Research on Cross-cultural Participatory Design by Design Teams Based on Chinese Cultural Background

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Abstract. With the acceleration of globalization, the acculturation issue of design is becoming an emerging challenge. At the same time, as one of the several design patterns in service design, which is becoming a mainstream in design society, has been adopted by more and more designers in design practice. Based on the output of a design workshop on acculturation issue of design, we presented the process of and learnings from participatory design aiming at helping foreigners living in China to use WeChat. To that end, we described the practice, problems and achievements, lessons learned, and outlook into the future for design practice using participatory design to address the acculturation issue.

Keywords: Participatory design · Cross-cultural design · WeChat redesign

1 Introduction

With the rapid development of globalization, reflecting the multi-cultural harmony and designing for acculturation is becoming a new challenge. As a comprehensive design patterns, participatory design (i.e. co-design) contains several factors such as comprehensive service, design, users and the environment. Given its close connection with the designers and users of properties, participatory design had been known as getting "user" in the process of creation. The design practice pattern of collective innovation has been created, making it a popular design theory in the cross-cultural design process [1]. This paper is unwound from the cultural background with China-based design team to cross-cultural participatory design perspective starting with Chinese localization applications re-engineering of the micro letter as a case study to explore the characteristics and problems of the Chinese design team in the design process and propose appropriate solutions and suggestions.

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2 Background

The way East and West cultures view the world can be traced back to the two very different thinking systems of Aristotle and Confucius thousands of years ago. Eastern and Western social structures, personal consciousness and cognitive styles, and worldview systems are inextricably linked. Westerners are relatively more independent about the characteristics of things and believe that the behavior of controlling things is based on the rules of domination. The interdependence of the Oriental people, the characteristics of collectivism and the general view of the problem are consistent, that things depend on the interaction of multiple factors. There are large differences between Chinese and Western cultures, and most of the current theories on Participatory design come from Western cultural backgrounds. However, these design theories from the West, whether it can better be effective in the Chinese cultural background of the design teams?

2.1 Participatory Design

Participatory is a deeper, more personalized collaborative process, and this term should be used selectively, perhaps we should call this field "cooperative design." We need to recognize that the entire design process is a negotiation to be successful and done, to reach an agreement, compromise and meet the process. Thomas Kvan et al. [3] summarized participatory design as a closed-coupled design process and a loosely coupled design process. The main difference between the two participatory design processes is the continuous relationship between users and designers throughout the participatory process. The theory of participatory design mainly refers to that during the design process, the designer encourages and guides users to participate in the creative process and solve problems together, blurring the identity boundary between the designer and the user, and hopes that the results presented will make users more satisfied. Participatory design differs from participatory design mainly in that there will not be any benefit elements in the participatory design process, and whether the beneficiaries use products to distinguish them from people-oriented design methods [4, 5].

2.2 WeChat

The latest report from market research company App Annie shows that Facebook was the most used application by netizens in the world in 2018, and Facebook Messenger was the most downloaded application. Besides, the top five most commonly used apps by Internet users are Facebook, WhatsApp, Facebook Messenger, WeChat, and Instagram. With the rapid development of mobile media technology, Facebook, WeChat, and other social network services (SNS) have penetrated the daily lives of mobile phone users and changed their lifestyles. As a social application based on Chinese cultural background, WeChat does well accommodate the characteristics of local social networking, and it also has a significant influence on the international social stage. The "observation report" carried out an inventory of the lives of foreign users in China. The report shows that foreign users in China send 60% more messages per month than typical Chinese users and use audio and video features 42% and 13% more frequently than Chinese users, respectively. However, WeChat is still not applicable to the process of Western users.

The workshop design practice in the latter part of this article is mainly based on the designer's exploration of the use of social applications by foreigners in China. Therefore, it is necessary to choose social applications that are relatively familiar to both designers and users. According to the above data, WeChat is a relatively suitable choice.

3 WeChat Redesign Workshop

To understand the characteristics of cross-cultural participatory design among design teams with a Chinese background, this article carried out the topic of WeChat redesign. Specifically, by recording the various stages of participatory design, the Chinese design teams and foreign WeChat users participate in the design process, emotional state, and design principles.

Workshop Background. The workshop is based on two design methods, UCD and Participatory Design, with 10 Chinese design teams. The only core topic of this design workshop is to design WeChat that is suitable for foreign users to use habits, to solve or slow down the pain points of foreigners in China using WeChat. Interestingly, each group of design team members comes from different disciplinary backgrounds, from the background of science and engineering disciplines such as interaction design, digital media technology, and the other part from the background of sociology, psychology, and other humanities. Designers from different disciplines but based on the same cultural background intersect together to develop WeChat redesign issues under two sets of design models. The focus of the workshop is on design practice. At the same time as achieving specific design results, it must be rooted in theory and design reflection. The final design purpose of the workshop is to 1) introduce and compare the similarities and differences between the two design methods of UCD and Participatory Design through design practices 2) explore the characteristics of the Chinese cultural background design teams in the process of cross-cultural design. This article focuses on the introduction and elaboration of the Participatory Design teams.

Arrangement and Participants. Participants in this workshop are young designers from the first and second grades of graduate students in the School of Digital Media and Design Art, Beijing University of Posts and Telecommunications. Designers at this stage are of certain help to our research. Some designers have just entered the field of design from other majors, and they do not have a solid grasp of design theory. Combining various background factors, the workshop restructures the settings of each team member, allowing participants with a design background and non-design background participants to form a design team, and allowing five of them to participatory design with foreign users. The other five groups use UCD design methods to carry out project practice. The workshop hopes that during the participatory design process, users and designers from different cultural backgrounds at home and abroad can compare the phenomena and characteristics of the participatory design process. And compare the differences between UCD and participatory design patterns. Among them, we are a team in the participatory design practice group.

Design Tools and Technical Support. The choice of tools is a key part of participatory design. In the design process, each group of participatory design teams is required to consider and select the appropriate design tools before writing the design process, and write the reasons for the tool selection. Most design teams will design with foreign participants using flexible [6] pen and paper prototypes, and some groups will also prepare pen-based electronic products. But in the end, most design teams mainly use paper and pen as the main design tools in the design process (Fig. 1).

Fig. 1. Paper prototype

The cycle of the whole workshop is 5 days, and the design practice is about 4 h per day. It is divided into three major sections: requirements definition, innovative design, and design evaluation. The workshop requires the participatory design teams to conduct in-depth interviews and define requirements and users, find foreign users to develop innovative designs, make prototypes and evaluate them in three parts. The UCD teams follows the traditional design pattern. After each group completes a stage of the design task, the workshop requires each design team to present an elaboration of the task principles and share the design report.

In-Depth Interviews and User and Demand Definition. The cross-cultural redesign of WeChat is a very broad subject. To further focus on the pain points and needs of foreign users in China using WeChat, through practice, the UCD design group and the participatory design group will use two different methods to collect Persona's background materials. Most of the data sources of the UCD teams come from the research literature data as user support. Compared with the participatory design group, the participatory design teams choose a combination of literature data and user interviews to conduct research. Besides, each participatory design team students will conduct in-depth interviews with foreign users at this stage. During the first user interview, we found that in the beginning, each team would have difficulty communicating with the language, resisting the phenomenon of communicating with foreigners and feeling self-lost. During the team's interview, members of the non-designed Chinese team will choose to work on records and data in small group hours to avoid positive contact with foreign users. Students with a design background will be more willing to communicate with foreign users. At the same time, the students of the UCD design team do not choose to communicate with users. Instead, they use internal brainstorming and data analysis methods to define users and potential design requirements.

Innovative Design Practice. Through previous investigations, the workshop asked the participatory design teams to determine a design requirement, and required foreign users who matched the searched user portraits to participate in the process of innovative design. The UCD design team uses traditional design processes to develop design practices and output results, such as drawing low-fidelity design prototypes and drawing user journey maps.

Hypothesis. Before starting participatory design, the workshop requires the participatory design team to predict possible problems in the design process and propose solutions based on the predicted problems. Compared with the traditional UCD design mode, the participatory design requires higher requirements on the designer's design theory and practical experience. Therefore, to avoid the participatory design team's post-design process from appearing "misguided by the user's innovative ideas" and forgetting their own designer's responsibilities and design concepts. Before starting the participatory design practice, the design team needs to predict possible design solutions and ideas for foreign users, and propose and define related design principles based on design predictions.

Design Practice Process. In the design practice process, we found that almost all participatory design teams will adopt Thomas Kvan's [3] loosely coupled design process, and design teams that do not use closed-coupled design process. This may be due to the relative difficulty in finding foreign participants, poor language communication, and the participatory design team not paying enough attention to the proportion of foreign users participating in the design process to make suggestions. At the same time, we found that preparing paper prototypes can achieve better design results than allowing users to create freely on paper. Besides, during the communication process, some groups will have a special phenomenon. When foreign users develop a design, it may be due to privacy reasons. When drawing and creating, they do not want the designer to watch it all the way. Most foreign users prefer to be able to show it to designers after creation. After that, the designer went to discuss with the users to understand their design ideas (Fig. 2).

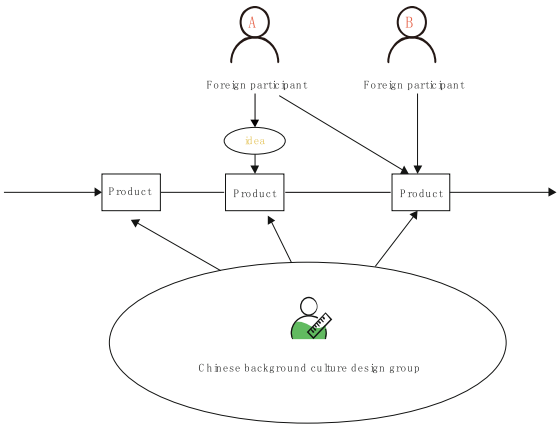

Fig. 2. Loosely coupled design process

Design Results. After developing design practices with foreign users, the design team needs to summarize and translate the design results with professional design tools. Regardless of whether it is based on the UCD design pattern or the participatory design pattern, the workshop requires each group to systematically produce interactive design prototypes based on the requirements defined earlier (Figs. 3 and 4).

Fig. 3. Participatory design draft

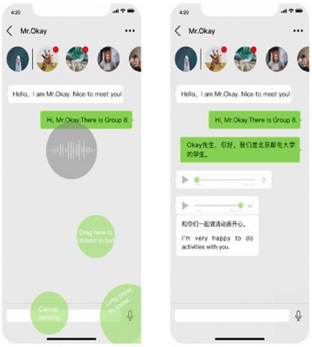

Fig. 4. High fidelity prototype

Availability Assessment. Based on the design results, each design team was asked to select the appropriate usability evaluation criteria and 10 foreign users to conduct usability evaluation based on the design prototype. Through statistical related test indicators, understand the advantages and disadvantages of the design results, and finally, iterate and improve the design results based on the evaluation results.

Evaluation Criteria. During the evaluation process, the team mainly used the Nielsen Usability Test and the SUS Software Evaluation Questionnaire as the evaluation principle. The main reason for using the SUS software to evaluate the test questionnaire is because the questionnaire is simple in structure and fits the focus of design evaluation. At the same time, it has the advantages of simple and convenient assessment, which reduces

the difficulty in finding suitable candidates for cross-cultural design time assessment in the time dimension. As WeChat is a localized application in China, in the process of perfecting the design, it is not only necessary to study the needs of foreign users for WeChat, but also to take into account the suggestions of Chinese users on the results of WeChat redesign. So we looked for 10 Chinese users and 10 foreign users to conduct design evaluations.

Evaluation Tasks. According to the needs and design point, we set up three tasks of sending voice:

1. Send English and translate into Chinese text by voice, then send to the other party;
2. View the voice sent by the other party, convert it to text and translate it;
3. Send a 5 s voice message;

Evaluation Results. Based on the test evaluation results of 10 Chinese users and 10 foreign users, the analysis of the steps is passed. We found that for Chinese users, completing the same three tasks, the evaluation time of WeChat was 4.6 min, and the prototype took 1.125 min, which illustrates the convenience of the design prototype for user operation from the time dimension. According to the operating steps, the first task requires 9 steps, and part of the test takes 12 steps to complete. When testing the same task on the prototype, the user's step fit is 100%, and the task can be completed in only 6 steps. The test of the second task is similar to the first task. When users use WeChat, errors occur to varying degrees, resulting in wasted steps. For the third task, WeChat and the prototype did not show much difference. According to the data of the task completion steps of foreign users, it is very difficult to complete the first task using WeChat. Two users did not complete the task. The average number of users who completed the task was 11.25, and the error operation rate reached 1/4. For the same task, using the prototype to operate, the user completion rate is 100%, the average number of operations is 4.8, and the error operation rate is 1/6. The second task cannot be completed in WeChat. WeChat was designed without considering the need for foreign users to send voice to text. There is not much difference between the two solutions to the third task. The user's completion rate is 100%. The prototype users did not misoperate. WeChat experienced 4 misoperations. In general, foreign users rate the design prototype slightly higher than Chinese users. The detailed data are as follows:

Data Analysis

Descriptive Statics. Table 1 shows the SUS scores for WeChat and design prototypes by Chinese users. The average SUS score for WeChat is 53.5, the standard deviation is 16.1322658, and the average SUS score for design prototypes is 75.75, with a standard deviation of 11.88749343. Chinese users have higher SUS ratings for design prototypes than WeChat.

Table 2 shows the SUS scores of WeChat and design prototypes by foreign users. The average SUS score of WeChat is 52, the standard deviation is 18.0843981, the average SUS score of design prototypes is 80.75, and the standard deviation is 10.55558878. Foreign users have higher SUS ratings for design prototypes than SUS ratings for WeChat.

Table 1. Descriptive statistics of SUS scores of WeChat and design prototypes by Chinese users.

Number	WeChat SUS	Prototype SUS
1	67.5	55
2	42.5	80
3	35	65
4	37.5	62.5
5	60	75
6	77.5	95
7	80	90
8	40	77.5
9	40	72.5
10	55	85
Means	53.5	75.75
SD	16.1322658	11.88749343

Based on Bangor's SUS scoring standard (Fig. 5), Chinese users consider the prototype design's Adjective ratings to be OK ~ GOOD, the Grade Scale is C, and Acceptability Ranges are Acceptable; foreign users consider the prototype design's Adjective ratings to be OK ~ GOOD, and the Grade Scale is B. Acceptability Ranges is Acceptable.

Table 2. Descriptive statistics of SUS scores of WeChat and design prototypes by foreign users.

Number	WeChat SUS	Prototype SUS
1	25	100
2	82.5	100
3	67.5	75
4	55	77.5
5	27.5	80
6	25	77.5
7	67.5	85
8	55	72.5
9	62.5	62.5
10	52.5	77.5
Means	52	80.75
SD	18.0843981	10.55558878

In general, foreign users rate the design prototype slightly higher than Chinese users.

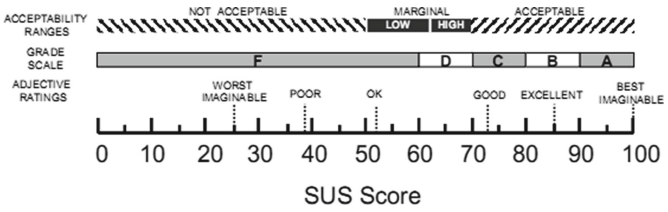

Fig. 5. SUS rating standard [7]

Inferential Statistics. The normal distribution test was performed on the SUS score data in Tables 1 and 2, and the K-S results were used to obey the normal distribution (Table 3).

Table 3. Chinese users' SUS score paired sample T test for WeChat and design prototype.

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	chsuswechat	53.5000	10	17.00490	5.37742
	chsusprototype	75.7500	10	12.53052	3.96250

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	chsuswechat & chsusprototype	10	.491	.149

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	chsuswechat - chsusprototype	-22.25000	15.38623	4.86555	-33.25665	-11.24335	-4.573	9	.001

The data shows that $t = -4.573$, $sig = 0.001 < 0.05$, indicating that Chinese users have significantly different SUS scores on WeChat and SUS scores on design prototypes (Table 4).

The data shows that $t = -3.866$, $sig = 0.004 < 0.05$, indicating that the SUS score of WeChat by foreign users is significantly different from the SUS score of the design prototype (Table 5).

The data shows that $Sig = 0.333 > 0.05$, indicating that there is no significant difference in the SUS scores of the design prototype between Chinese users and foreign users.

Table 4. SUS score pairing sample T test for foreign users on WeChat and design prototypes.

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	ensuswechat	52.0000	10	19.99305	6.32236
	ensusprototype	80.7500	10	11.66964	3.69026

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	ensuswechat & ensusprototype	10	-.037	.919

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	ensuswechat - ensusprototype	-28.75000	23.51861	7.43724	-45.57420	-11.92580	-3.866	9	.004

Table 5. Chinese and foreign users of SUS prototype of independent samples T-test scores.

Summary Data

	N	Mean	Std. Deviation	Std. Error Mean
Sample 1	10.000	75.750	11.888	3.759
Sample 2	10.000	80.750	10.556	3.338

Independent Samples Test

	Mean Difference	Std. Error Difference	t	df	Sig. (2-tailed)
Equal variances assumed	-5.000	5.027	-.995	18.000	.333
Equal variances not assumed	-5.000	5.027	-.995	17.752	.333

Hartley test for equal variance: F = 1.268, Sig. = 0.3571

95.0% Confidence Intervals for Difference

	Lower Limit	Upper Limit
Asymptotic (equal variance)	-14.853	4.853
Asymptotic (unequal variance)	-14.853	4.853
Exact (equal variance)	-15.562	5.562
Exact (unequal variance)	-15.572	5.572

4 Discussion and Summary

Being keenly aware of the challenges and potential of cross-cultural participatory design is an exciting and memorable experience, and the ingenuity and exchange of experience demonstrated by young designers is a return on this experience. Here, we share the

experience and lessons learned through observations in the workshop and analysis after the workshop. We hope to provide some references and suggestions for designers of future Chinese cultural background to carry out the cross-cultural design.

Build Relationships. In the process of cross-cultural design exchange, the design team should think and learn to establish a trusting design atmosphere and connection with users. Interestingly, this step of establishing connections often requires Chinese designers to overcome their inner caution and psychological barriers to oral English communication. This step is often based on the results of Chinese designers seeking the first foreign friend to join the design team. If foreign users join the design team with a willing and friendly attitude, this will encourage designers to find more foreign users in the later stage and start to show positive optimism attitude. If the designer is rejected when seeking the first foreign user to join the design practice, the post-design team will exacerbate the strong resistance to finding foreign users to participate in the design and increase the frustration.

Understanding the Background Culture. We surveyed and interviewed other students in the participatory design team. During the two participatory design processes, they will consciously or unintentionally understand the national cultural background of the foreign users they invited to avoid disrespect during the design process. The user's situation and phenomenon are very important links in the cross-cultural design process.

Prepare Appropriate Design Materials. The participatory design practice process lasted a total of 2 days, during which we continued to improve the preparation of materials. On the first day, we only prepared blank paper and pens. We hope to avoid too many elements to limit users' creativity and thinking. On the second day, we added paper prototypes. After two days of comparison, we found that preparing paper prototypes was not It will limit thinking, and it can also prompt users about some WeChat interaction processes and interaction pain points. Therefore, we recommend that designers can appropriately provide some design tools with hints to help users think when they start participatory design.

The Characteristics of UCD Design Method and Participatory Design Method in Cross-cultural Design. At the end of the workshop, 10 design teams (5 UCD design teams and 5 participatory design teams) respectively wrote the design guidelines for the two design practices on the blackboard based on the 5-day design practices. We summarized it and found:

1) Throughout the design process, we must fully respect the objective differences between different user groups, consider the different opinions of users, and develop adaptive design guidelines for subsequent stages.
2) In the user research phase, we need to consider using different research methods based on cultural differences between different user groups and predict the impact of research methods on subsequent design phases. At the same time, the protection of user privacy is very important.
3) During the sketch design stage, designers need to focus on a pain point for further exploration, rather than focusing on design performance.

4) Participatory design requires inviting users to participate in the design process. Collaborators need to guide users to use the right tools to express their ideas and explore the reasons behind those ideas.
5) During the prototyping phase, designers need to have a clear definition of the problem to guide the design on the right path.
6) UCD needs further design based on data and literature. It is necessary to provide multiple versions of the design for subsequent evaluations.
7) The Participatory design needs to invite users to the design team for a culturally adaptive design. Design multiple prototypes based on user needs and present them in a simple and straightforward manner.
8) During the testing phase, we need to find users who match the character model and provide them with simple testing tasks and a suitable testing environment. Collaborators need to avoid subjective biases.

Acknowledgement. The practice of this design workshop is a very rare experience and learning opportunity. Participatory design is not a rare design pattern, but cross-cultural participatory design practice is a rare and precious topic. Thanks to Professor Torkil Clemmensen, Qin Xiangang and Hou Wenjun for their guidance and support. Thanks to the group members for their expertise, the team's design practice has been successful and the corresponding design results have been achieved. Thanks to the sharing and communication of other design teams, let us Think about and contrast the differences and characteristics between cross-cultural Participatory design and cross-cultural UCD design.

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