INCLUSIVE DESIGN REPORT

—— ID5613 PROTOTYPING FOR INTERACTION AND PARTICIPATION

GROUP 2B FANSHU MA QINLIN LIU XIAOHAN CHEN XIAOTIAN MA

ABSTRACT

This project explores the efficacy of cross-cultural and multi-lingual collaboration in the context of a university elective course titled "Design Justice, Inclusion and Diversity." This report is structured around two main sessions where design major students collaborate with non-design major students, who are native speakers of different languages, to create a universally useful product—a lunchbox. The process includes various stages from concept to prototype, facilitated by translation tools to bridge language barriers.

Initial findings reveal that stakeholders often begin with a limited understanding of their roles and the design process, impacting their engagement and input. Furthermore, reliance on digital translation tools, while generally effective, occasionally leads to misunderstandings and distracts designers from fully expressing their creative ideas.

To address these challenges, the project suggests enhanced initial briefings for clarity, upgrading translation technology, and structured communication strategies to ensure all participants can engage effectively and contribute to the innovation process. This study aims to refine educational approaches in design disciplines, emphasizing inclusivity and practical collaboration across cultural and linguistic divides.

TEAM INTRODUCTION

TEAM 2B

Fanshu Ma

HEY, I'M FANSHU. I'M A FIRST YEAR MASTER STUDENT IN DFI, AND I USED TO STUDY LANDSCAPE ARCHITECTURE IN MY BACHELOR. I'M CURRENTLY ENTHUSIASTIC ABOUT USER EXPERIENCE (UX) AND KEEN TO MAKE A MEANINGFUL IMPACT IN THIS FIELD.

HEY, I'M QINLIN. I'M A FIRST YEAR MASTER STUDENT IN DFI, AND I USED TO STUDY INDUSTRIAL DESIGN IN MY BACHELOR. I AM CURRENTLY INTERESTING IN GAME DESIGN AND INCLUSIVE DESIGN.

Qinlin Liu

Xiaohan Chen

HEY, I'M XIAOHAN. I AM STUDYING DESIGN FOR INTERACTION IN IDE. THE FOCUS DURING MY MASTER'S IS MAINLY ON DIGITAL INTERACTION AND PARTICIPATORY DESIGN

HEY, I'M XIAOTIAN. CURRENTLY, I AM STUDYING MEDIA TECHNOLOGY AT LEIDEN UNIVERSITY. THE FOCUS DURING MY MASTER'S IS MAINLY ON CREATIVE PROGRAMMING AND GAME DESIGN. I ALSO WORK ON SOME CO-CREATIVE OR HUMAN-AGENT COLLABORATION PROJECTS.

Xiaotian Ma

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1 INTRODUCTION

1.1 CASE DESCRIPTION

In November, a new 5 ECTS Master elective will start: Design Justice, Inclusion, and Diversity (DJID). It is intended as a broad elective aiming to reach many students. Its curriculum is about learning how to design better with and for **stakeholders who might often be excluded**. Previous research has shown that students can feel anxiety about getting it right (De Jong, 2023). From another angle, stakeholders at risk of exclusion can feel exploited by interacting with students without an outcome they can use (Jackson, 2022).

1.2 PROJECT OVERVIEW

wk3.3

RESEARCH

Literature was reviewed and market research was conducted to understand the design of a curriculum design for designing equity, inclusion, and diversity and to identify the scenario-language barriers for this targeted study.

PILOT TEST

A small-scale test is conducted to evaluate the feasibility and effectiveness of collaboration with non-design major students, gathering data on communication and collaboration issues.

wk3.4-3.5

SESSION ONE

The design team and non-design major students collaborate on the project. The purpose of this session is to experience and analyze the actual design process of designing a lunchbox. Team members and students go through various stages of design, from need gathering to concept development, and then prototype creation.

wk3.6

ANALYSIS

Analyzes the session, evaluating engagement and inclusivity, identifying areas for improvement for the next session.

wk3.7-3.8

SESSION TWO

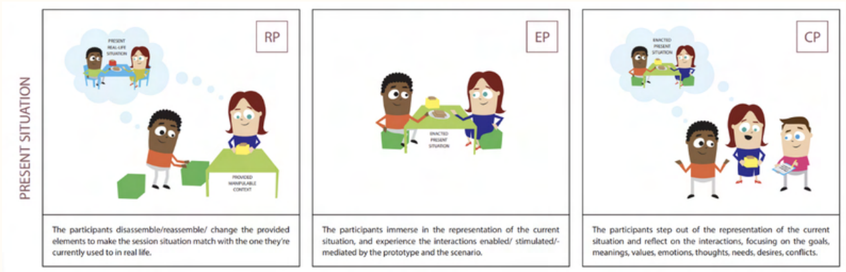
Based on the feedback and analysis from the first session, the second session involves necessary modifications and improvements. These might include changing communication strategies and introducing new tools or techniques. The purpose of the second session is to further optimize the design process and enhance the practicality and inclusiveness of the design.

wk3.9

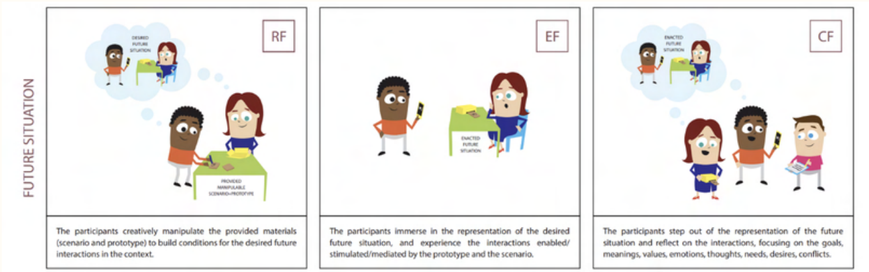
ANALYSIS

A final evaluation reviews the entire project, comparing the two sessions and summarizing theoretical and practical insights.

Current situation



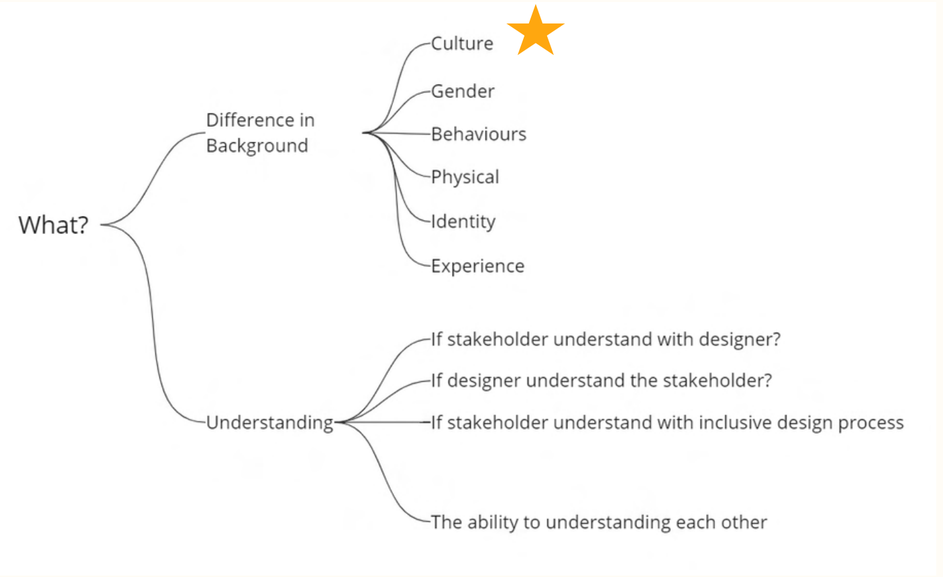
Future situation



2 BUILD UP

2.1 CONTEXT EXPLORATIONS

In the "Design Justice, Inclusion, and Diversity" course, designers and stakeholders face primary issues such as concerns about not achieving practically useful outcomes and the risk of becoming disconnected from the project. These concerns often stem from the complexity of transforming theoretical solutions into effective practices when attempting to solve real problems through academic activities. Additionally, in culturally diverse environments, differences in communication styles and perspectives can lead to misunderstandings, exacerbating disconnection from the project. Therefore, particular emphasis is placed on addressing language barriers within cultural differences, as language not only conveys literal meanings but also involves nuances of cultural expression. Effectively overcoming language barriers not only improves communication but also enhances understanding of design needs, ensuring that all participants can express and contribute their ideas effectively, thereby improving the overall quality and impact of the project.



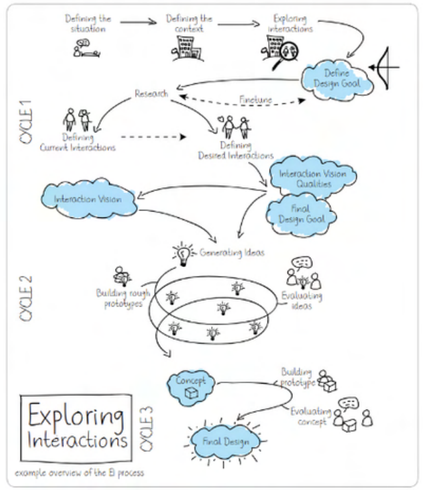
Based on our circumstances (as international students), we contemplated what this course might entail and what could pose the greatest challenges. It transpired that cultural diversity, notably the language barrier, emerged as our foremost challenge.

2.2 DESIGN GOAL

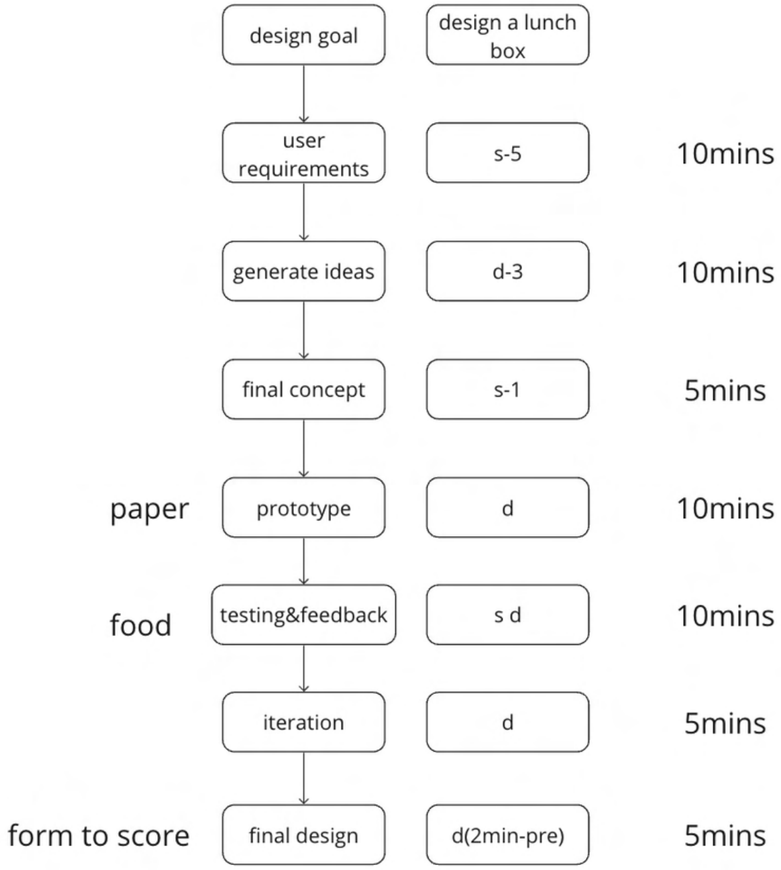
Increase stakeholders with different mother language interaction in the design process (within the DJID courses).

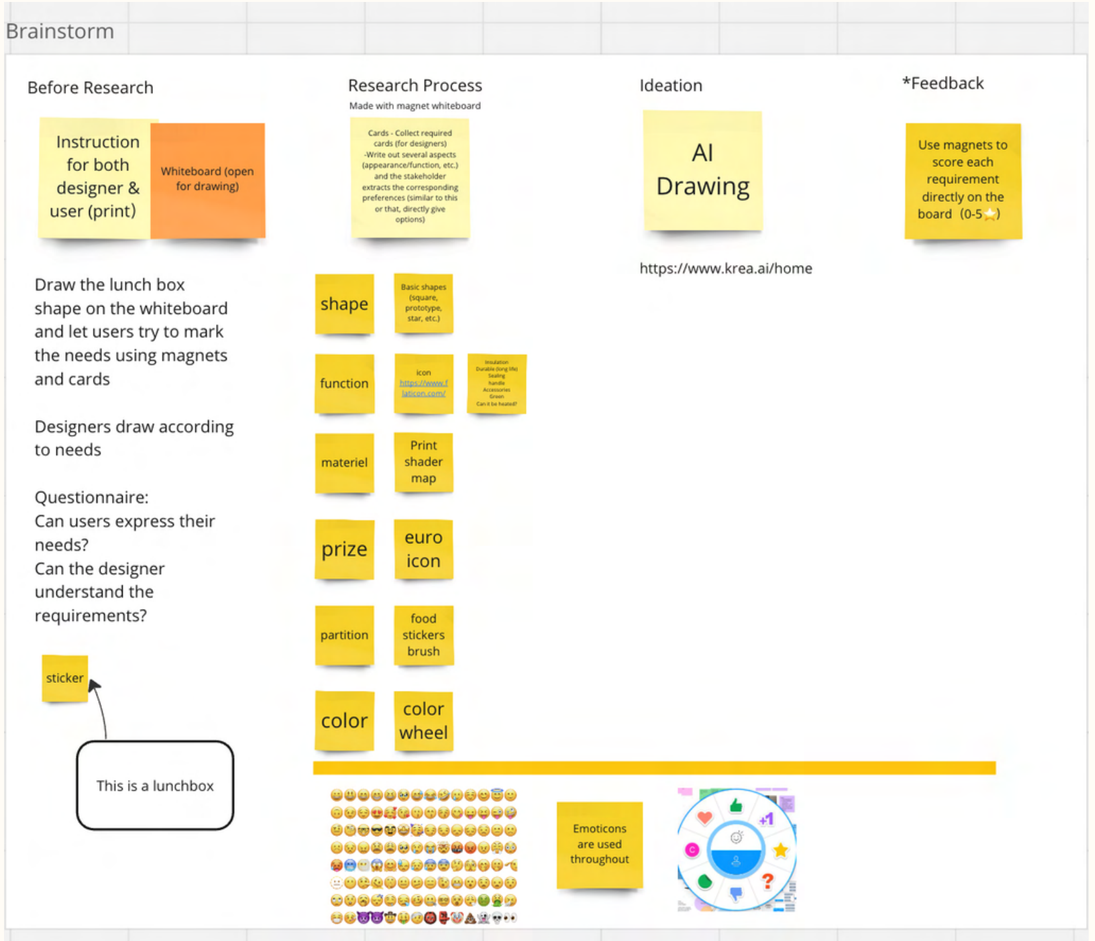
2.3 SCENARIO

We have designed two sessions in total, aiming to explore the current situation and purposefully create some tools to assist communication for future prospects. Both sessions are built upon the following scenario: a team composed of a designer played by group members and stakeholders played by recruited non-design major students, whose native languages are completely different. They need to collaborate to design a lunchbox for the stakeholders. They will go through a series of design processes to explore communication experiences and potential issues that may arise during this process.



finish the task asap





2.4 CASE QUESTION

What is the experience of designers and stakeholders with **different native languages** in participating in the **design process** like and how can this experience be improved?

2.5 PROTOTYPE QUESTION

PILOT TEST

How can the findings from a pilot test be utilized to enhance the setup of Session 1 in our study**?**

SESSION 1

How can we measure the communication efficiency between designer and user who has the language barriers**?**

SESSION 2

Can the visual material help improve the communication efficiency between the designer and the user who has a language barrier?

3 SESSION 1

3.1 PILOT TEST

HOW CAN THE FINDINGS FROM A PILOT TEST BE UTILIZED TO ENHANCE THE SETUP OF SESSION 1 IN OUR STUDY?

PARTICIPANTS (WITHIN THE GROUP)

1 Designer

1 User

1 Moderator & Observer

MATERIALS

Carton, Lunch box, and tinfoil for prototyping

GOAL

Try to find the limitations and questions for our prototype and iterate our prototype questions further.

SET-UP

Before we actually conduct Session 1, we started a pilot session within the group to clarify the whole process. During the session, two researchers were present; one was leading the session as a designer while the other observed and took notes. One of the non-design background members played the role of stakeholder sharing the same mother tongue as the designer.

PLIOT PLAN

TESTING (60 MIN)

Design process

Design Goal: Designing a lunch box

Role: 1 designer, 1 stakeholder
Time: 1h max (try to finish it asap)

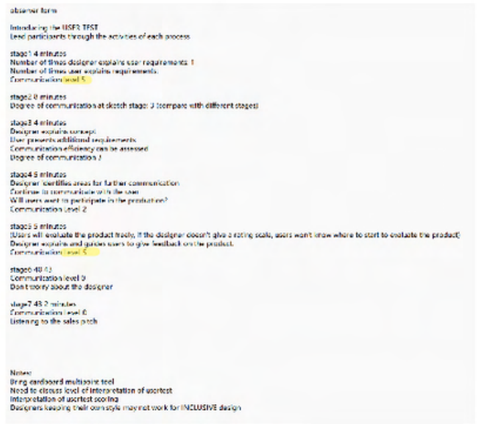
Phase	1 Research on user requirements	2 Ideation	3 Final concept	4 Generate prototype	5 Testing & Feedback	6 Iteration	7 Final design
Description	In this phase, stakeholder need to discuss with the designer to generate at least **3 needs** for the lunch box.	In this phase, the designer will generate at least **3 ideas** based on the user need. The designer can draw some sketch to express the concept.	In this phase, stakeholder need to choose **1 concept** as the final concept.	In this phase, the designer will make a **rough prototype** based on the final concept.	In this phase, stakeholder need to **test the prototype** with real food and give the **feedback** about the prototype.	In this phase, designer will **iterate the prototype** based on the feedback that the stakeholder give.	This is the last phase, designer need to give a **2-min presentation** for its final design.
Materials	Paper, pencil, translator	Paper, pencil		Tinfoil, pen, paper cart, normal lunch box	Food for test	Tinfoil, paper cart, lunch box	
Participant	Designer & stakeholder	Designer	Stakeholder	Designer	Designer & stakeholder	Designer	Designer & stakeholder
Recommended time	10 mins	10 mins	5 mins	10 mins	10 mins	5 mins	5 mins

QUESTIONNAIRE (10 MIN)
FEEDBACK WITHIN THE GROUP

Data:
User feedback + Observe

Observer’s notes

Efficiency of Communication



3.2 INSIGHTS

- In the pilot session, we measured the communication efficiency based on the observer's instinct, but we needed to specify how to evaluate the communication level. (E.G. which ways (criteria) can you measure communication efficiency?)
- In the feedback stage, the user will evaluate the product freely, if the designer doesn't **give an evaluation criteria** the user won't know where to start to give the feedback.
- During the test, for some stages, the stakeholder said he also wanted to join the process during some stage, but there was no chance to participate or the designers didn't realize that they could ask the **user** to **join the co-creation**.
- Designers keeping their style may not work for communication so it's better to let the chairman facilitate active communication if needed (appropriate intervention)(**Designers** need to be **more immersed in the context of inclusive design of inclusive design**)
- The **material** for prototyping is a bit restrictive.
- It is too direct and narrow to describe the language barriers in the survey, using more neutral words for describing the problems (it's not only about language barriers).

CHANGES WE MADE

- We made an observer form based on four ways of communication.
- We gave instructions to guide the stakeholder through these aspects: Usability, Functionality, Aesthetics, and Satisfaction, and then asked them to write down the feedback.
- We let the designer lead the entire process and eliminated the role of the moderator.

3.3 SESSION PLAN

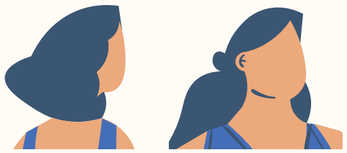
HOW CAN WE MEASURE THE COMMUNICATION EFFICIENCY BETWEEN DESIGNER AND USER WHO HAS THE LANGUAGE BARRIERS BY USING THE OBSERVATION FORM?

PARTICIPANTS

1 Designer

1 User

1 Moderator



2 Observer

MATERIALS

Cardboard, Lunch box,Stickers...for prototyping

Paper, pen

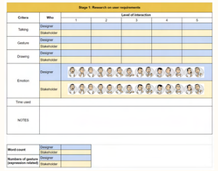
Translator

Go-pro

SESSION 1 TIME LINE

Instruction for participants

Observer form



PRIMING (5 MIN)

Consent form
Introduction
Few questions

TESTING (60 MIN)

Design process

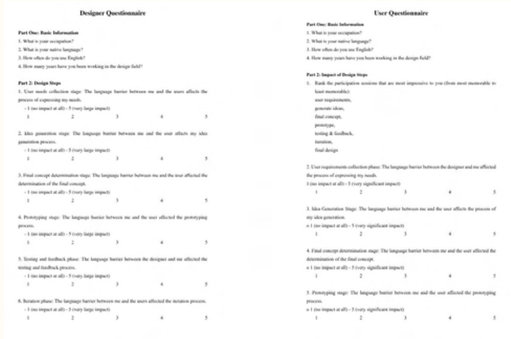
Design Goal: Designing a lunch box

Role: 1 designer, 1 stakeholder
Time: 1h max (try to finish it asap

Phase	1 Research on user requirements	2 Ideation	3 Final concept	4 Generate prototype	5 Testing & Feedback	6 Iteration	7 Final design
Description	In this phase, stakeholder need to discuss with the designer to generate at least **5 needs** for the lunch box. *You can use any way to communicate about your requirement to the designer.	In this phase, the designer will generate at least **3 ideas** based on the user need. The designer can draw some sketch to express the concept. *You can communicate anytime to the designer.	In this phase, stakeholder need to choose **1 concept** as the final concept.	In this phase, the designer will make a **rough prototype** based on the final concept.	In this phase, stakeholder need to **test the prototype** with real food and give the **feedback** about the prototype.	In this phase, designer will **iterate the prototype** based on the feedback that the stakeholder give.	This is the last phase, designer need to give a **2-min presentation** for its final design.
Materials	Paper, pencil, translator	Paper, pencil		Tinfoil, pen, paper cart, normal lunch box	Food for test	Tinfoil, paper cart, lunch box	
Participant	Designer & stakeholder	Designer	Stakeholder	Designer	Designer & stakeholder	Designer	Designer & stakeholder
Recommended time	10 mins	10 mins	5 mins	10 mins	10 mins	5 mins	5 mins

QUESTIONNAIRE (10 MIN)

Quesitionnaire



3.4 PROTOTYPING

TIME: 17/03/2024 Sunday

LOCATION: TU library, project room-Europe

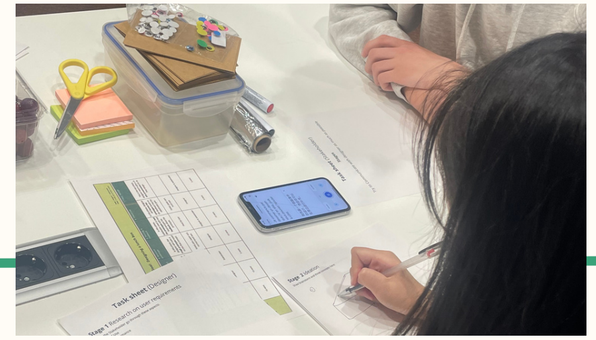
We recruited a native French-speaking aeronautics student as a user, and a member of our group, Fanshu (a native Chinese speaker), prototyped in the library's project room.

During the whole process, both participants are asked to only use their mother language to communicate (translator is allowed).

The prototype contains preparation, 7 stages of deisgn process and analysis.

PREPARATION

STAGE 1 - USER REQUIREMENTS



STAGE 2 - IDEATION

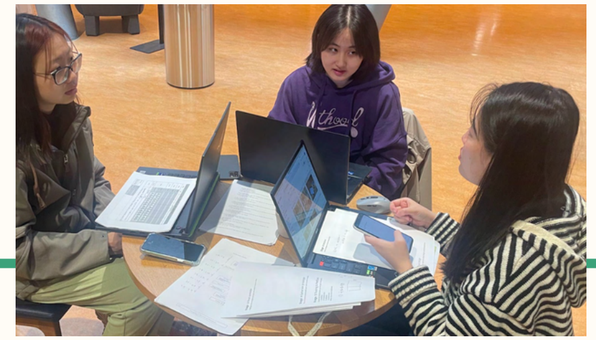
STAGE 3 - FINAL CONCEPT

STAGE 4 - GENERATE PROTOTYPE

STAGE 5 - TESTING & FEEDBACK

STAGE 6 - ITERATION

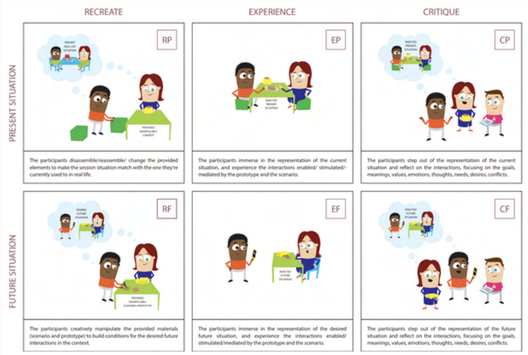
STAGE 7 - FINAL DESIGN



ANALYSIS

3.5 PHASE FLOW

We are analyzing where these 6 phases appear in our prototyping. The interesting thing is we find out that the process is quite different from our expectations. With the prototyping going on sometimes recreating of the future, the experience of the future and critique of the future show up.



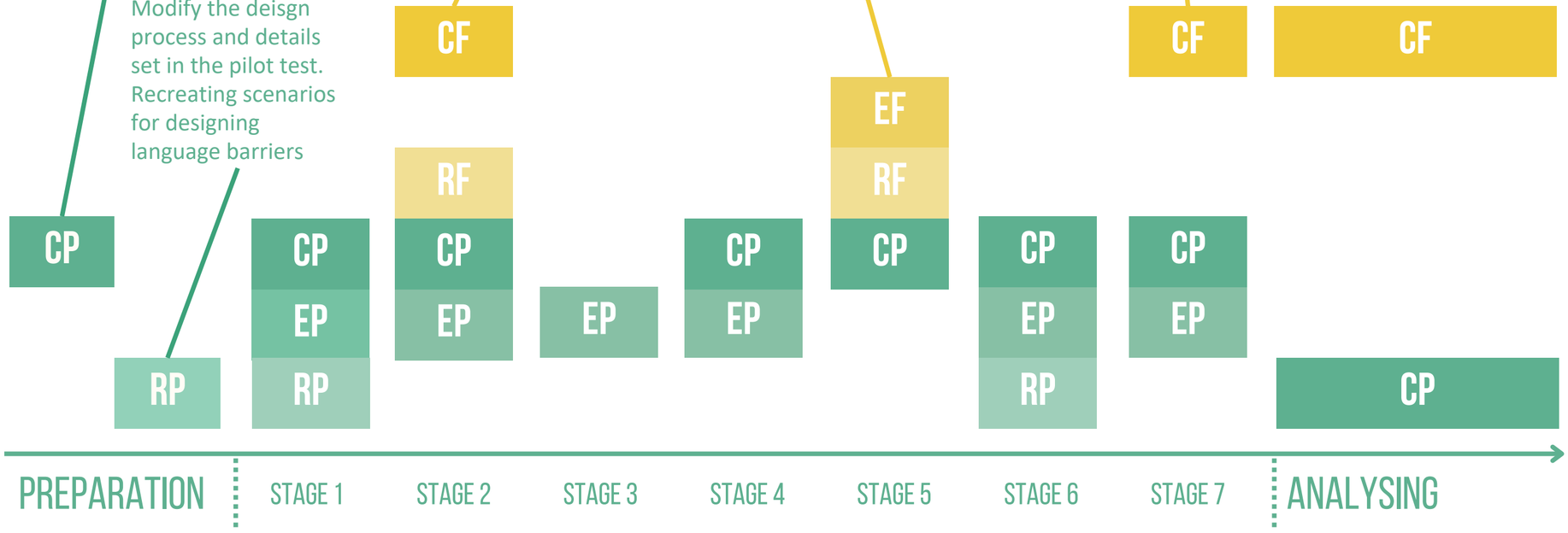
Got some insigts from the pilot test. Think of how to improve the session set up.

The moderator found her disturb the engagment so thought of leaving designer and user discuss themselves would be better.

While testing, the designer chose to iterate so that the feedback can be gained immediately. So modified the previous steps a bit.

During the presentation the designer found it wordy to say it again and stakeholders gave another feedback and the product iterated again.

Modify the deisgn process and details set in the pilot test. Recreating scenarios for designing language barriers



3.6 RESULT AND ANALYSIS

In the first session, we designed 2 different forms to evaluate our results: an **observation form** and a **participant survey**. The observation form is from the observer's (another designer) perspective to measure the communication problem and experience. The survey is from the designer's and user's perspective to know what they think about the process.

OBSERVATION FORM

The observation form contains the criteria for communication. We listed a template for each stage containing different communication methods, such as **talking, gestures, and drawing**. We will fill this form at each stage to understand how serious the problems are during different design stages.

TALKING

We use google translator to communicate with each other. It is measured by repeated sentences, words count and time used on each stage

GESTURE

How many times they use gesture to communicate with each other On each stage

DRAWING

We will provide both designer and user the A4 paper they can userwill use different color pens to draw on the same paper. It's easy to distinguish the contribution of drawing.

Stage___: _____

Critera	Who	Level of interac		
		1	2	3
Talking	Designer			
	Stakeholder			
Gesture	Designer			
	Stakeholder			
Drawing	Designer			
	Stakeholder			
Time used				
NOTES				

Word count	Designer	
	Stakeholder	
Word repeated	Designer	
	Stakeholder	
Numbers of gesture (expression related)	Designer	
	Stakeholder	

Based on the observation chart, we try to visualize the data the collected to evaluate the communication efficiency between designer and users.

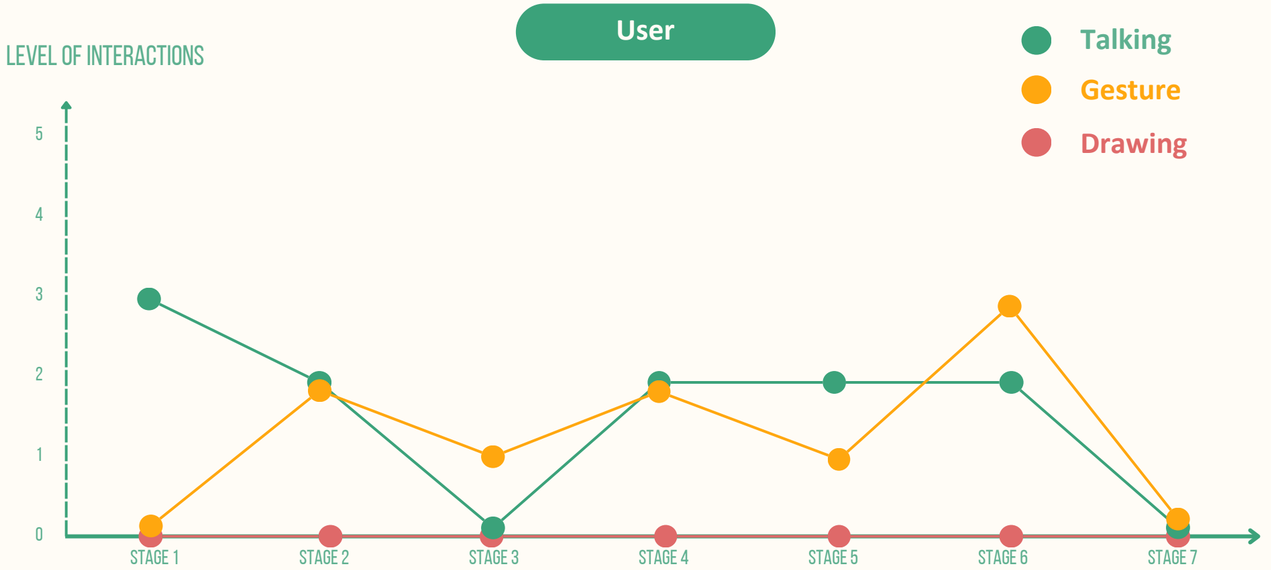
ANALYSIS

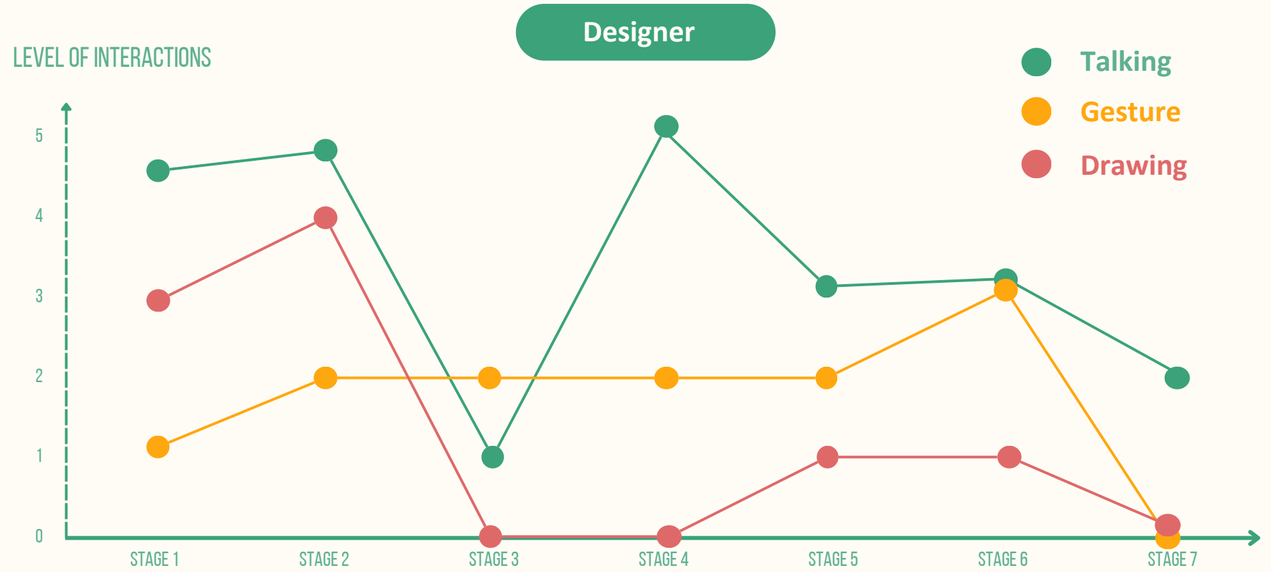
Generally, people are more willing to use the translator to communicate with each other rather than in other ways.
Communication need rank:

- High level of communication: stage 1, stage 2, stage 4
- The middle level of communication: stage 5, stage 6
- Low level of communication: stage 3, stage 7

It’s clear that, during the whole process, the user didn’t draw anything to express their opinions. 2 assumptions for it:

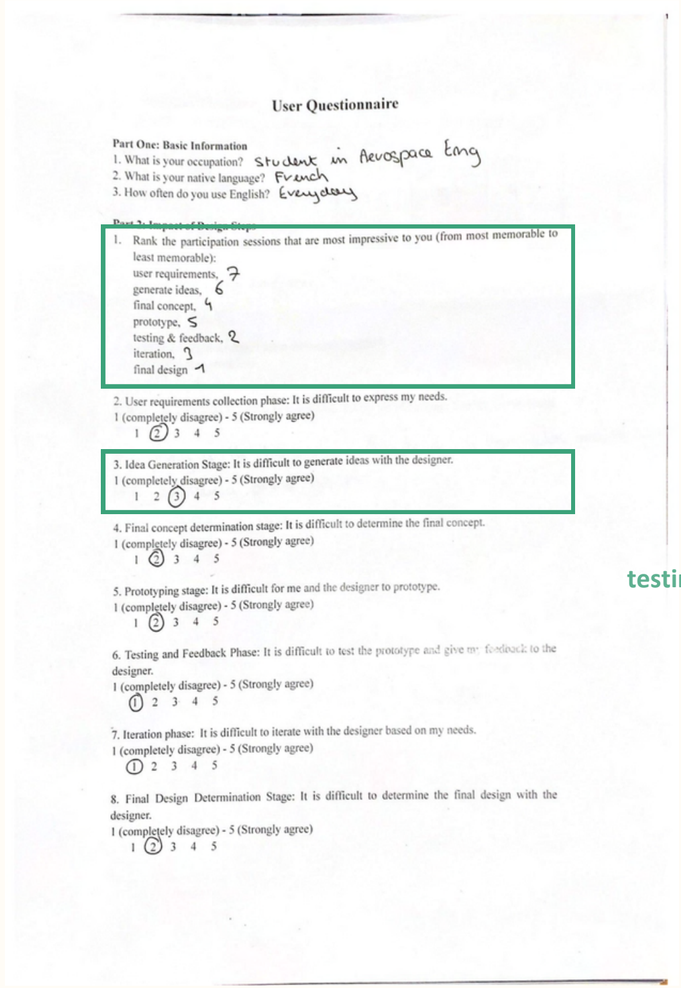
- Users don’t know how to join because of a lack of awareness to join the co-creation.
- Drawing is not the most efficient way to communicate so he didn’t choose it.





USER SURVEY

We used questionnaires for both users and designers to find out their attitudes toward the language barriers in the design stages. The negative(positive) degree of how they feel is measured by the numbers 1 to 5, for 5 means it is extremely negative and 1 means extremely positive. Based on that, we analyzed their attitudes and concluded some insights to answer the case question below.



User Questionnaire

Part One: Basic Information
1. What is your occupation? student in Aerospace Eng
2. What is your native language? French
3. How often do you use English? Everyday

1. Rank the participation sessions that are most impressive to you (from most memorable to least memorable):
user requirements, 7
generate ideas, 6
final concept, 4
prototype, 5
testing & feedback, 2
iteration, 3
final design 1

2. User requirements collection phase: It is difficult to express my needs.
1 (completely disagree) - 5 (Strongly agree)
1 (2) 3 4 5

3. Idea Generation Stage: It is difficult to generate ideas with the designer.
1 (completely disagree) - 5 (Strongly agree)
1 2 (3) 4 5

4. Final concept determination stage: It is difficult to determine the final concept.
1 (completely disagree) - 5 (Strongly agree)
1 (2) 3 4 5

5. Prototyping stage: It is difficult for me and the designer to prototype.
1 (completely disagree) - 5 (Strongly agree)
1 (2) 3 4 5

6. Testing and Feedback Phase: It is difficult to test the prototype and give my feedback to the designer.
1 (completely disagree) - 5 (Strongly agree)
(1) 2 3 4 5

7. Iteration phase: It is difficult to iterate with the designer based on my needs.
1 (completely disagree) - 5 (Strongly agree)
(1) 2 3 4 5

8. Final Design Determination Stage: It is difficult to determine the final design with the designer.
1 (completely disagree) - 5 (Strongly agree)
1 (2) 3 4 5

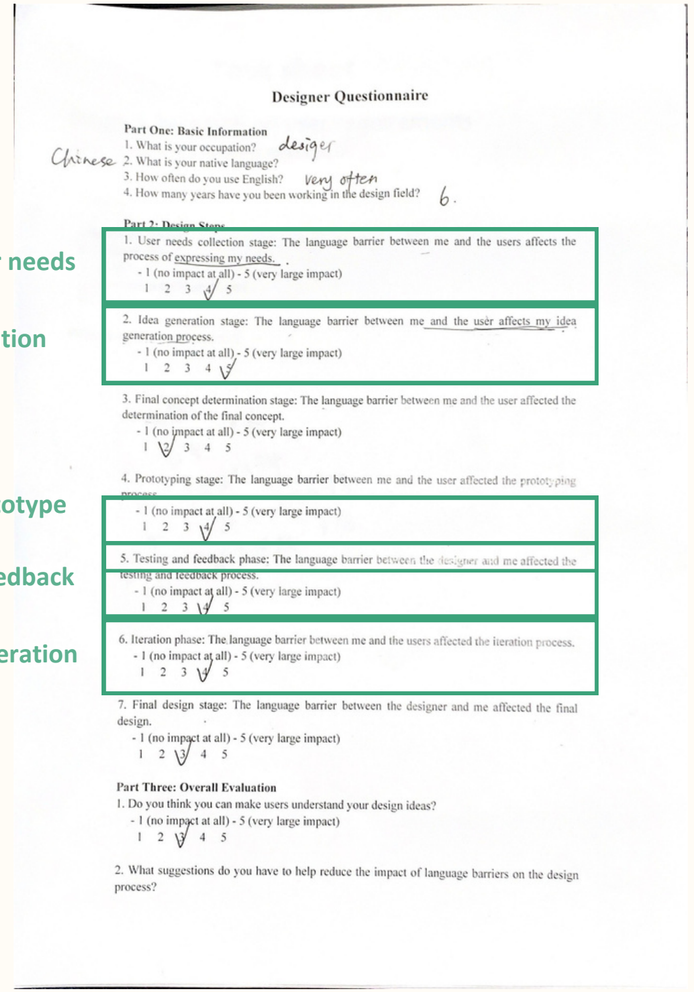
user needs

ideation

prototype

testing&feedback

iteration



Designer Questionnaire

Part One: Basic Information
1. What is your occupation? designer
2. What is your native language? Chinese
3. How often do you use English? very often
4. How many years have you been working in the design field? 6.

1. User needs collection stage: The language barrier between me and the users affects the process of expressing my needs.
- 1 (no impact at all) - 5 (very large impact)
1 2 3 (4) 5

2. Idea generation stage: The language barrier between me and the user affects my idea generation process.
- 1 (no impact at all) - 5 (very large impact)
1 2 3 4 (5)

3. Final concept determination stage: The language barrier between me and the user affected the determination of the final concept.
- 1 (no impact at all) - 5 (very large impact)
1 (2) 3 4 5

4. Prototyping stage: The language barrier between me and the user affected the prototyping process.
- 1 (no impact at all) - 5 (very large impact)
1 2 3 (4) 5

5. Testing and feedback phase: The language barrier between the designer and me affected the testing and feedback process.
- 1 (no impact at all) - 5 (very large impact)
1 2 3 (4) 5

6. Iteration phase: The language barrier between me and the users affected the iteration process.
- 1 (no impact at all) - 5 (very large impact)
1 2 3 (4) 5

7. Final design stage: The language barrier between the designer and me affected the final design.
- 1 (no impact at all) - 5 (very large impact)
1 2 (3) 4 5

Part Three: Overall Evaluation
1. Do you think you can make users understand your design ideas?
- 1 (no impact at all) - 5 (very large impact)
1 2 (3) 4 5

2. What suggestions do you have to help reduce the impact of language barriers on the design process?

ANALYSIS

- Stakeholders were initially unclear about their roles and the design process. Solution: Provide detailed briefings and clear step-by-step explanations from the outset.
- Translation tools sometimes erred but were generally understandable. Solution: Upgrade translation technology and allow more time for clarification to enhance accuracy.
- Designers often forget to communicate ideas, distracted by translation tools. Solution: Train designers on efficient tool use and set aside specific times for discussion to ensure creative ideas are shared.

3.7 DISCUSSION

Because they were required to communicate only in their native language, both the designer and the participant initially felt a bit confused, especially when figuring out how to use the translator. They both needed to double-check if the translations accurately captured what they intended to express, and they couldn't be sure if the translated content was understandable to the other party.

The previous line graph analysis also clearly indicates that using language (especially through a translator in this context) remains the primary means of communication for speakers of different native languages. Drawing is somewhat unfamiliar to stakeholders, partly because they are reluctant to disturb the designer's creative process (thus choosing not to participate).

Apart from the issue of verbal communication, there is also a lot of information that needs to be provided in textual form. In our session, we directly opted for the English version, failing to replicate the real-life scenario authentically. However, we believe that in actual design processes, designers would be familiar with the basic backgrounds of stakeholders, so the materials prepared would be presented in their native languages, significantly reducing barriers.

Despite some participants being unfamiliar with the design process, they were still able to engage well with the provided introductions and guidance from the designer throughout the process. One of the most interesting findings was that participants expressed a strong desire to join in drawing when observing the designer's hand-drawn ideas. Similarly, when the designer used materials to create simple prototypes, participants also wanted to collaborate in the creation process. In other words, stakeholders found the creative process engaging.

4 SESSION TWO

HOW + WHY + WHAT

From the first session, we tested the user with 7 different design processes, and in this session, we decided to choose 3 of them which are stage 1 (research on requirements), stage 2 (ideation), and stage 7 (evaluation) to reduce the time for the session 2. These stages are the main stages of the whole design process.

And we provided visual materials in this session, ranging from colors, shapes, functions, materials, and food stickers. Users can choose the picture based on their requirements. And they can put the sticker on the whiteboard and cooperate with the designer.

GOAL

- **To see if the visual materials can help improve communication efficiency.**
- **To see if the prototype can influence the outcome of the design: in our case is a lunch box.**

4.1 SESSION PLAN

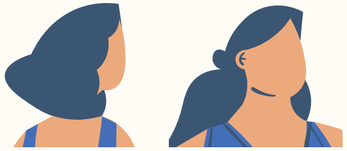
CAN THE VISUAL MATERIAL HELP IMPROVE THE COMMUNICATION EFFICIENCY BETWEEN THE DESIGNER AND THE USER WHO HAS A LANGUAGE BARRIER?

PARTICIPANTS

1 Designer

1 User

1 Moderator



2 Observer

MATERIALS

White board, evaluation template

Translator

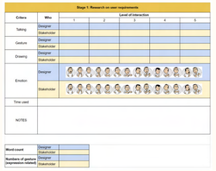
Visual materials: picture for texture/shape/mood/color

Pen, tape

SESSION 2 TIME LINE

Instruction for participants

Observer form



PRIMING (5 MIN)

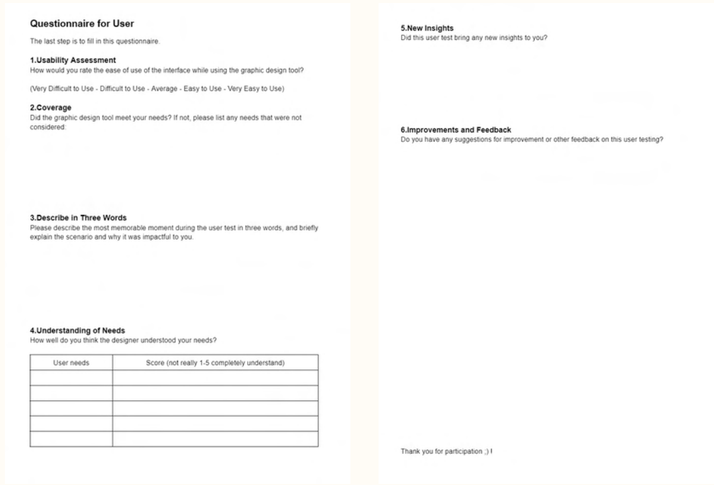
Consent form
Introduction
Few questions

TESTING (30 MIN)

Design Goal: Designing a lunch box

Phase	1 Research on user requirements	2 Ideation	3 Evaluation
Description	In this phase, stakeholder need to discuss with the designer to generate at least **5 needs** for the lunch box. *You can use any way to communicate about your requirement to the designer.	In this phase, the designer will generate at least **3 ideas** based on the user need. The designer can draw some sketch to express the concept. *You can communicate anytime to the designer.	In this phase, the stakeholder will evaluate the idea base on the requirements template.
Materials	Paper, translator, visual material	Paper, visual material	Paper, visual material
Participant	Designer & stakeholder	Designer	Stakeholder
Recommended time	10 mins	10 mins	10 mins

QUESTIONNAIRE (10 MIN)



Questionnaire for User

The last step is to fill in this questionnaire.

1.Usability Assessment
How would you rate the ease of use of the interface while using the graphic design tool?

(Very Difficult to Use - Difficult to Use - Average - Easy to Use - Very Easy to Use)

2.Coverage
Did the graphic design tool meet your needs? If not, please list any needs that were not considered.

3.Describe in Three Words
Please describe the most memorable moment during the user test in three words, and briefly explain the scenario and why it was impactful to you.

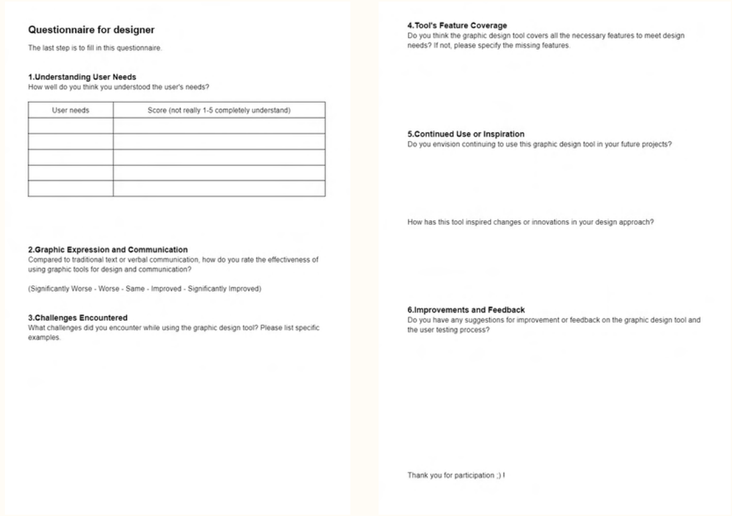
4.Understanding of Needs
How well do you think the designer understood your needs?

User needs	Score (not really 1-5 completely understand)

5.New Insights
Did this user test bring any new insights to you?

6.Improvements and Feedback
Do you have any suggestions for improvement or other feedback on this user testing?

Thank you for participation ;) !



Questionnaire for designer

The last step is to fill in this questionnaire.

1.Understanding User Needs
How well do you think you understood the user's needs?

User needs	Score (not really 1-5 completely understand)

2.Graphic Expression and Communication
Compared to traditional text or verbal communication, how do you rate the effectiveness of using graphic tools for design and communication?

(Significantly Worse - Worse - Same - Improved - Significantly Improved)

3.Challenges Encountered
What challenges did you encounter while using the graphic design tool? Please list specific examples.

4.Tool's Feature Coverage
Do you think the graphic design tool covers all the necessary features to meet design needs? If not, please specify the missing features.

5.Continued Use or Inspiration
Do you envision continuing to use this graphic design tool in your future projects?

How has this tool inspired changes or innovations in your design approach?

6.Improvements and Feedback
Do you have any suggestions for improvement or feedback on the graphic design tool and the user testing process?

Thank you for participation ;) !

4.2 SESSION FLOW

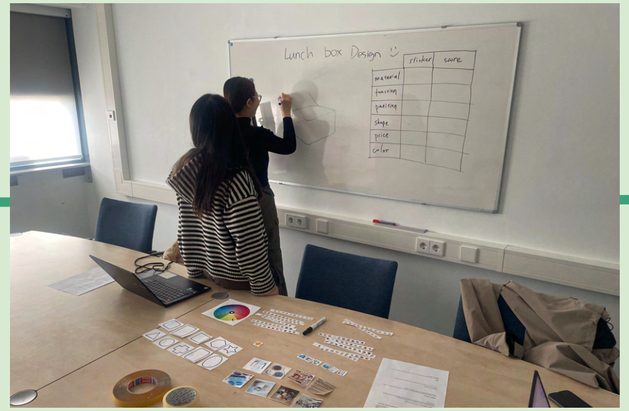
TIME:
04/04/2024 Thursday

LOCATION:
ME Building, meeting room

PROCESS:
We recruited a native Italian-speaking computer science student as our user, and a member of our group, Fanshu (a native Chinese speaker), as the designer. During the whole process, both participants are asked to only use their mother language to communicate (translator is allowed).

1 USE REQUIREMENT RESEARCH

In this phase,stakeholder need todiscuss with thedesigner to generate atleast 5 needs for thelunch box.



2 IDEATION

In this phase, the designer will generate at least 3 ideas based on the user need. The designer can draw some sketch to express the concept

3 EVALUATION

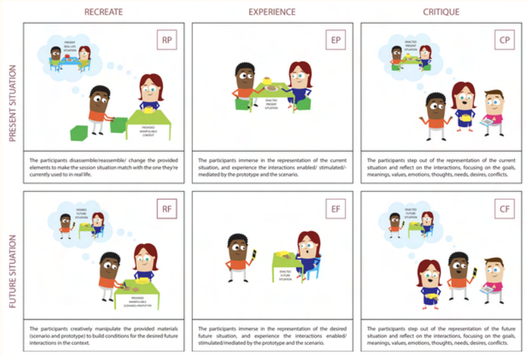
In this phase, the user will evaluate the idea base on the requirements template.

4.3 PHASE FLOW

We analyzed where these 6 phases appear in our second prototyping.

For stage 1, it takes a bit longer than we thought and the designer had explained some kits to the user several times.

For stage 2, we thought it might increase the speed of this process but it turned out to take a long time and didn't involve the interaction with the user that much.



The user didn't get the usage of the food icon and the designer used the translator to communicate with her to explain.

The users didn't involve in this process that much, just the designers handling with the AI.

Based on the performance of both the user and designer, we thought this could be improved by combining text with visuals and using touchable materials.

CF
EF
RF
CP
EF
EF
CF
CP
EP

PREPARATION | STAGE 1 | STAGE 2 | STAGE 3 | ANALYSING

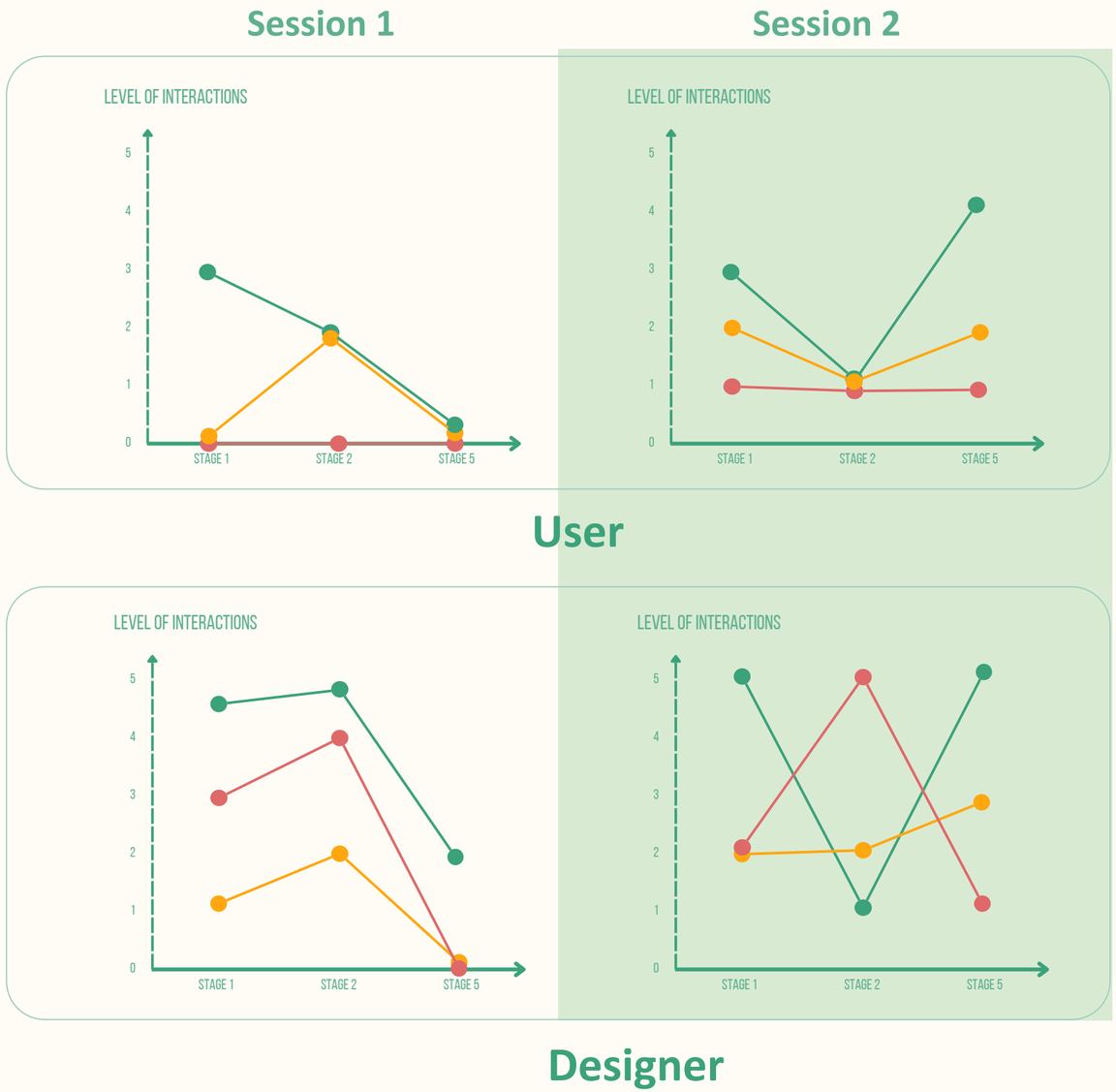
DESIGN PROCESS

4.4 RESULT AND ANALYSIS

During the test, we used the observation form to document me the communication efficiency of different interaction. And then we compared it with the one in the first session to see if there's any improvement by using the prototype.

- **Talking**
- **Gesture**
- **Drawing**

- Compared with session 1, there are more communications on stage 1 (research on requirement) and stage 3 (evaluation).
- The proportion of drawing is decreased because we bring in the visual materials, and it's easy for the designer to introduce pictures to users.
- Because we bring in the AI generative in stage 2 (ideation), the process is not predictable which results in lower communication efficiency in talking.



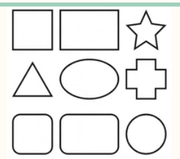
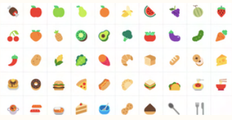
4.4 RESULT AND ANALYSIS

PROTYPE QUESTION

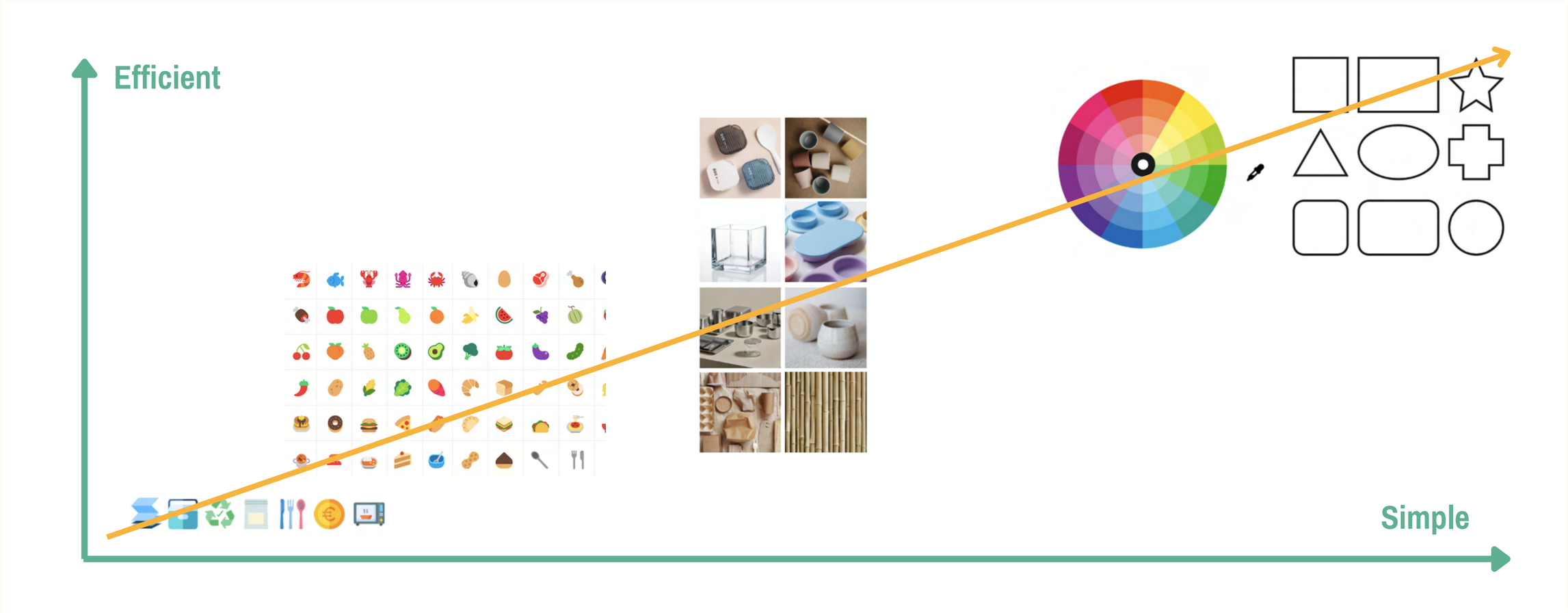
Can the visual material help improve the communication efficiency between the designer and the user who has a language barrier?

We tested the user with five different visual materials: color, shape, functions, materials, and food stickers. After the session, we have a short interview about how these materials work:

- Color wheel: Easy to understand and select.
- Box's shape: Easy to understand and select.
- Function icon: Hard to understand most of the icons, the user can only understand the microwave icons; others are difficult to know.
- Materials: The user only understands the first one which shows the lunch box in the picture and he thinks others represent other products.
- Sticker: It's hard for the user to select and needs to cut from the paper which is not convenient.

Requirement	Visualization	Effect
Color		Easy to understand and select
Shape		Easy to understand and select
Functions		Hard to understand most of the icon
Materials		only understand the first one which shows the lunch box in the picture
Food sticker		hard for user to select and need to cut from the paper

In summary, the effectiveness of visual materials relies on their simplicity. The simpler the visual, the easier it is for users to understand. For instance, color and shape are among the simplest visualizations for communication.



4.5 OVERALL PHASE FLOW

Why?

The design process is too complex and needs to figure out the stages where language barriers lower the efficency

How?

Simplify the design process:

1. User Requirements
2. Ideation
3. Evaluation

SESSION 1

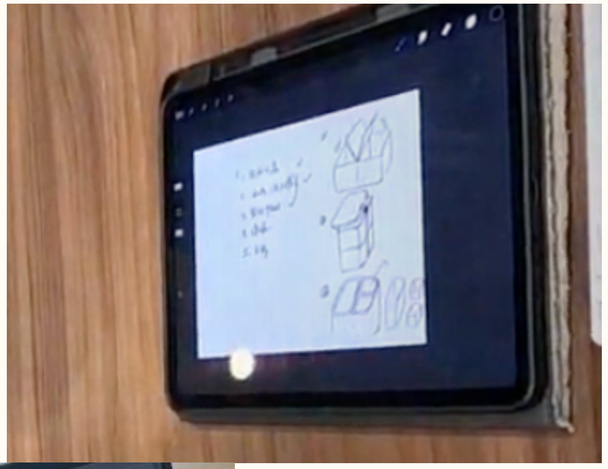
SESSION 2

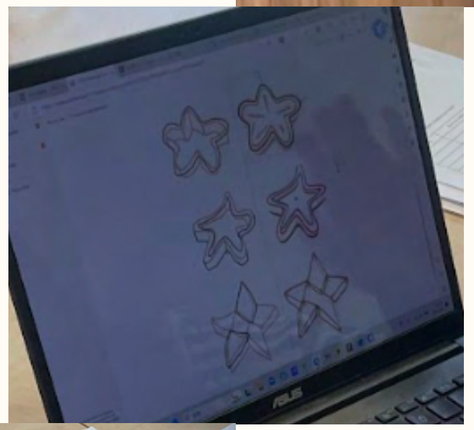
4.6 DISCUSSION

For designers:

The designers feel that compared to session 1, the users' choices have narrowed because, in the previous session, the designers mainly guided the users' needs. Additionally, for many of the requirements, users only provided one or two simple words or did not have any specific needs in that regard. This indirectly led to the outcome being more conventional, with less room for innovation.

Furthermore, based on the feedback from session 1 users, AI-generated sketches were chosen this time. During this process, the level of user engagement was relatively low, and there was no desire to get hands-on.





DISCUSSION

As to the users:

Despite users having no prior design experience and lacking understanding of the design process, they were still able to grasp the overall process through the sessions we designed.

It's recommended to provide visual examples for the optional functionalities.

The users expressed that they did not understand what "functionality" meant at the time, and they were also unclear about why there were icons of knives, forks, and spoons within the functionality category (which was meant to inquire whether the lunchbox needed to have the function of storing utensils).

When users first use the visual tools we provide, such as stickers, they may find it a bit puzzling. Even though we have categorized the same types of requirements (such as functionality, and shape), lacking textual explanations can still leave users with questions. Emojis, being the most easily conveyed form of communication, don't require special tools to facilitate communication because both parties can already sense each other's emotions during the interaction.

Visual tools can indeed facilitate communication between both parties during the design process, especially for simple functionalities like shape and color, which are particularly evident. For more complex content, the assistance of a translator may be required for additional explanation. Therefore, for any auxiliary communication tool, simplicity and clarity are the first characteristics it should possess.
Furthermore, when designing communication tools, it's essential to make them more relatable to users' lives and consider whether users from different backgrounds can understand them. Otherwise, it may only create greater barriers to communication.

For instance, in our scenario, when designing cards for material functionalities, we simply selected different materials without considering whether users are familiar with materials like rubber. Choosing pre-designed samples or displaying tangible materials that users can touch would allow them to better understand.

One noteworthy point is that stakeholders demonstrated a willingness to participate beyond just the requirement-finding stage in both sessions. This suggests that there is an opportunity worth exploring in the future to involve stakeholders more actively in the design process.

5. FUTURE RECOMMENDATION

This future recommendation aims to explore strategies for enhancing the experience of designers and stakeholders with different native languages in the design process. Drawing upon insights from previous discussions and research findings, this recommendation seeks to provide actionable insights and best practices to facilitate clearer communication, foster cross-cultural understanding, and promote collaborative innovation in the design process. These are some aspects that we would like to focus on in the future.

CLEAR AND SIMPLE INSTRUCTIONS

Ensure that all instructions and explanations provided during the design process are clear, concise, and easy to understand, regardless of language. Avoid jargon and technical language, opting instead for plain language that is accessible to all participants.

COMBINATION OF VISUAL AND TEXTS

From the analysis of our prototype, it is difficult for users to understand these relatively abstract visuals, so the combination of images and text will be easier for them to understand. By integrating a combination of visual and text-based communication strategies, designers can enhance the accessibility, inclusivity, and effectiveness of the design process for participants with different native languages. This approach fosters clearer communication, facilitates cross-cultural understanding, and promotes collaborative innovation across diverse linguistic and cultural contexts.

PROJECT SENSITIVITY

Stakeholders and designer could engage in a design exercises before the formal design process (in the start of DJID) to familiarize themselves with their rights and responsibilities. Incorporate sensitive design practices throughout the project lifecycle to ensure that design materials and communication strategies resonate with participants from diverse linguistic and backgrounds.

6 REFLECTION

During our participation in the ID5613 Prototyping for Interaction and Participation course, we gained a deep appreciation for the inclusive design, especially the participatory experience of designers and stakeholders of different native languages in the design process. We considered the course was a deep exploration of communication and collaboration with different people.

LEARNING AND REFLECTION

We learned that the design process communicates cross-culturally and cross-linguistically requires designers to have an open and inclusive mindset. Through this course, we learned that inaccuracies in language expression can lead to misunderstandings of design intent, and that we need to find better ways and tools to communicate in order to improve the engagement and efficiency of the design process.

COURSE STRUCTURE AND CONTENT

The course enabled us to learn and reflect from practice through a combination of case studies and practical exercises. The course covered all aspects from theory to practice. However, we would have liked to have a greater proportion of theory, perhaps more theory on how to conduct this prototype and we would have had more clarity on how to conduct the process.

CHALLENGES AND UNEXPECTED ASPECTS

The biggest challenge was how to design interventions to establish effective communication between team members from different linguistic and cultural backgrounds. As well as how to recruit the target population for prototype testing. This greatly honed our communication skills.

7 REFERENCE

[1] Boess, S. (2018). Design for Self-inclusion: supporting emotional capability. Proceedings of DRS. https://doi.org/10.21606/drs.2018.628

[2] Pieter Jan Stappers, About. (2021, February 25). Retrieved from https://studiolab.ide.tudelft.nl/studiolab/stappers/

[3] Huang, D., Yang, C. M., & On, G. H. (2018). Experiences-Based design for Overcoming language Barriers in healthcare Service: a case study. In Lecture notes in computer science (pp. 298–307). https://doi.org/10.1007/978-3-319-92252-2_24

[4] Meuter, R.F., Gallois, C., Segalowitz, N.S., Ryder, A.G., Hocking, J.: Overcoming language barriers in healthcare: a protocol for investigating safe and effective communication when patients or clinicians use a second language. BMC Health Serv. Res. 15(1), 371 (2015)

APPENDIX

PILOT TEST

Design Process Template

This appendix presents a Design Process Template, developed to standardize the experiences of designers and stakeholders during user testing within the project. The template outlines a structured framework that guides all participants through the sequential phases of the design process, ensuring that every step—from initial concept development to final prototype evaluation—is clearly defined and understood.

Design Goal: Designing a lunch box

Role: 1 designer, 1 stakeholder
Time: 1h max (try to finish it asap)

Phase	1 Research on user requirements	2 Ideation	3 Final concept	4 Generate prototype	5 Testing & Feedback	6 Iteration	7 Final design
Description	In this phase, stakeholder need to discuss with the designer to generate at least **3 needs** for the lunch box.	In this phase, the designer will generate at least **3 ideas** based on the user need. The designer can draw some sketch to express the concept.	In this phase, stakeholder need to choose **1 concept** as the final concept.	In this phase, the designer will make a **rough prototype** based on the final concept.	In this phase, stakeholder need to **test the prototype** with real food and give the **feedback** about the prototype.	In this phase, designer will **iterate the prototype** based on the feedback that the stakeholder give.	This is the last phase, designer need to give a **2-min presentation** for its final design.
Materials	Paper, pencil, translator	Paper, pencil		Tinfoil, pen, paper cart, normal lunch box	Food for test	Tinfoil, paper cart, lunch box	
Participant	Designer & stakeholder	Designer	Stakeholder	Designer	Designer & stakeholder	Designer	Designer & stakeholder
Recommended time	10 mins	10 mins	5 mins	10 mins	10 mins	5 mins	5 mins

APPENDIX SESSION 1

Observer Evaluation Form

This appendix includes the Observer Evaluation Form, designed to systematically assess user interactions during the project sessions. The form is structured to capture the level of interaction among users based on various criteria, providing a quantitative and qualitative measure of engagement, communication effectiveness, and collaboration.

Stage___: _____						
Critera	**Who**	**Level of interaction**				
		1	2	3	4	5
Talking	Designer					
	Stakeholder					
Gesture	Designer					
	Stakeholder					
Drawing	Designer					
	Stakeholder					
Time used						
NOTES						
Word count	Designer					
	Stakeholder					
Word repeated	Designer					
	Stakeholder					
Numbers of gesture (expression related)	Designer					
	Stakeholder					

APPENDIX SESSION 1

Participant Feedback Questionnaire

This questionnaire is designed to collect detailed feedback from all participants involved in the design sessions, including both designers and stakeholders. The purpose of the questionnaire is to assess the effectiveness of the design process and identify areas for improvement.

Designer Questionnaire

Part One: Basic Information

1. What is your occupation?
2. What is your native language?
3. How often do you use English?
4. How many years have you been working in the design field?

Part 2: Design Steps

1. User needs collection stage: The language barrier between me and the users affects the process of expressing my needs.
   - 1 (no impact at all) - 5 (very large impact)
   1 2 3 4 5

2. Idea generation stage: The language barrier between me and the user affects my idea generation process.
   - 1 (no impact at all) - 5 (very large impact)
   1 2 3 4 5

3. Final concept determination stage: The language barrier between me and the user affected the determination of the final concept.
   - 1 (no impact at all) - 5 (very large impact)
   1 2 3 4 5

4. Prototyping stage: The language barrier between me and the user affected the prototyping process.
   - 1 (no impact at all) - 5 (very large impact)
   1 2 3 4 5

5. Testing and feedback phase: The language barrier between the designer and me affected the testing and feedback process.
   - 1 (no impact at all) - 5 (very large impact)
   1 2 3 4 5

6. Iteration phase: The language barrier between me and the users affected the iteration process.
   - 1 (no impact at all) - 5 (very large impact)
   1 2 3 4 5

7. Final design stage: The language barrier between the designer and me affected the final design.
   - 1 (no impact at all) - 5 (very large impact)
   1 2 3 4 5

Part Three: Overall Evaluation

1. Do you think you can make users understand your design ideas?
   - 1 (no impact at all) - 5 (very large impact)
   1 2 3 4 5

2. What suggestions do you have to help reduce the impact of language barriers on the design process?

User Questionnaire

Part One: Basic Information

1. What is your occupation?
2. What is your native language?
3. How often do you use English?

Part 2: Impact of Design Steps

1. Rank the participation sessions that are most impressive to you (from most memorable to least memorable):
   user requirements,
   generate ideas,
   final concept,
   prototype,
   testing & feedback,
   iteration,
   final design

2. User requirements collection phase: It is difficult to express my needs.
1 (completely disagree) - 5 (Strongly agree)
   1 2 3 4 5

3. Idea Generation Stage: It is difficult to generate ideas with the designer.
1 (completely disagree) - 5 (Strongly agree)
   1 2 3 4 5

4. Final concept determination stage: It is difficult to determine the final concept.
1 (completely disagree) - 5 (Strongly agree)
   1 2 3 4 5

5. Prototyping stage: It is difficult for me and the designer to prototype.
1 (completely disagree) - 5 (Strongly agree)
   1 2 3 4 5

6. Testing and Feedback Phase: It is difficult to test the prototype and give my feedback to the designer.
1 (completely disagree) - 5 (Strongly agree)
   1 2 3 4 5

7. Iteration phase: It is difficult to iterate with the designer based on my needs.
1 (completely disagree) - 5 (Strongly agree)
   1 2 3 4 5

8. Final Design Determination Stage: It is difficult to determine the final design with the designer.
1 (completely disagree) - 5 (Strongly agree)
   1 2 3 4 5

Part Three: User Satisfaction
(1-very poor, 5-very good)

	user needs -1	user needs -2	user needs -3	user needs -4	user needs -5
content					
satisfaction level					

Part 4: Overall evaluation

1. I had to explain my needs multiple times.
1 (strongly disagree) - 5 (strongly agree)
   1 2 3 4 5

2. Do you think the final design result still needs iteration?
(1-not at all, 5-very seriously)
   1 2 3 4 5

3. What suggestions do you have to help reduce the impact of language barriers on the design process?

NASA Task Load Index

Choose one from the two choices:

Effort or Performance	Temporal Demand or Frustration	Temporal Demand or Effort	Physical Demand or Frustration	Performance or Frustration
Physical Demand or Temporal Demand	Physical Demand or Performance	Temporal Demand or Mental Demand	Frustration or Effort	Performance or Mental Demand
Performance or Temporal Demand	Mental Demand or Effort	Mental Demand or Physical Demand	Effort or Physical Demand	Frustration or Mental Demand

Evaluate these variables:

Mental demand: How mentally demanding was the task?

Low Hight

1 2 3 4 5 6 7 8 9 10

Physical demand: How physically demanding was the task?

Low Hight

1 2 3 4 5 6 7 8 9 10

Temporal demand: How hurried or rushed was the pace of the task?

Low Hight

1 2 3 4 5 6 7 8 9 10

Effort demand: How hard did you have to work to accomplish your level of performance?

Low Hight

1 2 3 4 5 6 7 8 9 10

Performance demand: How successful were you in accomplishing what you were asked to do?

Low Hight

1 2 3 4 5 6 7 8 9 10

Frustration demand: How insecure, discouraged, imitated, stressed, and annoyed were you?

Low Hight

1 2 3 4 5 6 7 8 9 10

APPENDIX SESSION 2

Observer Evaluation Form

This appendix includes the Observer Evaluation Form, designed to systematically assess user interactions during the project sessions. The form is structured to capture the level of interaction among users based on various criteria, providing a quantitative and qualitative measure of engagement, communication effectiveness, and collaboration.

Design Goal: Designing a lunch box

Phase	1 Research on user requirements	2 Ideation	3 Evaluation
Description	In this phase, stakeholder need to discuss with the designer to generate at least **5 needs** for the lunch box. *You can use any way to communicate about your requirement to the designer.	In this phase, the designer will generate at least **3 ideas** based on the user need. The designer can draw some sketch to express the concept. *You can communicate anytime to the designer.	In this phase, the stakeholder will evaluate the idea base on the requirements template.
Materials	Paper, translator, visual material	Paper, visual material	Paper, visual material
Participant	Designer & stakeholder	Designer	Stakeholder
Recommended time	10 mins	10 mins	10 mins

Instructions

This document provides comprehensive instructions for participants involved in the user testing sessions of the project. It is designed to ensure that all participants, whether designers or stakeholders, understand their roles, the objectives of the session, and the procedures they need to follow.

指示

欢迎参加我们针对语言障碍的包容性设计的用户测试环节。 您将与用户（其母语与您的母语不同）一起设计午餐盒。 在整个测试期间，您必须用中文与利益相关者进行交流。 允许使用翻译器。
(提示：确保用户使用我们提供的卡片并尽量使用除了说话之外的交流方式。)

Stage 1 Research on user requirements

在这个阶段，你需要帮助用户考虑午餐盒的需求。
尝试通过以下几个方面引导用户：
外形
功能
材质
价格
食物是否需要分区
颜色

(引导用户使用不同需求维度的卡片，并使用磁铁将需求放在白板上)

Stage 2 Ideation

根据用户的需求，使用generative AI生成三个草图，引导用户使用五角星卡片打分（选择最符合需求的一个）。

Instructions

Welcome to our user testing session. The topic of our test is: Inclusive Design in Language Barrier. You will work with a designer (whose mother language differs from yours) to design a lunch box for you. Remember to **communicate using your native language** throughout the session, and feel free to use a translator if needed.
(**Tips: make full use of the stickers we provide and think about methods other than talking**)

Now, let's start!
↓↓↓

Stage 1 Research on user requirements

In this stage, you need to consider your lunch box requirements.
(Put your needs on the whiteboard using magnets and stickers which are from different dimensions)

Stage 2 Ideation

In this stage, the designer will use generative AI to give you three concepts of the lunch box. Please choose the design that best meets your needs.

Stage 3 Evaluation

Score each need directly on the whiteboard using magnets and star stickers

Tips:

During the whole session,You can use the emoji stickers to express emotions such as approval or doubt

APPENDIX SESSION 2

Participant Feedback Questionnaire

This questionnaire is designed to collect detailed feedback from all participants involved in the design sessions, including both designers and stakeholders. The purpose of the questionnaire is to assess the effectiveness of the design process and identify areas for improvement.

Questionnaire for User

The last step is to fill in this questionnaire.

1.Usability Assessment
How would you rate the ease of use of the interface while using the graphic design tool?

(Very Difficult to Use - Difficult to Use - Average - Easy to Use - Very Easy to Use)

2.Coverage
Did the graphic design tool meet your needs? If not, please list any needs that were not considered:

3.Describe in Three Words
Please describe the most memorable moment during the user test in three words, and briefly explain the scenario and why it was impactful to you.

4.Understanding of Needs
How well do you think the designer understood your needs?

User needs	Score (not really 1-5 completely understand)

5.New Insights
Did this user test bring any new insights to you?

6.Improvements and Feedback
Do you have any suggestions for improvement or other feedback on this user testing?

Thank you for participation ;) !

Questionnaire for designer

The last step is to fill in this questionnaire.

1.Understanding User Needs
How well do you think you understood the user's needs?

User needs	Score (not really 1-5 completely understand)

2.Graphic Expression and Communication
Compared to traditional text or verbal communication, how do you rate the effectiveness of using graphic tools for design and communication?

(Significantly Worse - Worse - Same - Improved - Significantly Improved)

3.Challenges Encountered
What challenges did you encounter while using the graphic design tool? Please list specific examples.

4.Tool's Feature Coverage
Do you think the graphic design tool covers all the necessary features to meet design needs? If not, please specify the missing features.

5.Continued Use or Inspiration
Do you envision continuing to use this graphic design tool in your future projects?

How has this tool inspired changes or innovations in your design approach?

6.Improvements and Feedback
Do you have any suggestions for improvement or feedback on the graphic design tool and the user testing process?

Thank you for participation ;) !