hands, which is called tinkering. The creation of an artifact can build bridges of imaginations between abstract thoughts and concrete experience [22]. The designers' intentions concerning the interaction of the design and

its surroundings, including its cultural and societal contexts, are all present in the artifact [21, 40]. The artifact does not only represent a certain function, but it is a tool that transfers a meaning.

3.7 Deliver a Video: Making User Experience Visible

As last assignment the students were asked to make a short video to present their artifacts. They were given a storyboard template (see Fig. 8) and asked to consider the protagonists as well as the environment of shooting.

The format of the video, a teleshopping video, is derived from a procedure by The Extrapolation Factory, a design-based research studio for participatory futures studies [37]. The final episode of the workshop required different skills of the students: writing a film scenario, acting, filming and editing image and sound, which of course could be divided among the team members. The advantage of this approach is that it gives space for reflection between the various stages of the creative process [41].

Although sales video is a specific kind of story, the teams were supposed to give a lot of information about the product, its use and context. If this contextualization has no linkage to the essentials of known activities, the resulting concepts may be too disruptive to potential users [18]. This can be done through introducing the problem or challenge at the beginning of the video. By showing stories of humans who interact with an object, you can help to make user experience more tangible [23]. Video has lately been used to create design fictions, while suggest, mediate and provoke discourse on future technologies and their implications rather than demonstrate fully developed solutions [42].

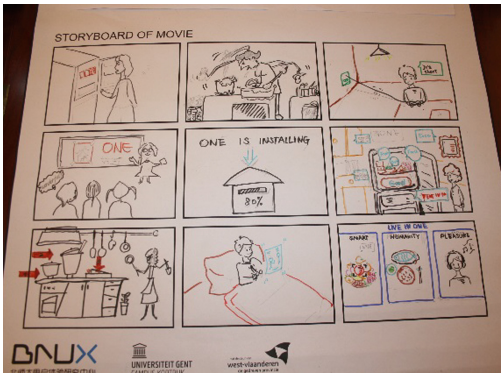

Fig. 8. Example of a completed storyboard template (topic: housing).

4 Conclusions

This paper does not rely on any quantitative evidence or rigorous modeling but on empirical experience. The workshop was based on a combination of reflecting on the changing circumstances, with the use of our imagination when designing for

anticipation on these evolutions. Overall, the learning outcomes of the session are met, but there is still an opportunity to improve the outcomes and the flow of the workshop. The language related issues, e.g., added to the complexity of the project. Although this generation Chinese students learn English since primary school, we observed that they are not used to operate in an English-speaking environment. Especially listening and speaking seemed to be rather underdeveloped skills. To overcome this language-based obstacle, a Chinese-speaking assistant and translated templates and presentation slides would have helped in the communication process. Also, the use of (moving) images could have been explored more. For example, the postcards could have been used on the extrapolation timeline to illuminate and bring to life historic moments [39].

By reflecting on a workshop approach that is grounded on techniques from design thinking, futures studies and narratives, we contributed practical insights about a workshop that had as its final output an artifact for a possible future context.

This paper was limited to the reflection of futures studies techniques during the Discover-phase of design thinking. In further research we want to explore whether they can also have an added value in the following phases of the design thinking model.

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