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Designing a Design Thinking Workshop for HCI Skill Development among Young People within the EU Union of Skills Framework

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Abstract

Developing the skills of youth, especially in the field of Science, Technology, Engineering, and Mathematics (STEM) is a priority of the European Commission's Union of Skills strategy, yet little is known about how short, hands-on design thinking workshops can support Human-Computer Interaction (HCI) skills among non-designers from different cultural backgrounds. This thesis investigates how a design thinking workshop aligned with the Union of Skills strategy can support HCI skill development among young people, and how the experience differs between participants from Europe and the Global South (developing economies according to the United Nations Conference on Trade and Development (UNCTAD) classification).

A formative study (n = 56) identified the skills respondents (mostly aged 18–29) wanted to learn the most, with creative thinking and design thinking chosen the most. Based on these results, a three-hour, in-person design thinking workshop was designed around the Stanford *d.school* Design Thinking Process and the Digital Society School (DSS) Design Method Toolkit, using loneliness among youth as the design challenge.

The workshop was run with 14 participants, of which seven were classified as European and seven as Global South, across three sessions. A mixed-methods evaluation combined a pre- and post-workshop self-assessment questionnaire with open-ended questionnaire responses and voice notes, which were analyzed using thematic analysis. Self-assessed scores increased on all eight Likert scale-questionnaire items for both groups.

Qualitatively, creative thinking was the key Union of Skills competence participants consistently reported having practiced, while digital skills were reported the least, attributed to the paper-based format. Relocation, rather than cultural background alone, was noted by several participants as a reason for why loneliness felt relevant, and the participants widely described the Empathize phase as challenging, either because it felt emotionally demanding or because it was cognitively demanding. The Empathy map caused synthesis difficulties for several participants, and the toolkit's time estimates were longer than the time available in the workshop.

Given the small population size and the absence of a control group, the findings of this study are exploratory. They suggest that design thinking workshops can be adjusted for non-designer youth across cultural contexts and inform their design, and give concrete guidance for revising the toolkit.

Keywords

Design thinking, Human-Computer Interaction, Union of Skills, Card-based toolkit, Youth loneliness, Cross-cultural

Sammanfattning

Att utveckla ungdomars färdigheter, särskilt inom STEM, är en prioritet i Europeiska kommissionens strategi för kompetensunionen, men lite är känt om hur korta, praktiska design thinking-workshops kan stödja HCI-färdigheter bland icke-designers från olika kulturella bakgrunder. Denna avhandling undersöker hur en design thinking-workshop i linje med Union of Skills-strategin kan stödja HCI-kompetensutveckling bland unga, och hur upplevelsen skiljer sig mellan deltagare från Europa och det globala syd (utvecklingsekonomier enligt UNCTAD:s klassificering).

En formativ studie (n = 56) identifierade de färdigheter som respondenterna (främst i åldern 18–29 år) ville lära sig mest, där kreativt tänkande och designtänkande valdes mest. Baserat på dessa resultat utformades en tre timmar lång workshop i design thinking på plats kring Stanford *d.school* Design Thinking Process och DSS Design Method Toolkit, där ensamhet bland ungdomar användes som designutmaning.

Workshopen hölls med 14 deltagare, varav sju klassificerades som europeiska och sju som det globala syd, fördelade på tre sessioner. En mixed-methods-utvärdering kombinerade ett självbedömningsformulär före och efter workshopen med öppna frågeformulär och röstanteckningar, vilka analyserades med tematisk analys. Självbedömda poäng ökade på alla åtta Likertskalans frågeformulär för båda grupperna.

Kvalitativt var kreativt tänkande den kompetens inom Union of Skills som deltagarna konsekvent rapporterade att de övat, medan digitala färdigheter rapporterades minst, vilket tillskrevs pappersformatet. Flytt, snarare än enbart kulturell bakgrund, nämndes av flera deltagare som en anledning till varför ensamhet kändes relevant, och deltagarna beskrev i stor utsträckning Empathize-fasen som utmanande, antingen för att den kändes känslomässigt exponerande eller för att den var kognitivt krävande. Empatikartan orsakade syntessvårigheter för flera deltagare, och verktygslådans tidsuppskattningar var längre än den tid som fanns tillgänglig i workshopen.

Med tanke på den lilla populationsstorleken och avsaknaden av en kontrollgrupp är resultaten från denna studie utforskande. De föreslår att design thinking-workshops kan anpassas för ungdomar utan designer över kulturella kontexter och informera deras design, samt ge konkreta riktlinjer för att revidera verktygslådan.

Nyckelord

Design thinking, Människa-dator-interaktion, Union of Skills, Kortbaserad verktygslåda, Ungdomsensamhet, Tvärkulturell interaktion

Samenvatting

Het ontwikkelen van de vaardigheden van jongeren, vooral op het gebied van STEM, is een prioriteit van de Union of Skills-strategie van de Europese Commissie, maar er is weinig bekend over hoe korte, hands-on design thinking workshops HCI-vaardigheden kunnen ondersteunen bij niet-ontwerpers afkomstig uit verschillende culturele achtergronden. Deze scriptie onderzoekt hoe een design thinking workshop, die aansluit bij de Union of Skills-strategie, de ontwikkeling van HCI-vaardigheden onder jongeren kan ondersteunen, en hoe de ervaring verschilt tussen deelnemers uit Europa en de Global South (ontwikkelingseconomieën volgens de UNCTAD-classificatie).

Een formatieve studie (n = 56) identificeerde de vaardigheden die respondenten (voornamelijk tussen 18 en 29 jaar oud) het meest wilden leren, waarbij creatief denken en design thinking het meest werden gekozen. Op basis van deze resultaten werd een fysieke, drie uur durende design thinking workshop ontworpen rond het Stanford *d.school* Design Thinking Process en de DSS Design Method Toolkit, waarbij eenzaamheid onder jongeren als ontwerpuitdaging werd gebruikt.

De workshop werd georganiseerd met 14 deelnemers, waarvan er zeven als Europees en zeven als Global South werden geclassificeerd, verspreid over drie sessies. Een mixed-methods-evaluatie combineerde een zelfevaluatievragenlijst die voor en na de workshop ingevuld werd met open antwoorden en spraaknotities, die werden geanalyseerd door middel van een thematische analyse. Zelfbeoordeelde scores stegen op alle acht Likert-schaal-vragenlijstitems voor beide groepen.

De kwalitatieve resultaten toonden aan dat de Union of Skills-competentie 'creatief denken' voornamelijk consequent geoefend is door de deelnemers, terwijl de competentie 'digitale vaardigheden' het minst werd gerapporteerd, wat werd toegeschreven aan het papieren format van de workshop. Verhuizing, in plaats van alleen culturele achtergrond, werd door verschillende deelnemers genoemd als reden waarom eenzaamheid relevant aanvoelde, en de deelnemers beschreven de Empathize-fase vaak als uitdagend, omdat het ofwel emotioneel blootstellend ofwel cognitief veeleisend aanvoelde. De Empathiekaart veroorzaakte syntheseproblemen voor verschillende deelnemers, en de tijdsindicaties van de toolkit waren langer dan de beschikbare tijd in de workshop.

De kleine populatiegrootte en het ontbreken van een controlegroep, maken de bevindingen van deze studie verkennend. De bevindingen suggesteren dat design thinking workshops aangepast kunnen worden voor niet-designer jongeren in verschillende culturele contexten en kunnen het ontwerp van

design thinking workshops informeren, en geven concrete richtlijnen voor het herzien van de gebruikte toolkit.

Trefwoorden

Design thinking, Mens-computer interactie, Union of Skills, Kaartgebaseerde toolkit, Eenzaamheid onder jongeren, Crossculturee l

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List of acronyms and abbreviations

AES	Adult Education Survey
AI	Artificial Intelligence
DSS	Digital Society School
EU	European Union
HCD	Human-Centered Design
HCI	Human-Computer Interaction
HEI	Higher Education Institution
hi-fi	high fidelity
HRI	Human-Robot Interaction
ISK	Inventar Sozialer Kompetenzen
KTH	KTH Royal Institute of Technology
lo-fi	low fidelity
MVP	Minimum Viable Product
OECD	Organisation for Economic Co-operation and Development
PISA	Programme for International Student Assessment
POV	point-of-view
STEAM	Science, Technology, Engineering, Arts, and Mathematics
STEM	Science, Technology, Engineering, and Mathematics
UI	User Interface
UNCTAD	United Nations Conference on Trade and Development
UX	User Experience
VET	Vocational Education and Training

Chapter 1

Introduction

Developing the skills of young people, especially in the fields of Science, Technology, Engineering, and Mathematics (STEM), is a priority of the European Commission's Union of Skills framework [1, 2]. Introduced in March 2025 [3], the framework aims to address skills and labor gaps that affect the European Union (EU) in the areas of innovation, productivity, and competitiveness [1]. Basic skills are a concern central to this framework: active citizenship is a basic skill, as well as a lifelong learning aim listed [4], together with basic digital skills, which the European Commission reports as lacking in nearly half of young people in Europe [2]. Non-formal education, which is typically delivered through short courses, workshops, or seminars [5], is acknowledged as a suitable format to expand skills with [1] and is recognized as essential for young people's skill development by the EU Youth Strategy 2019–2027 [6].

Design thinking is a creative, iterative, human-centered problem-solving process that can be applied to problems from any discipline [7]. Design thinking and Human-Computer Interaction (HCI) are increasingly viewed as overlapping yet complementary to each other [8, 9], which makes design thinking relevant to HCI skill development. Studies have applied design thinking with non-designers [10, 11, 12, 13], but were mainly situated in higher education settings [14], and literature on how to facilitate design thinking for non-designers remains limited [10]. Card-based design method toolkits can offer structure to the design process [15], yet the Digital Society School (DSS) Design Method Toolkit [16] has appeared in only two papers in academic literature [17, 18] and had not been evaluated in a design thinking workshop. At the same time, HCI research, practice, and education are unevenly distributed globally, with the production of knowledge being

concentrated in the Global North [19, 20]. This is not only a matter of visibility, as culture and context also shape how HCI is taught and practiced [19, 21], which means that HCI skill development cannot be assumed to translate uniformly across regions. However, little is known about how short, hands-on design thinking workshops can support HCI skills among non-designers from different cultural backgrounds.

This thesis aims to address this gap by designing, facilitating, and evaluating a three-hour design thinking workshop for non-designer young adults from Europe and the Global South (the developing economies in the United Nations Conference on Trade and Development (UNCTAD) classification [22], see Section 3.7), based on the Stanford *d.school* Design Thinking Process [23] and the DSS Design Method Toolkit [16]. Loneliness among young people was chosen as the design challenge, as the Joint Research Centre reports it as an issue more prevalent among youth and it having more than doubled among 18-25 year-olds between 2016 and spring 2020 [24]. The workshop's focus was informed by a formative study (n = 56, of whom 52 were within the 18–29 target age range), in which creative thinking, followed by design thinking were the skills respondents were interested in learning the most. This research was conducted in collaboration with BøthOfUs AB, a Swedish company working on soft skill development to empower youth, which planned to offer the workshop as part of a wider skills training program. The overarching research question of this study is: *how can a design thinking workshop, aligned with the Union of Skills framework, effectively support HCI skill development among young people aged 18–29 from different cultural backgrounds?* The following sub-research questions guide this research:

- **sub-RQ1**: How should a design thinking workshop be structured to introduce design thinking to non-designer young adults aged 18–29?
- **sub-RQ2**: Does participation in the design thinking workshop produce measurable improvement in the perceived HCI skill competencies of the participants?
- **sub-RQ3**: How does the workshop experience and skill development differ between participants from Europe and the Global South?
- **sub-RQ4**: How does the workshop align with the skill development priorities that the EU Union of Skills strategy proposes?

To address these questions, a mixed-methods approach was adopted. The workshop was developed from scratch and run in three sessions with 14

participants, seven classified as European and seven as Global South following the UNCTAD classification [22]. It was evaluated through a pre- and post-workshop Likert-scale self-assessment, analyzed with descriptive statistics due to the low sample size, and through open questionnaire questions and voice notes, analyzed through a thematic analysis following Braun and Clarke's [25] thematic analysis framework. The comparison between the two groups is made at an anecdotal level. The study focuses on non-designer youth aged 18–29, instead of the official age range of youth of 15–29 years old according to the European Commission [2], as including minors can pose additional ethical concerns [26]. The workshop was facilitated at KTH Royal Institute of Technology (KTH) in Stockholm and included a design thinking process, a method toolkit, and a design challenge. Of the competences in the Union of Skills framework, only the four, which are named in one of the voice note questions, are examined: critical thinking, digital skills, creative thinking, and civic competences. Skill development is measured as perceived competence through self-assessment, without a control group, skill tests, or follow-up beyond the voice notes, making the findings exploratory. Participants are reported by participant number only.

This thesis presents a workshop design, the first evaluation of the DSS Design Method Toolkit in a design thinking workshop to the extent identified in existing literature, and guidance for facilitators, educators, and organizations offering non-formal skills training to young adults on how to structure similar workshops and how to use the toolkit in time-constrained settings.

The thesis is structured as follows: Chapter 2 presents background information on the Union of Skills, design thinking, design method toolkits, and design facilitation. Chapter 3 describes the methodology behind the formative survey, the design of the workshop and its evaluation, and the data analysis. Chapter 4 presents the results, and Chapter 5 discusses them per sub-research question, reflects on facilitation in practice, and discusses the limitations. Chapter 6 concludes the thesis with suggestions for future work.

Chapter 2

Background

This chapter provides information from existing literature on the relevant topics of this research. The sub-chapters discuss the Union of Skills policy (Section 2.1), design thinking (Section 2.2), design method toolkits (Section 2.3), design facilitation (Section 2.4), and the general state-of-the-art (Section 2.2.3).

2.1 Union of Skills framework

2.1.1 Origins and policy context

In March 2025, the European Commission introduced a novel framework called the Union of Skills [3]. The framework was developed to address the current challenges the EU faces that have an adverse impact on the innovation, productivity, and overall advancement of the EU and the EU's competitiveness on the global stage [1].

One of the main challenges the EU is currently facing is the lack of skilled people needed for the available positions on the job market, resulting in both skills and labor gaps [1]. The need for skilled talent in the field of STEM is a growing challenge in particular [2]. Within STEM, the digital technologies sector is named a strategic sector facing this challenge in particular, as the European Commission notes that nearly half of young people in Europe lack basic digital skills [2]. In general, inadequacy in skills can be identified throughout all age ranges and levels of education in the EU. Statistics from the most recent Programme for International Student Assessment (PISA) report published by the Organisation for Economic Co-operation and Development (OECD) show that the performance of the basic

subjects of science, mathematics, and reading is declining among 15-year-olds [27]. Furthermore, the current job market also lacks laborers in occupations that are typically performed by citizens with a Vocational Education and Training (VET) background [1], that is, education and training that prepares people for particular occupations. There is a widespread need for skilled workers to work in the crafts sector, which is a competency taught mainly in VET [1]. Additionally, VET laborers who possess green skills are needed to support the EU's environmental efforts [1].

Out of all the educational levels, the job market is expected to mostly consist of jobs for which a higher education level is needed, with more than half of the vacancies in 2035 requiring high level skills [1]. However, the European population will not be able to fulfill the demand, as not enough high skilled workers will exist to fill the available positions [1].

As many fields experience changes over time, it is of importance that the European population continuously improves and broadens their skill set, not only during formal education, but also afterwards. The concept of learning and improving skills throughout the entirety of life is termed as 'lifelong learning', with the term 'adult learning' being used to refer to lifelong learning as an adult [28]. Adult population is defined by Eurostat as adults of 25–64 years old [4]. The most recent Adult Education Survey (AES) (2022) conducted by Eurostat shows that less than half of the adult population in the EU had participated in education or training in the past 12 months [4]. Between age groups, education level, and whether the EU citizen is employed or not, vast differences can be identified as well [4].

Shown in Figure 2.1, the Eurostat survey indicates that people of ages 25–34 participate the most in adult learning of all age groups [4]. Furthermore, the employed adult population actively learns almost twice as much as unemployed counterparts and more than twice as much as citizens outside the labor force [4]. Additionally, almost 70% of individuals who graduated from the highest level of education participate in adult learning, which is the highest percentage across all three categories [4].

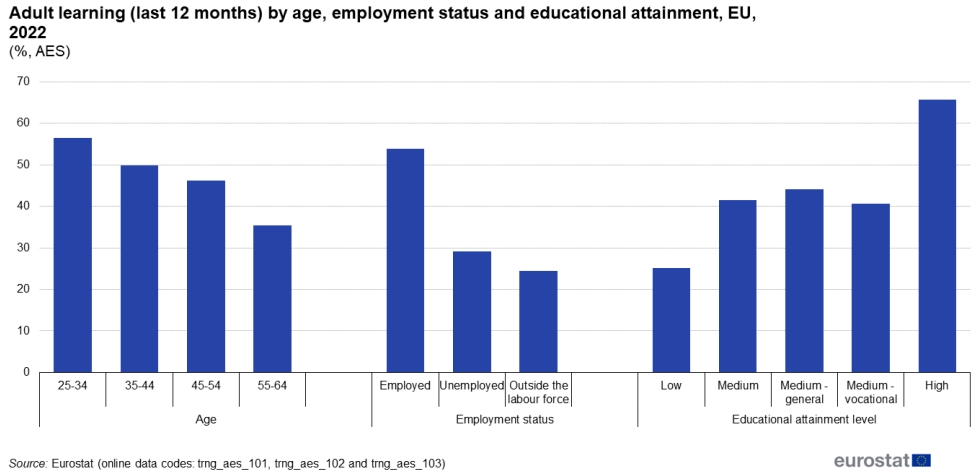


Figure 2.1: Adult learning by age, employment status and educational attainment in the EU in the last 12 months (2022) [4]

Several major skills gaps exist in the EU. One of the most alarming gaps concerns the safety of the EU. In crisis situations, the EU risks being unable to mobilize a sufficiently skilled workforce, as current skill scarcity has reached a concerning level [4]. Furthermore, a global gap is seen in talent attraction. North America and Australia attract more non-EU nationals than the EU [29]. Additionally, the EU often fails to retain its talent, with many moving out the region to pursue more favorable positions elsewhere [4]. Another issue is that innovation in the EU is restrained by Europeans' insufficient entrepreneurship and finance skills, as well as the lack of women in the field of STEM [4].

The second main agenda point of the Union of Skills policy is solving the problem of current education not adapting quickly enough to the rapid changes taking place in the economy and labor market [1]. As a result, the skill sets of EU citizens are not evolving rapidly enough to fill urgent demands of strategic sectors, particularly in sectors that require STEM knowledge [4].

A third issue is the lack of coordination in governance [4]. Domains such as education, finance, economy, and labor all have implications towards the Union of Skills policy through their respective institutions and ministries [4]. This complicates coordinated action, as priorities are often not aligned [4].

To address the ongoing challenges and issues, three main objectives have been formulated by the European Commission, namely:

1. Empowering Europeans to build solid skills foundations and engage in lifelong upskilling and reskilling

2. Supporting companies to be competitive
3. Making skills and qualifications trusted, transparent, and recognized (regardless of where in Europe they are acquired)

The Union of Skills framework, a structured four-step model, was created to achieve these objectives.



Figure 2.2: Key strands of the Union of Skills [2]

As shown in Figure 2.2, *'Building skills for quality lives and jobs'* is the first step and the basis towards tackling the current challenges faced by the European Union. Once the foundations for the necessary basic skills are created, the next step is to uphold the quality of the skill set by teaching relevant, emerging skills, with a focus on skills needed for the green and digital transition in particular [4]. The third step is to assure that skill sets across the EU will be widely improved to maintain competitiveness across the region [4]. Maintaining competitiveness is paramount to driving innovation and economic success and stability [4]. The final step is to upkeep and continue evolving the existing EU talent, as well as attracting new talent from outside the EU [4].

2.1.2 Key skills and competencies priorities

The Union of Skills prioritizes skills and competencies in several areas. The policy puts an emphasis on assuring that all EU citizens master basic skills, in which an increasing number of citizens currently underperform [4, 27]. These include numeracy, literacy, science, and digital skills [4]. The aim is to reduce inadequacy in basic skills to less than 15% by 2030 [4]. Additionally, active citizenship is seen as an important basic skill, being listed as one of the aims of lifelong learning by the EU [4].

Furthermore, STEM-related skills are heavily addressed in the Union of Skills. The pace of technological innovation is rapid, and Europe will likely be unable to compete at the same speed due to European talent in the STEM fields continuously declining [1]. In particular, attention should be paid to educating and training Europeans in the emerging field of Artificial Intelligence (AI) to increase people's awareness and literacy about the topic [1]. Additionally, STEM methods that include the arts (Science, Technology, Engineering, Arts, and Mathematics (STEAM)) and combine this set of disciplines across traditional subject boundaries will also be supported [1]. STEAM methods promote creative thinking, which according to the World Economic Forum's 2025 Future of Jobs report, is one of the most important skills to currently possess, with 57% of surveyed employers indicating that creative thinking is a core skill they seek after [30]. Its importance will remain in the coming years [30].

Additionally, VET-skills are within the shortages highlighted by the Union of Skills policy. Specifically in the crafts industry an alarming shortage is experienced in the EU, encompassing two thirds of the shortages [1].

The EU also needs to innovate more. Entrepreneurial and financial competencies are primary skills that enable Europeans to make investments and contribute to innovation [1].

Furthermore, the EU should equip its citizens with competencies used in the strategic sector context [1]. These competencies consist of green/climate-related skills, which are critical in supporting the green transition and circular economy, as well as cybersecurity and defense, among others [1].

Lastly, the shortage in teachers and academic staff prompts the Union of Skills policy to call for making the field more appealing, but to also future-proof teachers' skills [1]. The focus is specifically on teachers' digital skills, as a mere 40% are equipped with the skill set to implement digital technologies into their teaching practices [1].

2.1.3 Relevance to non-formal education and youth

While the Union of Skills policy mainly puts an emphasis on formal education and training, it also acknowledges that non-formal education initiatives and informal learning are suitable options to expand the skill set and knowledge of EU citizens [1]. Non-formal education is defined by the UNESCO Institute for Statistics as "education that is institutionalized, intentional and planned by an education provider" [5]. A distinctive aspect of non-formal education is that it is provided as a supplement to formal education that supports lifelong learning [5]. Initiatives tend to be short in duration, often delivered through workshops, short courses or seminars [5]. Despite being institutionalized, it does not necessarily entail that the participant acquires a recognized qualification [5]. On the other hand, informal learning is characterized by being non-institutionalized, and not as structured and organized as non-formal education [5].

The EU has further reinforced the role of non-formal education for youth specifically in its EU Youth Strategy 2019–2027 [6]. In the strategy, non-formal education and youth work are recognized as essential for young people's skill development and stimulate social inclusion, positioning non-formal learning as a vital part for skill development of European youth [6].

A currently existing issue regarding non-formally acquired skills is the lack of acknowledgment towards them [1]. The Union of Skills policy aims to work towards broadening the recognition towards skills gained through non-formal education across EU borders and outside the EU.

2.2 Design thinking

2.2.1 Origins and definitions

Design thinking is a creative, iterative, human-centered problem solving approach [7]. The conceptual foundations of design thinking combine various fields of study in addition to design, such as social sciences and engineering [7]. The approach emerged as an alternative to existing, rational problem-solving methods [7]. While rational approaches and design thinking both rely on critical thinking, creativity has a central role in the design thinking process [7].

Early ideological contributions towards the concept of design thinking emerged in the 1960s and throughout the remainder of the twentieth century [31]. With discussions initially mainly covering the methods designers use

to design, the focus progressively moved towards understanding the train of thoughts behind carrying out design [31]. Before exploring design thinking, however, it is necessary to first establish what design is as a discipline. Initial contributing efforts towards understanding and defining design include the philosophies of psychologist and sociologist Herbert Simon and design theorist Christopher Alexander, with both having different views on the practice [31]. Simon argued that design is a universal way of thinking that shapes existing situations into preferred ones [31]. On the other hand, Alexander viewed design as fundamentally concerned with forming artifacts [31]. One of the first introductions of the term 'design thinking' appeared through the 1987 book *Design Thinking* by Peter Rowe [31]. Rowe produced the initial foundations of the approach through discussions and principles, highlighting that the problem-solving element of the design process itself subsequently forms the solution [31]. The 1992 academic paper *Wicked Problems in Design Thinking* by Richard Buchanan played a central role in formalizing the concept of design thinking, reinforcing the shift towards detaching the approach from the specific contexts it initially emerged from [31]. The concept further developed throughout the 1990s and the 21st century [31].

As of today, several structured design thinking processes exist, including the Design Thinking Process, developed by the Hasso Plattner Institute of Design at Stanford (commonly known as Stanford *d.school*) [23], the Design Council's "Double Diamond" model [32], former IDEO CEO Tim Brown's "three spaces of innovation" [33], and IBM's "the Loop" model [34]. The Stanford *d.school* 5-step model (Figure 2.3) is one of the most established design thinking processes [23]. This model consists of five steps, also known as 'modes', which are carried out in the following order: Empathize, Define, Ideate, Prototype, and Test [23].

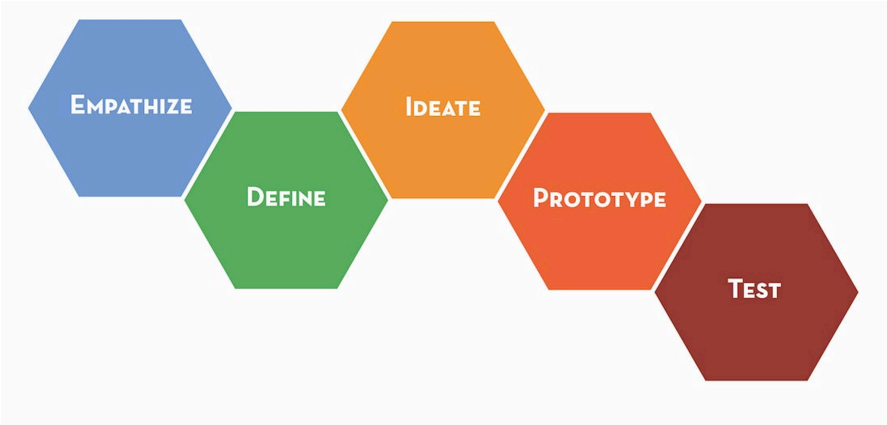


Figure 2.3: The Stanford *d.school* 5-step Design Thinking Process [23]

The first step commences by empathizing with the target user(s) to understand their thoughts, actions, and their needs within the problem context [23]. In this phase, the designer relies on divergent thinking, which Guilford [35] describes as the process of searching or going off in multiple directions, without a single expected conclusion. Empathizing surfaces deeper underlying insights, which often surprise the person being observed as much as the designer [23]. A transitional step between the Empathize phase towards the next phase is to synthesize the insights, often visualizing the information collected [23].

Thereafter, the designer goes to the Define phase. In this phase, the findings and observations from the Empathize phase are analyzed to identify patterns and key takeaways. Thus, the focus of the design process is narrowed down [23]. Here the designer thinks in a convergent manner, in which thinking is channeled toward a single, unique conclusion [35]. In this case, this is done by formulating a point-of-view (POV) statement, which is the main objective of the Define phase [23]. A POV states the problem that is specific enough to act on and is grounded in the collected evidence [23]. The Stanford *d.school* argues that the more precise the POV is, the better the quality and higher the number of the ideated solutions is in the Ideate phase [23].

Once the focus is defined, the next step is to ideate as many solutions as possible without the quality of the ideas being a concern [23]. This is the main activity of the Ideate step, which allows the designer to incorporate their creativity along with their unique understanding of the targeted user group [23]. Before diving into this step, a recommended transitional step between the Define and Ideate step is to pinpoint subtopics that can be explored based on the formulated POV statement [23].

During the Ideate phase, solutions can then be brainstormed for each of these topics [23]. Various ideation methods can be utilized to generate ideas, such as brainstorming, mind mapping, and drawing sketches [23]. An important aspect of the ideation process is to think in an innovative and outside-the-box manner, and not necessarily within the boundaries of reality [23]. Before progressing to the Prototype phase, it is advised to think of three criteria to measure the ideas that resulted from the ideation phase against. With that, they are considered whether to be carried forward into the Prototype phase [23]. The designer(s) have the freedom to decide on the voting criteria themselves, but a criterion could for example be "the most innovative idea" [23]. The one or two ideas that received the majority of the votes will be focused on in the next phase [23]. This small transitional step of reasoned selection maintains the innovation potential, instead of directly converging on one option [23].

In the Prototype phase, several prototypes are made towards the favored ideas from the Ideate phase [23]. A prototype is defined by Houde and Hill [36] as "any representation of a design idea, regardless of medium". Prototypes are usually made rapidly and with low-cost materials in the early stages of prototyping (low fidelity (lo-fi) prototypes), gradually becoming more robust and refined in the later stages of prototyping (high fidelity (hi-fi) prototypes) [37]. Prototypes can be made through virtually any medium (ex. cardboard, role-playing, technology), as long as it is possible to interact with [23]. Several aspects that are important to keep in mind in this phase are, for example: to be mindful of what exactly is aimed to be tested in each prototype; to not dedicate too much time to each prototype; and to prototype with the end user in mind [23]. Furthermore, as the Prototype phase and the Test phase go hand in hand, it is of value to determine what elements are intended to be tested and how, ideally before starting to develop the prototype iteration [23].

In the Test phase, designers can gain swift feedback from users and other stakeholders by presenting the prototypes for them to interact with [23]. An iterative cycle of receiving feedback and crafting another version of the prototype is pursued between the Prototype and Test phases [23]. The positive and negative aspects of the prototype that are communicated through this feedback serve as useful information to the designer, who subsequently learns which features to keep in future iterations, and which points of improvement need to be targeted [23]. Preferably, the prototype is tested in a way that fully immerses the user into the intended user experience. This can be achieved by suggesting possible use scenarios or presenting the prototype in a certain context or related (physical) environment [23]. A unique aspect of the Test

phase is that new user information can emerge through the testing, fostering the feeling of empathy of the designer with the user [23]. Alternatively, the phase may also reveal that the problem initially perceived was, in reality, not the true problem [23]. In this case, the designer must reframe the problem and correct their POV [23]. A good measure to follow during the Test phase is to let the user explore the prototype without clarifying too much [23]. The user's instinctive actions, emotions, and remarks pose valuable information to the designer [23]. Another action recommended to designers is to prompt users to compare the presented prototypes to one another, which is another strategy to surface unrevealed needs [23].

As previously acknowledged, a prominent continuous cycle exists between prototyping and testing. However, iteration does not merely exist between these two steps. The entirety of the design process cycle can be iterated through as many times as needed [23]. Stanford *d.school* emphasizes that although the cycle is presented as a structured 5-step process, the designer has the freedom to adjust and alternate the process at their discretion [23].

Design thinking can be applied to a wide range of intricate problems from any discipline [7]. The approach is especially suitable for problems in which there is uncertainty surrounding either the problem or solution [7]. However, some scholars argue that what design thinking can achieve should not be overstated. In an expert essay, Denning [38] indicates that design thinking is often claimed to be a catalyst for innovation, and suggests that design thinking is indeed linked to innovation, but that using the approach does not explicitly result in innovation [38]. On the contrary, Denning rather views the method as a tool that primarily supports the ideation stage of the problem solving process of innovation [38]. In reality, innovation relies on whether a community decides to embrace a novel practice, typically built around the developed process or artifact [38]. Denning notes that adoption of a novel practice accounts for 90% of the work, while the ideation phase, in which design thinking plays a central role, accounts for 10% of the innovation process [38]. Although collaborative design teams can accelerate innovation during the ideation stage, design teams are often not involved with the other teams responsible for the adoption that drive innovation [38]. This suggests that while design thinking is a valuable approach for idea generation, it cannot singularly solve the challenge of innovation [38].

2.2.2 Design thinking as an HCI competency

HCI and design thinking have been increasingly compared to each other as overlapping, but distinct, design processes. Culén and Følstad [8] indicate that HCI design processes are often criticized for mainly producing incremental innovation, while design thinking has emerged as a process oriented more towards fundamental, breakthrough innovation, creating an interest in how they can inform each other. Park and McKilligan [9] compared HCI to design thinking processes in a systematic literature review, through which they determined that the two share process phases but differ in underlying goals, suggesting that the two domains can complement each other, rather than substitute each other. This overlap creates a space in which design thinking is not separate from HCI practice, but as a process increasingly integrated into it instead, relevant to the skill development this thesis explores.

2.2.3 Design thinking for non-designers

A growing body of work explores how design thinking can be applied by and taught to individuals outside the traditional design field from various age groups. However, studies are mainly directed towards higher education settings, with studies focusing on primary and secondary education slowly emerging [14]. Guaman-Quintanilla et al. [10] express that despite the increasing popularity of design thinking, literature describing how to facilitate the practice to non-designers specifically is limited, not only in how to teach the approach, but also on how to enhance the 21st century competencies that design thinking is supposed to build among students [10]. These competencies include creativity, problem solving, and teamwork, among others [10].

Henriksen et al.'s [11] study addressed this gap in the context of teacher education [11]. Graduate-level educators applied the Stanford *d.school* 5-step design cycle to self-selected problems of practice from their own teaching contexts in a semester-long online course developed and taught by the researchers [11]. Results showed that each of the five phases were deemed as helpful to their profession in various ways [11]. The Empathize phase aided the educators in understanding how to empathize with their students, increased their awareness regarding their assumptions, and how to utilize empathy in any issue and context [11]. Defining the problem made the participants view the issue from numerous perspectives and a more thorough comprehension of the problem, and ideating was perceived as a useful tool to utilize in their own classrooms [11]. Prototyping and testing were characterized by students recognizing that creativity fuels risk-taking, and that the failures that take place

during the process are beneficial to solving the issue [11]. Additionally, the educators noted that the design thinking testing method was more effective than other traditional educational testing methods currently being used [11].

Another study by Morehen et al. [12] portrays some of the difficulties that can emerge during design thinking among non-designers. The research explores how undergraduate non-design students from various disciplines can be taught design thinking [12]. The design thinking intervention consisted of a two-hour workshop, facilitated by postgraduate design students [12]. Valuable insights on the challenges and benefits of such an intervention emerged through the case study [12]. According to observations of the facilitators, the non-designers had difficulties with framing the problem and understanding what the boundaries were regarding the scope of the project [12]. Moreover, non-designer students had trouble adhering to following the initial steps of the design thinking process that take place prior to ideating solutions, which is an inherent part of design thinking [12]. The students were too focused on thinking of what the outcome could be, resulting in dedicating less attention to the process as a whole [12]. Many students also struggled with fear of failure, which caused hesitation throughout the steps of the process [12]. However, prototyping made participants aware of the advantages of experiencing failure early in the development of the project [12]. Furthermore, the cross-disciplinary nature of the collaboration also posed negotiation difficulties, with unclear leadership roles and uneven participation across disciplines being experienced across the teams [12]. However, these challenges gradually evened out over the course of the activities [12]. Additionally, non-designers tended to find it challenging to think non-linearly and from different perspectives, especially from an empathetic one [12]. Despite the challenges, the participants recognized the value of several core design thinking principles, such as prototyping and early testing being acknowledged as beneficial to the project's success, as well as broad, exploratory thinking before narrowing down to solutions [12]. Collaboration and working in a multidisciplinary team were also highlighted as valuable experiences [12].

Guaman-Quintanilla et al. [10] conducted their own semester-long design thinking course with first-year non-design university students, from which results further aligned with these findings. The students followed a design thinking model that was a hybrid of the Stanford *d.school* 5-step process and the Design Council's "Double Diamond" model, consisting of six steps (Research, Empathize, Define, Ideate, Prototype, and Validate) [10]. Out of the six phases, students highlighted that the Prototype phase was the most

pleasant, and the Define and Validate the least [10]. This experience with the Define and Validate stages can be attributed to the convergent thinking necessary in these stages, with the processes of synthesizing information and decision-making in both steps causing a higher cognitive load to occur [10]. Nonetheless, the high average perceived skills improvement across all six skills evaluated (human-centered problem-solving, creativity, prototyping and validating, teamwork, communication, and getting out of the comfort zone) indicated that utilizing design thinking improved students' ability to creatively work on human-centered problems in a collaborative setting [10].

A younger demographic of non-designers aged 14-16 was studied by Noweski et al. [13], who compared the effects of design thinking and another hands-on, experience-based teaching approach on 21st century skill development. Through a standardized questionnaire (the "Social Competencies Inventory", also known as the *Inventar Sozialer Kompetenzen (ISK)*), the social competencies of the students were evaluated before and after the workshop [13]. The questionnaire evaluated competencies such as perspective-taking, emotional stability, and assertiveness [13]. ISK gain-scores revealed that students in the design thinking condition experienced more favorable gains than students in the other condition across 18 of the 21 ISK metrics, with statistical significance favoring design thinking measured on the Reflexibility, Self-Monitoring, Direct Self-Attention, and Self-Expression scales [13]. Additionally, between the two approaches, the teachers of both student groups expressed a preference towards the design thinking approach [13]. Average scores indicated that the teachers perceived design thinking as a more valuable approach than the comparison approach and were more likely to facilitate design thinking in future teaching [13]. Overall, students also rated the design thinking method more positively than the other approach [13]. The study suggests that the practice of design thinking does not only benefit non-designers following higher education, but also younger students engaging with the approach for the first time [13].

These four studies illustrate that design thinking can be successfully taught to individuals outside the design field from varying ages, having many positive implications towards the development of relevant skills and competencies, including creativity, problem-solving, and communicating in a team setting. However, non-designers may initially have to work through challenges, such as learning to accept failure [11, 12], convergent decision-making [10], and communicating within an interdisciplinary team [12], before recognizing the benefits of design thinking.

2.2.4 HCI in cross-cultural contexts

HCI research, practice, as well as education, are still unevenly distributed globally, as the knowledge produced in the field is mainly concentrated in the Global North [19]. For Latin America for example, which is considered as part of the Global South the numbers reflect this at major HCI conferences for example, where merely 0.5% to 1.2% of the attendees are from Latin America, despite the region's size and technological relevance [20]. Reynolds-Cuéllar et al. [20] pinpoint this as a structural pattern, as HCI practice in and about the Global South is defined by limited institutional funding, research publication norms differing from those in the Global North, and general difficulties on a socio-political and economic level, resulting in research efforts remaining widely invisible to the rest of the field internationally. It is argued by the authors that the HCI field should become a "pluriverse" instead, in which heterogeneous and contrasting regional practices are also viewed as valid, rather than measured against the Global North-centric standard [20].

Apart from research visibility, culture and context also extensively shape how HCI is taught and practiced. Winschiers-Theophilus and Bidwell [21] argue that the dominant HCI paradigms remain rooted in Western theory of knowledge, and offer an Afro-centric alternative, in which HCI concepts and methods are developed by local practices rather than adapted from existing, externally adopted frameworks. Alvarado García et al. [19] also raise questions about the influence of the Global North on Latin Americans, specifically on the topic of technology, calling for a better understanding of how technologies developed predominantly in the Global North are appropriated by Latin Americans that in turn mediated their culture, relations, and communication, among others.

These papers suggest that, especially with the Global North having an overpowering presence in the HCI field, the vast differences between culture and context outside the Global North do not translate uniformly across regions, which thus will also not in the case of HCI skill development, and generally must also be considered more within the field. This motivates the comparative focus of this thesis, between Europe and the Global South.

2.3 Design method toolkits

2.3.1 Card-based design tools: landscape and typology

The history of card-based design tools can be traced back to Charles and Ray Eames' *House of Cards* (1952), consisting of imagery of Eames' favorite items, which aimed to boost designers' creativity and promote innovative thinking [15]. Thereafter, many other card decks followed, that were directed towards supporting designers in problem solving and creative thinking, such as the *Meta Cards* (1972) created for a university design course, as well as the renowned *Oblique Strategies* (1975) deck (Figure 2.4) by acclaimed musician Brian Eno and artist Peter Schmidt [15].

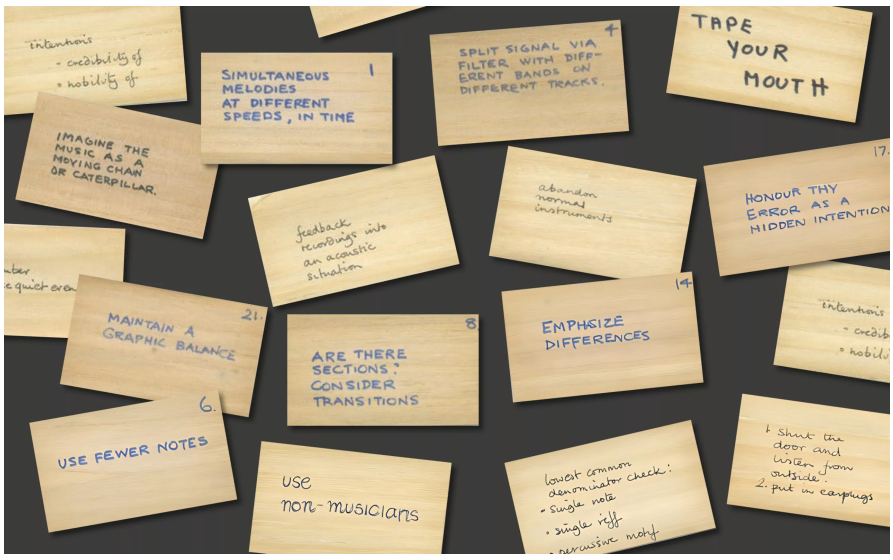


Figure 2.4: Several cards from the early handwritten version of *Oblique Strategies* (1975) by Brian Eno and Peter Schmidt [39]

During the 1990s, a rise in card-based tools for participatory IT system design was seen, including Bell Labs' *CARD* (Collaborative Analysis of Requirements and Design), which was adopted by Microsoft, and of which various adaptations followed, such as *PictureCARD* (developed at Apple), *CUTA* (Collaborative Users' Task Analysis), and *LayeredCARD* [15]. Thereafter, a vast amount of card-based design tools for Human-Centered Design (HCD) and User Experience (UX) emerged after the year 2000, including the *IDEO Method Cards* [15]. The *IDEO Method Cards* consisted

of 51 HCD methods, initially developed for IDEO's own design teams, but it became arguably the most well-known HCD card deck [15]. These are some of the card decks reviewed by Roy and Warren [15] in their card-based design tool analysis, which encompassed 155 different physical card decks.

With the increasing number of card-based design tools, Wölfel and Merritt [40] pioneered in attempting to classify them in an academic comparative analysis [15]. A total of 18 tools were examined across five dimensions: intended purpose and scope, duration and moment of use in the design process, system or methodology of use, customization, and formal qualities [40]. Within "intended purpose and scope", Wölfel and Merritt differentiate between three levels: "General/Repository", "Participatory Design", and "Context Specific/Agenda-Driven" [40]. "General/Repository" card decks serve as an inspiration tool, have no specific context in which they must be used, and do not necessarily provide any guidance on how to use them [40]. Card decks such as *Oblique Strategies* fall under this category [40]. "Participatory Design" card decks, such as *PictureCARD*, on the other hand are meant to be used to build empathy and include both users and designers into a design process [40]. Lastly, "Context Specific/Agenda-Driven" cards are designed to aid within a particular design situation, for example, a card deck for game sound design [40]. By mapping out all 18 tools across the five dimensions, three method card design patterns were identified: "General purpose/repository" cards (usable at any point of the design process), "Customizable" cards (containing detailed instructions and usable in a specific moment in the design process), and "Context-specific" cards (also usable in a specific point of the process, but only within a specific context) [40].

Roy and Warren [15] also developed a card-based tools classification for 155 card decks, a much higher number than Wölfel and Merritt. Additionally, Roy and Warren [15] had several points of critique on Wölfel and Merritt's classification system. Firstly, the three categories were deemed as quite limiting, causing some classification uncertainties. The researchers argued that while the *IDEO Method Cards* and the *SILK Method Deck* were categorized under the "General/Repository" tools umbrella, rather than as tools for user participation in design [15]. Furthermore, the category "Participatory Design" only included users as participants and did not consider all types of possible participants, such as other stakeholders [15]. Roy and Warren therefore prefer to label these decks as "user participation in design" decks instead [15]. They also relabeled other decks (*Inspiration Cards* and *Visual Explorer*) labeled as participatory under "collaborative design" instead, which consists of decks guiding collaboration between different experts and

disciplines [15]. Roy and Warren's [15] classification, based on their larger sample, consisted of six categories which the card-based tools were grouped under, listed below from most prevalent to least:

- **Creative thinking and problem solving** (40 decks)
- **Domain-specific design** (39 decks)
- **Human-centred design** (37 decks)
- **Systematic design methods and procedures** (18 decks)
- **Team building and collaborative working** (14 decks)
- **Futures thinking** (7 decks)

The first three categories listed above encompassed about 75% of the card decks reviewed [15]. Overlapping with these six categories, three separate subsets were identified, including decks supporting direct end-user participation, designer consideration of user needs, wants, and abilities, and collaboration across disciplines and experts, which contained the highest amount of decks of all three subsets [15]. The researchers also differentiated the various ways card-based design tools function regardless of their category [15]:

- Inducing creative thinking through straightforward or ambiguous prompts
- Synthesizing good design practice or information
- Outlining design methods
- Presenting concepts for specific design problems or domains
- Offering checklists for specific design tasks

Apart from being defined and categorized, the reviewed card decks' effectiveness was also explored by reviewing existing results. Roy and Warren [15] found that most of the tests surrounding the card decks were conducted by their own designers, with controlled and comparative trials run by unaffiliated individuals being less common. Evidence suggested that card decks are engaging, flexible in use, they can facilitate idea generation and discussion reliably, and they can offer structure to the design process. On the other

hand, the effectiveness of cards was also sometimes mixed. For example, a comparative study found no advantage in the quality of the assessed design proposals of the students over a control group that did not utilize cards, while other trials of a different deck found improvements specifically in the rated creativity and conceptual complexity over a control condition [15].

A study by Aarts et al. [41] claimed that Wölfel and Merritt's [40] review was, apart from being outdated, also not systematic. Roy and Warren's [15] review was deemed as very thorough, but also similarly non-systematic, lacking research on the perception of the card-based tools by the intended users [41]. Aarts et al. [41] systematically reviewed existing papers on design card decks to build upon Wölfel and Merritt's [40] dimensions. Firstly, the broader "Purpose and Scope" category was mainly retained, apart from the subgroup "Context Specific", which was dissolved into three more specific categories: "Human-centered", "Technology Design", and "Game Design & Gamification" [41]. The researchers also added a new category "Availability," as they identified that merely six decks were accessible on the market for the general public [41]. Secondly, a card-sorting study was conducted by the researchers in which design students had to sort ten existing card decks against predefined criteria, and thereafter could decide on their own criteria in five open sorts [41]. This activity resulted in a categorization system consisting of ten different dimensions, including several novel categories ("Consistency", "Clarity", "Reliability", "Structure", "Attractiveness", and "Datedness") [41]. A noteworthy observation is the students rating the more structured text/graphics-based card decks that guide the user more favorably than the open-ended ones [41]. Aarts et al. [41] however still label open-endedness as "a promising approach", but do suggest that the amount of freedom a deck allows to the user should be adjusted according to the aim of the card deck.

Another review by Peters et al. [42] explored design and HCI literature, as well as commercially available tools for physical, non-digital tools that support collaborative ideation. Their research extends beyond card-based tools, also including artifacts such as toolkits, templates, and board games [42]. A total of 76 of these analogue tools were included and classified across ten descriptors [42]. Unlike Roy and Warren [15], who classified design tools based on their purpose, Peters et al.'s [42] typology was content-based and spanned across seven different types [42]:

- **Prompts:** Includes certain triggers, abstract visuals, and inciting questions

- **Methods:** A collection of design methods or creativity strategies
- **Components:** Consists of physical placeholders (e.g., cards or pawns), each illustrating different components relevant to the issue (e.g., stakeholders, users, or technologies) that can be rearranged)
- **Stories:** Narrative-based illustrations or prompts
- **Concepts:** Expert knowledge presented in small fragments
- **Construction:** Physical building materials
- **Embodiment:** Simulates an embodied experience

Apart from this descriptor, the tools were also defined on their specificity (generic or specialized), focus area, format, availability, industry of origin, and whether or not there are case studies or research evidence regarding the tool [42]. Their title and author also accounted for two descriptors [42]. Despite the broader focus on tools beyond card-based ones, the authors observed that the majority of the reviewed tools in the landscape were card decks (55 out of 76 tools) [42]. In general, the analyzed tools mainly focused on creativity and innovation, as well as gamification and service design [42].

More recently, Hsieh et al. [43] extended upon both Wölfel and Merritt [40] and Roy and Warren's [15] typologies by reviewing previously unidentified design cards and cards unpublished at the time those studies were carried out. Experienced design practitioners then identified categories by coding the decks [43]. Rather than categorizing them based on purpose or domain, the researchers based their classification on what design knowledge they contained [43]. Seven categories emerged:

- **Creative Inspiration**
- **Human Insights**
- **Material & Domain**
- **Methods & Tooling**
- **Problem Definition**
- **Team Building**
- **Values in Practice**

Their "Methods & Tooling" category strays away from Roy and Warren [15], who had made a distinction between "Human-centred design" and "Systematic design methods and procedures" categories. Instead, Hsieh et al. combine them into one category based on the argument that the decks categorized under these classifications, in reality, did not fit into each of them clearly enough based on the cards' actual content [43]. To map the cards into categories of time of use of the decks, the authors formulated six categories: Research, Ideation, Prototyping, Implementation, Evaluation, and a Meta category (in case decks needed to be listed under multiple categories) [43]. Overall, cards were quite unevenly distributed across both the design knowledge and time of use categorization schemes [43]. The largest amount of decks were "Methods & Tooling" cards (46%) and the smallest "Problem Definition" and "Team Building" (12% and 14%) [43]. In the category of time of use, the distribution is even more skewed, with most decks falling into the category "Ideation" (81%) [43]. Furthermore, the researchers also conducted a design practitioner survey, from which findings revealed that approximately 1 in 6 respondents had previously utilized design cards [43]. Barriers to adopting design cards in practice included practitioners not recognizing their added value, the financial burden of purchasing and applying cards, and the absence of norms regarding the application of card decks in the workplace [43]. Another aspect is the awareness of the existence of the vast majority of design cards, with most practitioners being unaware of more than 150 design card decks existing in the first place [43].

Table 2.1: Card-based tools typologies based on purpose and content (adapted and extended from Hsieh et al. [43] (Table 2)); border placed between purpose typologies and content typologies

Wölfel & Merritt [40] **(Intended Purpose and Scope)**	**Aarts et al. [41]** **(Purpose)**	**Roy & Warren [15]** **(Intended Purpose and Scope)**	**Peters et al. [42]** **(Content)**	**Hsieh et al. [43]** **(Knowledge Embedded in Cards)**
General/ Repository	General/ Repository	Creative thinking and problem solving	Methods	Creative Inspiration
Participatory Design	Participatory Design	Domain-specific design	Prompts	Human Insights
Context specific/ agenda-driven	Human-centred Design	Human-centred design	Components	Material & Domain
	Technology Design	Systematic design methods and procedures	Concepts	Methods & Tooling
	Game Design & Gamification	Team building and collaborative working	Stories	Problem Definition
		Futures thinking	Embodiment	Team Building
			Construction	Values in Practice

These five typologies together compose about a decade of research, ranging from 18 to more than 160 analyzed card-based tools, moving from purpose- and content-based categorization towards exploring how users perceive the tools. While differing in scope and depth, several functions card-based tools are meant to fulfill seem to reoccur in most of the typologies: stimulating creativity, communicating human-centred or domain-specific knowledge, synthesizing design methods, and guiding teamwork [15, 40, 41, 42, 43]. None of the typologies have been adopted as a single standard across the field and typologies are observed to often critique and build upon prior typologies [15, 41, 43]. This diversity seen in the typology landscape reflects the wide variety of card-based design tools, which range from general, open-

ended cards to domain-specific decks. As Peters et al.'s [42] study shows, although the design tool landscape stretches further than card decks, the dominance of card decks is still quite apparent.

The next section provides a detailed description of a card-based design tool found to be very relevant for the current thesis: the DSS Design Method Toolkit.

2.3.2 The DSS Design Method Toolkit

An example of a card-based design method toolkit is the Design Method Toolkit (Figure 2.5) [16], developed by the DSS at the Amsterdam University of Applied Sciences.



Figure 2.5: DSS's Design Method Toolkit [16]

The toolkit consists of a curated collection of sixty design and research methods, being designed to support teams in deciding which design method to select per task, and in planning how to carry out their design process efficiently and in short, iterative cycles [16].

The cards (Figure 2.6) include a detailed, task-based description that supports task division within the team, making the toolkit especially useful in lean, agile design processes and for multidisciplinary teams [16].

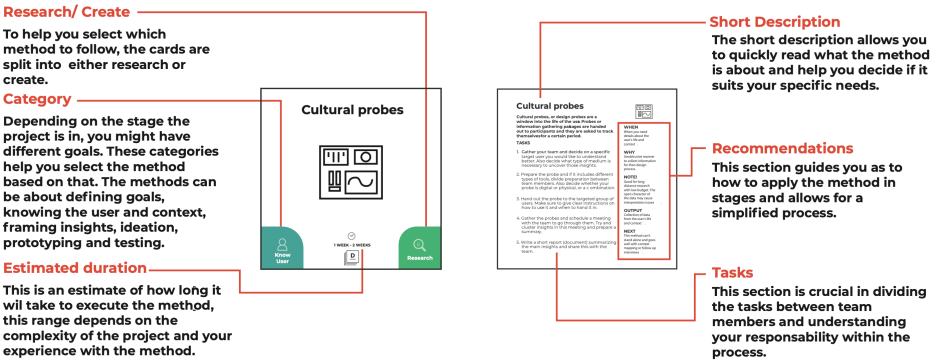


Figure 2.6: An infographic specifying the aspects of the Design Method Toolkit cards [16]

The toolkit is structured around five phases: “Know User”, “Define Intentions”, “Frame Insights”, “Ideation & Concepts”, and “Prototype & Test” [16]. In the Know User phase, the goal is for the stakeholders to be empathized with, while the team familiarizes itself with the context of the project [16]. The Define Intentions phase consists of deciding the boundaries of the challenge, as well formulating the objectives, scenarios, and vision [16]. The collected information will be deducted to the most essential findings and conclusions will be drawn in the Frame Insights phase [16]. In the Ideation & Concepts phase, ideas are generated based on the insights, and concepts are formulated [16]. In Prototype & Test, concepts are developed into prototypes and subsequently tested with target users [16]. In addition to the phases, each method is categorized as either a “Research” method or a “Create” method [16]. The main purpose of the “Research” cards is collecting information and comprehending it [16]. On the other hand, the “Create” cards produce a tangible artifact (e.g., storyboard, persona, or paper prototype) [16]. Each phase consists of both “Research” and “Create” methods [16].

Furthermore, each method card specifies an estimated time range required for its execution [16]. The indicated times range anywhere from 30 minutes to as long as two weeks [16]. These time indications are very useful towards project planning, as teams can decide which methods to apply based on their available time [16].

2.3.3 Toolkits in educational contexts

In educational settings, design method toolkits have been used to teach design skills to students. Existing evidence in academic literature mainly involves

card-based toolkits, and varies widely in scale and methodological approach.

Directed towards primary school students, *We!Design!ForSTEAM* is a 40-card design tool aiming to guide primary school students in gaining empathy towards a problem and idea generation within the specific context of an educational robotics competition [44]. The design approach developed by Arvanitakis et al. [44] consists of five stages: creating alter egos, exploring problems, needs, and opportunities, idea generation, considering sustainability, and assessing the resulting proposals. The approach was implemented across six three-hour sessions with 31 children aged 10–12 [44]. Attitudes towards the approach were profoundly positive towards the overall approach and towards the perceived productivity [44]. The students' alter egos aided in designing and communicating ideas rather than creating an obstacle towards their train of thought [44]. Additionally, students widely indicated that they would not have been able to generate ideas as novel without the approach [44]. The overall level of satisfaction was high throughout most of the stages, with a dip recognized during the sustainability stage, and tiredness mainly increasing during the more demanding second stage in which the problem was explored [44]. It must be noted that as this study consists of elementary students, its findings are only suggestive rather than applicable towards older populations, as that of the scope of this thesis.

In another study by Daly et al. [45], a deck of 77 *Design Heuristics* cards, derived from analyzing expert designers' ideation patterns, was examined during introductory design and engineering courses directed towards first year students. Decks of 12 heuristic cards were randomly assigned to the students in a design task focused on generating ideas towards the usage of solar energy in cooking [45]. Several findings emerged from the intervention. Firstly, the students that used the heuristics were more likely to generate out-of-the-box ideas rather than generic ones compared to those that did not make use of heuristics [45]. Additionally, a companion study by the same researchers using the same card format and design task with second-year industrial design students showed that students who utilized heuristics overall were rated higher on creativity by the two independent coders than those without [46].

Leahy et al. [47] built on this existing body of work, specifically focusing on the issue of "new ideas being similar to existing designs" [47], known as design fixation. In their experiment, a flawed example was shown to first-year engineering students as the source for possible design fixation, followed by brainstorming, and thereafter using the *Design Heuristics* cards to generate ideas [47]. The results showed that the practice of brainstorming produced more concepts than its counterpart [47]. However, compared to the concepts

generated with the *Design Heuristics* cards, the students themselves later identified a higher number of concepts as similar to the flawed example [47]. These results suggested that the cards containing heuristics supported the reduction of design fixation [47].

Taken together, these findings suggest that card-based toolkits can support the generation of more original ideas by both elementary and university students, and can help reduce design fixation. However, a toolkit alone is not enough to support all the possible positive outcomes of a design thinking intervention, as the guidance provided by the person facilitating plays an important role. This addressed in the following section.

2.4 Design facilitation

Facilitation can be described as creating a space for individuals to have an open dialogue in which their own perspectives lead to a variation of possibilities that can be explored [48]. Mosely et al. [48] express that design facilitation, however, does not have one definition within the field, with academic sources connecting different definitions to the term. By systemically reviewing the existing academic body of work on design facilitation, Mosely et al. define design facilitation as "the act of drawing on and applying design processes and approaches to enable dialog and ideas to emerge within participatory design contexts, in order to develop novel solutions to complex problems." [48]

The popularity of design thinking in recent years as a useful method to promote innovation within industries has resulted in people teaching design thinking without being trained in design [48]. Therefore it is important to create a general understanding of what a facilitator teaching design thinking to others should be capable of.

2.4.1 Constructs of design facilitation

Due to a lack of clear constructs within design facilitation, existing conceptualizations are explored by Mosely et al. to determine a set of constructs [48]. A total of ten constructs were determined by the researchers. These constructs have been used as guidelines throughout the thesis.

The first construct is that the facilitator must have core design competencies [48]. This entails that facilitators should have a good comprehension of design and its processes, and are able to design themselves [48]. Designers already possess these skills, making them capable of facilitating the design activities, such as providing guidance throughout the design thinking process

[48]. Additionally, the ability to visualize is an important skill for design facilitators to possess [48]. Visualization can help communicate concepts and ideas to participants, creating a better mutual understanding [48].

The second construct is being able to facilitate design dialogue [48]. Guiding the discussion throughout the entire design thinking process requires clear communication through language understood by all participants, and being able to act as a moderator during design discussions that encourages open dialogue [48]. Active listening is an important skill the facilitator should possess as well [48].

Thirdly, design facilitation expertise is built up through various practices. The conversational aspects of design facilitation are acquired through both observation and experience, evolving through repeated facilitation experiences and reflecting on them [48]. Furthermore, it is of importance to understand when to implement the design knowledge and skills as a facilitator [48]. Lastly, the problem context that is set up to allow learners to understand the design process and apply the new design knowledge and skills must be customized according to not only the experience of the target group, but also the facilitator [48].

Another quality of good design facilitation is the ability to adapt and be flexible to the dynamics of the creative process [48]. Design facilitation oftentimes consists of unexpected notions due to its emergent and dynamic nature. Therefore, the facilitator should be able to engage well in situations that are not considered in the general facilitation plan [48].

The fifth construct is with respect to the necessary tasks that must be carried out to set up the design workshop. These tasks include thorough preparation of the time planning, design activities, and the logistics and communication between the stakeholders and participants [48]. The participants should also be recruited based on how well they match with the contents and difficulty of the workshop [48]. Apart from consulting existing scientific literature, it is also recommended to research or survey the target population to determine what the design context and methods used in the workshop will be and how to schedule it [48].

The environment in which the design thinking workshop is facilitated plays an important role [48]. The space should be spacious and enough natural light should enter the space [48]. The furniture and room layout should not limit the collaborative possibilities [48].

In design facilitation, there is a need for design tools and objects to promote engagement and active participation among participants, and help the facilitator in guiding the design discussion [48]. A variety of design tools can

be used during design facilitation. Mosely et al. [48] mention five design tool categories:

- *Contextually designed*: Tools that are developed specifically for the workshop that did not exist before [48].
- *Readymade*: Existing tools that are utilized, such as sticky notes [48].
- *Templated*: Existing templates [48], such as the DSS Design Method Kit Empathy map template .
- *Roleplaying* [48]
- *Improvisational theatre* [48]

This range of tools can aid participants in coming closer to their goal within the design workshop, which is creating a design artifact that serves as a solution to the design problem [48]. The design artifact can take on various forms: from tangible creations to intangible ones [48]. The facilitator should be able to guide the participants in turning their ideas and concepts into a design artifact [48].

Apart from practical design skills, the facilitator should possess social-emotional abilities [48]. Characteristics such as empathy, leadership, confidence, open-mindedness, and being aware of oneself are several qualities that may have positive implications for the design facilitation [48]. As mentioned before, due to the dynamic nature of the design process, the facilitator also needs to have the quality to persist through the unexpected turns that might take place during the workshop [48].

The ninth construct is that the facilitator needs to maintain neutrality and avoid indirectly infusing biases and prejudices into the facilitation process [48]. Furthermore, equal power must exist between both the facilitator and the participants to assure a safe space to co-create [48]. It can occur that there are power inequalities between participants. The facilitator needs to be able to defuse these inequalities to make the design process as comfortable for all parties as possible [48].

The last construct is to create conditions that promote a healthy co-creation environment for the facilitator and the participants [48]. These conditions should encourage inclusivity and equality, assuring participants that they have a voice and that it is okay to fail [48]. Additionally, the facilitator should make an effort to form relationships between the participants to increase their credibility and instill trust [48]. Activities such as icebreakers aid in building

relationships [48]. Lastly, the facilitator should act as a source for inspiration and excitement during the design process [48].

2.4.2 The role and challenges of design thinking facilitators

The facilitator plays an important role in design thinking interventions. Design thinking facilitators stimulate and support design conversations and idea generation in a collaborative setting that creatively work towards a solution within the problem space [49]. Research directly addressing the role of the facilitator in design thinking, however, remains scarce. Henriksen et al. [50] highlight this scarcity, stating that one of the first papers contributing to this gap was Mosely et al.'s [49] 2018 study that examined the facilitator's role in teaching design thinking to non-designers specifically.

Mosely et al. [49] aimed to explore the level of design expertise needed to facilitate design thinking by comparing facilitation in design thinking workshops from two existing Australian and Dutch case studies. The facilitators in the Australian case study consisted of two design lecturers, and nine postgraduate design students [49]. The Dutch case study was facilitated by only two facilitators with limited design experience (novice-to-advanced beginner-level design expertise): one professor in project and programme management and one postgraduate project management student [49]. All participating facilitators in both case studies had prior facilitation experience to a certain extent [49]. Findings indicate that the facilitators' level of design expertise has an impact on various aspects [49]. The main findings indicated that the complexity and depth of the challenges experienced by facilitators differ between levels of expertise [49]. The facilitators with more design experience had trouble translating their more advanced level of design knowledge to a common language the non-designer participants could understand [49]. Meanwhile, the less experienced facilitators experience more surface-level difficulties related to the overall structure of the workshop [49]. Complexities included developing a curiosity-inducing workshop that simultaneously is on par with the participants' knowledge level, as well as instilling a design thinking mindset in place of participants' conventional thinking approach [49]. Thus, no matter the design experience level, facilitators will each deal with their own set of challenges, which may impact the students' learning experiences in varying ways depending on the level of expertise [49]. However, another element that affects the workshop experience is the complexity of the catered problem [49]. Therefore, this suggests that

facilitators are also responsible for carefully formulating a problem at an appropriate level for the participants [49].

Henriksen et al. [50] identified further aspects of non-designer facilitation that challenge the facilitator based on their own experiences facilitating a design thinking workshop. The facilitation experiences were examined through Kuhn's theoretical lens of "essential tensions", through which it can be argued that facilitation inherently consists of multiple co-existing, clashing demands that cannot be resolved in a single manner [50]. Instead, they should be navigated by the facilitator as these demands are an inherent, permanent part of facilitation [50]. Four areas in which these "tensions" arise are determined by the researchers [50]. The *design process* presents the tension of having to support and motivate the participants to extensively ideate and think of solutions within a limited time frame, while also simultaneously holding them back from rapidly converging to a solution before fully having explored the problem [50]. During the creation of *design artifacts*, facilitators must manage the tension between following the design process accordingly while simultaneously withholding themselves and the participants from the desire to think about potential solutions, as well as perceiving a lack of clarity while ambiguity is a part of the process [50]. Furthermore, the *discussion flow* calls for finding a balance between letting participants extensively explore and discuss multiple perspectives and possibilities while adhering to the allocated time [50]. Lastly, facilitators must mediate the *group dynamics* across participating teams accordingly by ensuring that all participants receive an equally distributed time to speak, exert the right amount of control, and maintain a sense of psychological safety in a setting that can induce fear and anxiety [50].

These two studies illustrate the underlying aspects of design thinking facilitation, specifically involving non-designer participants, and highlight the challenges that may emerge. The design thinking process has proven to be dynamic by nature, causing facilitation to be more than understanding and communicating what the process entails. In fact, it requires every facilitator, regardless of the level of their design expertise, to navigate the constantly changing demands and inherent tensions [49, 50].

Chapter 3

Methods

This chapter provides an overview of the methods used for the background research (Section 3.1), formative study (Section 3.2), participant recruitment (Section 3.3), workshop methodology and toolkit selection (Section 3.4), workshop materials (Section 3.5), as well as how the workshop was structured (Section 3.6) and evaluated (Section 3.7), and how the evaluation data was analyzed (Section 3.8).

3.1 Background Research

The literature for this thesis was obtained through different academic search engines, namely Scopus and Google Scholar. Information regarding the Union of Skills policy of the European Commission was mainly retrieved through general publications from official European Union websites. The relevant research topics were determined and several queries were formulated with different combinations of relevant keywords, such as *design thinking, card-based design toolkit, and design facilitation*. The search strategy consisted of commencing with a more focused search query, limiting the results to research output from the past five years, to gradually removing keywords from the query depending on the number of relevant sources the search resulted in.

3.2 Formative Survey

A formative survey was conducted to determine what skills the target group was interested in. The company supervisor suggested conducting the formative survey, a step that is also recommended by Mosely et al. [48]. Mosely et

al. [48] recommended that, apart from consulting existing scientific research, the target population should be surveyed or studied to decide on the design context, suitable methods, and workshop scheduling. The sections of the survey covered demographics, what skills they were interested in learning, and whether they would be interested to participate in a training program consisting of these skills. At the end of the survey, the participants could opt-in to leave their contact information if they wished to be kept informed about the training program.

The survey was created in Google Forms and distributed across several WhatsApp group chats consisting of university students and young professionals from both Europe and countries of the Global South. Additionally, personal contacts were individually contacted to fill in the survey through convenience sampling. This method was chosen to get a larger amount of data within a small amount of time. The results of the survey would determine the skills the training program would cater to the target group.

Ethical considerations were made for the formative survey. Firstly, participants had to give their informed consent before being able to start the survey in addition to their age, for the use of their anonymized data. The minimum age to participate was set to 18 years, as including minors in the population could potentially pose additional ethical concerns [26].

3.3 Participant recruitment and partnerships

The company this thesis was conducted under, BøthOfUs AB, collaborates globally with both public and private institutions, including Higher Education Institution (HEI)s and VETs. A part of BøthOfUs AB's work consists of soft skill development to empower youth. Following the same line of work, the initial plan was to implement the design thinking workshop into a full-fledged skills training program offered to educational institutions in which four categories of skills would be offered: Human Centered Design & Innovation (consisting of the design thinking workshop), Communication & Interpersonal Skills, Professional & Career Development, and Strategic, Analytical, and Project Skills. Participants who would have chosen the category consisting of the design thinking workshop would have then had the voluntary choice to participate in the study. The company's program shaped the four skill categories in the survey and the decision to also include respondents above 29, whose data was useful to the company (Section 4.1), and the company's target group contributed to excluding ages 15 to 17, together with the ethical reasons (Section 5.6). The company gave advice at times, for example by

suggesting the formative survey (Section 3.2), but most decisions about the study were made by the researcher. It expected a workshop that supports youth empowerment through skill development within the Union of Skills framework, and the results of the study were communicated to the company.

As one of the goals of the design thinking workshop was connecting youth from Europe and the Global South with each other, the initial plan was to reach out to institutions internationally. The first focus was laid on rolling the program out between the Netherlands and Kenya, as the researcher has ties to both countries. The assumption of bureaucracy being more difficult to navigate in European countries left the search for possible partnerships to start by finding Dutch partners. A Google Sheets document* was set up to systematically contact Dutch HEIs and VETs. The information set to be collected consisted of the institution names, institution type (university–e.g., applied sciences, arts, or college–or VET), contact person and email (removed for privacy in the publicly available version of this data), and contact date. Additionally, the status of each lead was tracked, the response date, as well as whether a follow-up message was sent to the lead. A collection of Dutch HEIs and VETs was accumulated through both the researcher's knowledge and performing additional Google searches using relevant keywords, such as *dutch universities of applied science* and *dutch university colleges*.

Apart from this initial plan, a contingency strategy for participant recruitment was also determined in case not enough institutions chose to participate in viable time for the thesis completion. This strategy consisted of recruiting non-designer youth from Europe and the Global South locally in Stockholm instead. This would be done by setting up a WhenAvailable-poll† through which prospective participants could indicate their availability for the workshop. The availability poll would then be shared through a recruitment message on platforms, including WhatsApp, Slack, and Instagram, with the details of the workshop to both individual contacts and various online group chats consisting of youth within the 18–29 age range, including Stockholm-based groups for young professionals, university students, and student housing. Additionally, a promotional poster would be designed in Adobe Illustrator and spread around local student housing, as well as attached to messages digitally. Technically, the official classification of youth by the European Commission is people of ages 15–29 [2]. However, due to ethical concerns [26], a decision was taken to exclude underage youth as participants

*https://docs.google.com/spreadsheets/d/e/2PACX-1vRgu5FxZZA36Xlnv_WQFXvoiwkIqmTfQb3SszFcd2zA1LU9uoNLceynwlwS5hJaiw/pubhtml

†https://whenavailable.com/

in the present study.

3.4 Workshop methodology and toolkit selection

The Stanford *d.school* Design Thinking Process was quickly identified as a strong candidate to apply as a methodology in the workshop. The Design Thinking Process is widely recognized and applied due to its clear structure and it being developed by a renowned institute that popularized design thinking as a whole.

Once it was determined that the Stanford *d.school* Design Thinking Process would be followed, the search for an appropriate design method toolkit began. As the batch of participants would purposely consist of non-designers, likely unfamiliar with design thinking, a design method toolkit that provided structure was sought after. Furthermore, it had to pair well with the Stanford *d.school* Design Thinking Process.

Initially, the Stanford Design Thinking Bootleg [51] was identified as a card-based design tool consisting of a set of methods that directly accompanied the Stanford *d.school* Design Thinking Process. However, the tool had a presence in multiple existing studies already, such as in a study by Maneeratana et al. [52], who used it as the teaching material for a design thinking project in an engineering course.

Another toolkit that was considered was the DSS Design Method Toolkit, due to the researcher's familiarity with the toolkit through a university course on human-computer design that the researcher followed. This toolkit was structured, consisting of similar phases compared to the Stanford *d.school* Design Thinking Process. Compared to the Stanford *d.school* Design Thinking Bootleg, the DSS Design Method Toolkit specifies an estimated time range for each method, ranging from 30 minutes to two weeks, which is a feature not included in the Design Thinking Bootleg, that instead states "a little bit, every day" [51] as time required to use it. Additionally, the DSS Design Method Toolkit offers a larger set of design methods, providing a curated selection of 60 methods, compared to the Design Thinking Bootleg's approximately 30 methods. The DSS Design Method Toolkit also has a clearer layout and provides a more structured, numbered step-by-step task description for every method. Moreover, the online version of the Design Method Toolkit has a method filtering feature, providing the possibility to filter on phase, desired duration, and 'Research' or 'Create' method. The Stanford

d.school Design Thinking Bootleg does not possess any of these features, is quite lengthy, and mixes advice with methods without ordering methods in a structured way, making it more difficult to choose what to use in a compact 3-hour workshop in which not all activities can be carried out.

The choice was additionally motivated due to the currently underrepresented body of literature that validate this as a design thinking methodology, having only been mentioned in two papers by the same two researchers in existing academic literature: in an empirical review on design methods [18] and in a paper describing the creation of an information structure for design methods [17], and having not yet previously been evaluated in a design thinking workshop. Due to fitting the desired qualities, the toolkit was chosen to be applied and evaluated in the workshop intervention to address this gap.

3.5 Workshop materials

Several workshop materials were produced for two separate purposes. For the design thinking workshop itself, facilitation slides were created in Google Slides. Additionally, the DSS Design Method Toolkit was downloaded from the existing template on the DSS website, printed out, cut into individual cards, and laminated with a lamination machine for durability, prior to being used in the workshop. A total of two card decks were printed out to have at least one complete deck per two teams.

For the 1-on-1 interview method [53] used in the Empathize phase, a set of interview prompts was formulated by the researcher that participants could use if they wanted to, as supplementary workshop material. The interview prompts consisted of the following:

1. Tell me about a time you felt really lonely. What was going on?
2. What do you usually do when you want to connect with someone?
3. Has a place, app, or event ever helped you feel less alone? How?
4. What makes it hard to reach out when you're feeling isolated?
5. What's one thing your city or school could do differently?
6. If a friend was lonely, what would you wish existed to help them?

The accompanying templates that some of the included methods had were also printed out on A3 paper. Other materials, including pens, colored

markers, scissors, tape, rulers, post-it notes, and A3- and A4-sized blank paper were lent from the university's design studio to be used by the participants. A syllabus and participant booklet were also designed in Adobe Illustrator for the broader planned skills training program, which the design thinking workshop is a part of, intended to support a larger-scale, future rollout by BøthOfUs AB as well. The syllabus and participant booklet were not used in the workshop sessions within this thesis, although the booklet's content was incorporated into the facilitation slides used during the workshop.

3.6 Design thinking workshop

3.6.1 The design thinking challenge

Selecting an appropriate design thinking challenge was an important methodological decision for the design thinking workshop, as it would determine the level of engagement and the applicability of design thinking itself. Loneliness among young adults was ultimately selected as the challenge for several reasons.

Firstly, loneliness is a well-documented and growing societal issue that is specifically affecting the target group that would participate in the workshop. According to the European Commission's Joint Research Centre (JRC), loneliness is particularly prevalent among youth, with prevalence decreasing as age increases [24]. The amount of people experiencing frequent loneliness between ages 18 to 25 more than doubled between 2016 and spring 2020, which was also partially attributed to the COVID-19 pandemic [24]. Given that this age range is a part of the target group of the workshop (18–29 year olds), loneliness is presented as a relevant challenge in the environment the study is conducted in. Additionally, the aspect of it specifically being an EU challenge also put an added highlight onto the EU focus of this thesis, as it is motivated by a novel framework presented by the European Commission.

Furthermore, the loneliness challenge also aligns with current EU youth policy priorities. The European Youth Goals, which were developed through the EU Youth Dialogue [54] and incorporated into the EU Youth Strategy 2019–2027 [6], include 'Mental Health & Wellbeing' as one of the eleven goals, which specifically aims to "achieve better mental wellbeing and end stigmatisation of mental health issues, thus promoting social inclusion of all young people" [55]. Loneliness is closely tied to this goal, as it also impacts one's well-being and is related to social inclusion. Therefore, using loneliness as the design challenge increased the workshop's relevance, going beyond

being relevant to the target group, also being relevant to another existing European policy framework.

Lastly, incorporating a challenge relevant to participants was expected to support the learning outcomes of the workshop itself. In a study by Ingram et al. [56], in which public health university students followed a design thinking course, the researchers identified that the relevancy of the topic to the personal lives of the students mattered. Groups working with a topic relevant to their lives experienced less difficulty with problem definition compared to others in the course [56]. As many young adults have had an either direct or indirect experience with loneliness to a certain extent, it was expected that choosing this challenge would allow easier problem definition than a more unfamiliar, abstract subject would, especially given that most participants were unfamiliar with design thinking.

3.6.2 Workshop structure and materials

The workshop, held in the university library of KTH for the first and second session, and in another KTH building for the third session, mainly structured around a Google Slides presentation made from scratch for the workshop. The first part of the presentation consisted of general, logistical information about the workshop informing the participants, such as the duration, method and what field the workshop is related to. Thereafter, the researcher introduced themselves and BøthOfUs AB, the motivation behind the workshop, explaining the Union of Skills framework and the connection to the study. Then, a short round of introductions took place to familiarize the participants with each other. After the introduction, the main topic of the workshop, design thinking, was directly introduced by the researcher. The process was described as a human-centered design process widely used in the field of HCI, that was structured and popularized by *Stanford d.school* and is commonly used to tackle an issue in a short timeframe. The field of HCI was explained as being "a multidisciplinary field focused on the design, evaluation, and implementation of interactive computing systems". Additionally, the DSS Design Method Toolkit was briefly named as the method toolkit that were to be utilized, which would be explained in detail later, and the workshop goals were named, which included:

- Learning about and applying the entire design thinking cycle
- Applying a wide range of design methods
- Collaborating with your peers in an interactive setting

- Tackling a current European issue

Thereafter, the social issue that would be tackled during the workshop was introduced to the participants, stating that they would be designing a solution for a social problem, namely loneliness. The introduction was supported by an image of a young person who was seemingly lonely and two EU-specific loneliness statistics from the most recent EU loneliness survey conducted in 2022 [24]:

- Loneliness among EU adults aged 18-25 doubled between 2016 and 2020 [24]
- 1 in 5 Young EU adults aged 16-25 felt lonely most of the time in 2022 [24]

Then, this issue was presented to the participants as a clear challenge statement: ”How might we help young adults in this city feel less lonely and more connected to people around them?”

The design thinking process was then explained through a short animated YouTube video*. Thereafter, the time division per design thinking phase was shared and it was emphasized that no experience is needed and that there are no wrong answers.

The next step was determining the groups, which was done by the researcher in an attempt to assure an even gender balance and collaboration between European and Global South participants. Additionally, some ‘rules for the day’ were presented to be encouraging of participation.

Each phase of the design thinking process started with a slide explicitly highlighting the phase in the whole process for clarity, naming the goal of the phase, and what activities would be carried out. Thereafter, each individual design method slide included a visual example of the method. These visual examples consisted of either images of the DSS templates for the methods that had them, and for the methods that did not have a visual provided by DSS, examples illustrated by the researcher were shown to show how the method should be carried out, and images from external sources (for the Persona, Paper prototyping, and Wireframes methods), which were all cited on the facilitation slides. Furthermore, the slides included what materials participants could use and the instructions on how to use the method.

*https://youtu.be/a7sEoEvT8l8?si=CjseXZAgDzSIdItK

3.6.2.1 Empathize phase

In the Empathize phase, the goal was to understand the user as a person, within the design challenge context. Each participant interviewed one teammate to understand their real experiences related to loneliness. The activities spanned across a total of 35 minutes and included the following:

1. **1-on-1 interview (20 min)**
2. **One chosen additional method (10 min)**: 'Persona' or 'Break up/Love letter' method
3. **Share-out (5 min)**

Before participants dived into interviewing their teammate, a supplementary video was shown that illustrated the difference between empathy and sympathy*.

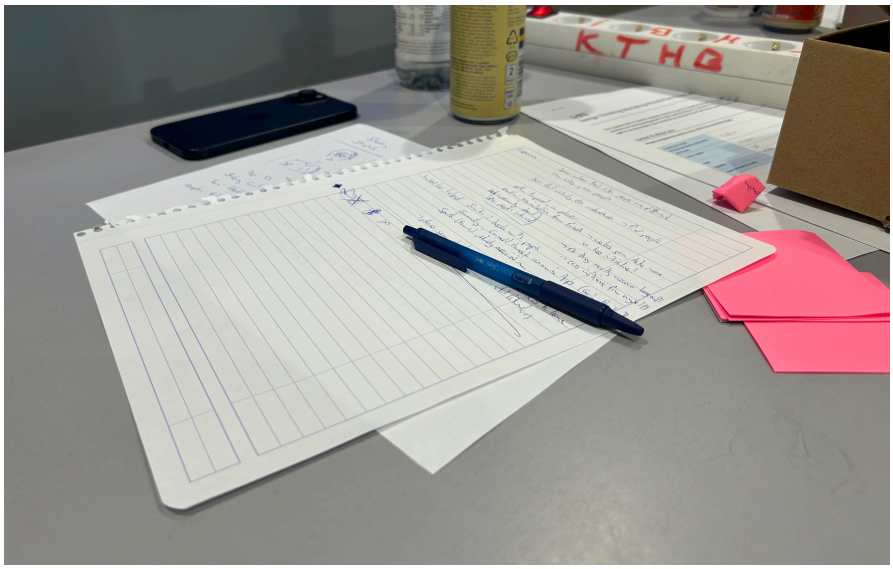


Figure 3.1: A sheet of interview notes written down during the Empathize phase of the first workshop

During the 1-on-1 interview method, participants took turns of 10 minutes sharing their experience of loneliness. While listening, the other participant would take notes of what their teammate said and vice versa, as displayed in *Figure 3.1*. The set of interview prompts formulated by the researcher

*https://youtu.be/1Evwgu369Jw?si=bRVjAcTm0u7-8fhj

that participants could use if they wanted to, was displayed on the method's PowerPoint slide. The questions were offered in case some participants experienced difficulties thinking of questions to ask.

Then, for the additional Empathize method, the participants got the choice between the Persona method [57] and the Break up/Love letter method [58]. These methods were both carried out individually. After the methods, it was time for a group share-out, in which all participants had to opportunity to share some interesting insights they gained in the phase so far.

3.6.2.2 Define phase

In the Define phase, the participants' aim was to clearly put the problem into words based on what you learned about the person and the context in the Empathize phase. In this phase, the interview notes they generated were turned into a clear human-centered problem statement.

Activities consisted of the following:

1. **Write down observations and insights on sticky notes (10 min)**
2. **Insight sorting (10 min)**: 'Empathy map' or 'Emoji story' method
3. **POV statement (5 min)**

After 10 minutes of writing down the observations and insights on sticky notes, the groups had the choice to choose between two methods to sort their insights with: the Empathy map and the Emoji story method.



Figure 3.2: Two participants sorting their insights into the Empathy map in the Define phase of the third workshop

The Empathy map method was accompanied by a template on the DSS website (depicted in *Figure 3.2*), which was printed onto A3 paper to allow participants using the method to sort their sticky notes directly onto the map into six different categories: what the person thought and felt, what they heard, what they gained, what their pains in this situations were, what they said and did, and what they saw.

In the Emoji story method, participants could retell a scene from their interviews as a short story, replacing key emotional words with emojis, which aimed to help surface feelings and design directions. In practice, not a single group chose the Emoji story method. All the groups used the Empathy map method.

After the insight sorting, the groups formulated one clear problem statement based on their insights. This is known as a POV statement, in which the user and their needs are described, and what insights enforce these needs. A formulation structure was provided that followed the standard '[user] needs [need] because [insights]' [59] structure, but was slightly altered to '[name of user], a [description of user], needs [need] because [insight]' to humanize the user described in the POV statement more within the humane nature of the workshop's topic.

3.6.2.3 Ideate phase

The participants then moved onto the Ideate phase, in which the main goal was to generate as many ideas as possible that could serve as a solution. An emphasis was put on that the participants should write down any idea, however crazy it might sound, and that the quantity is more important than the quality of the ideas in this phase.

The activities carried out were the following:

1. **Worst possible idea warm-up (5 min)**
2. **Brainstorm and build (15 min)**: 'Brain writing', 'Mash-up', or 'Lotus blossom' method
3. **Dot voting (5 min)**

This phase was initiated with a warm-up activity in which participants had to think of what the worst ideas might be towards solving the loneliness issue, as a means to ease into the phase and create a lighthearted atmosphere.

Then, the actual ideation commenced, for which groups could choose one of three ideation methods to use as a group. These included Brain writing, Mash-up, and the Lotus blossom method.

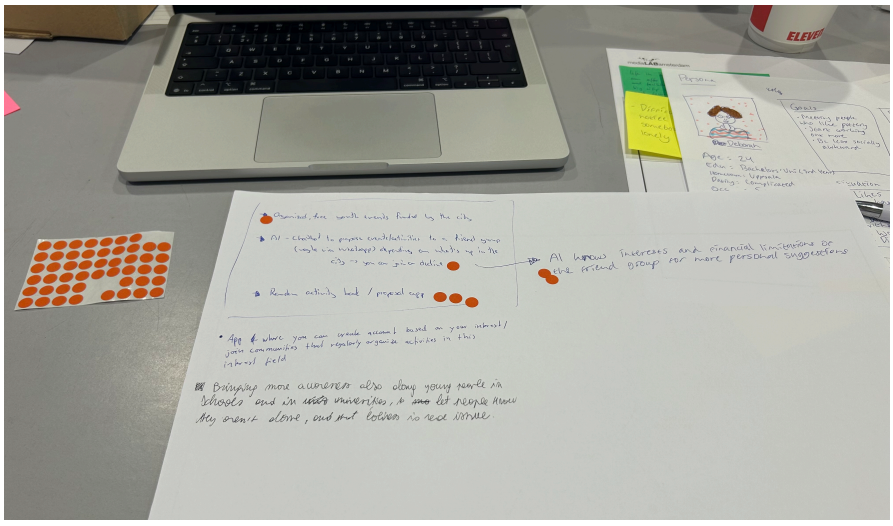


Figure 3.3: A result of the utilization of the Brain writing method and dot voting in the first workshop

During the Brain writing method, depicted in *Figure 3.3*, every group member writes three ideas down in silence and then passes the paper onto

the next group member, which in turn builds onto the previous ideas. This is repeated as many times as there are people.

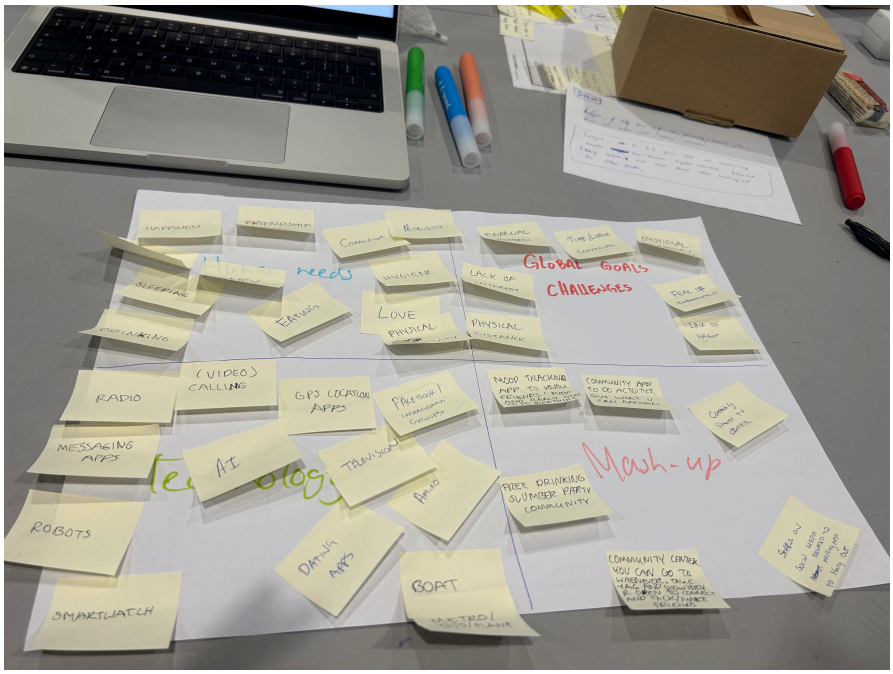


Figure 3.4: A result of the utilization of the Mash-up method in the second workshop

The mash-up method, shown in *Figure 3.4* consists of drawing a big square and dividing it into four sections: human needs, global goal challenges (issues related to the goal), technology (technological innovations or existing technologies), and mash-up. On post-it notes, human needs, global goal challenges, and technologies are written down. Then, one post-it from each category is randomly chosen and combined into one idea in the mash-up section.

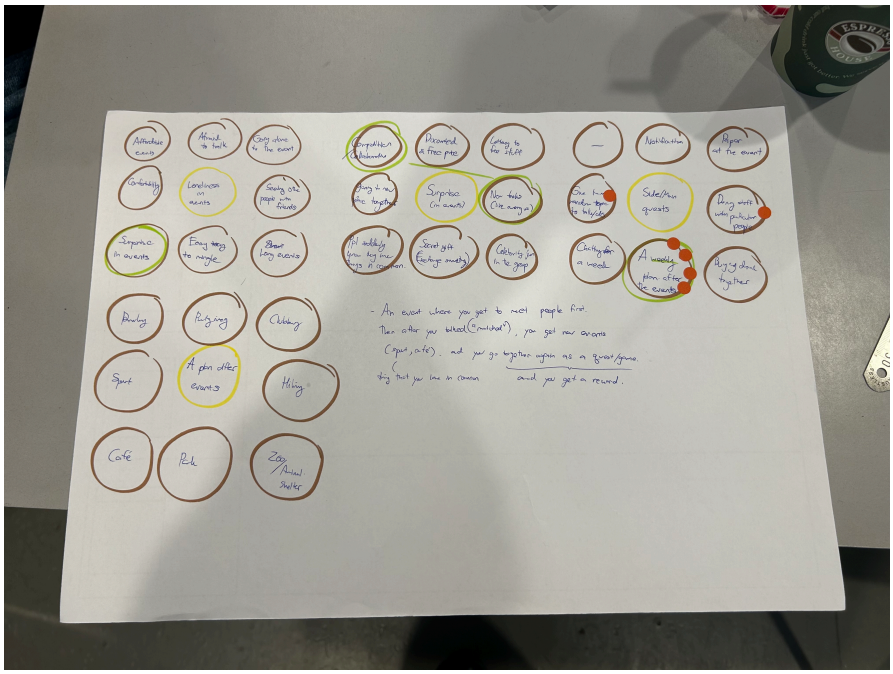


Figure 3.5: A result of the utilization of the Lotus blossom method and the dot voting method, carried out in the second workshop

The Lotus blossom method requires a central theme to be written down, around which eight related ideas are generated. Once the lotus is filled with eight ideas, eight new themes are created around each of the eight previous themes.

Once the ideation was completed, each member within the group received three dots to vote on the ideas with, without a limit to how many dots they could give per idea.

3.6.2.4 Prototype phase

In the Prototype phase, participants were asked to build a maximum of three prototypes of the one idea they decided to continue with through the dot voting. The following activities took place:

- **Build your prototype (20 min)**: 'Paper prototyping', 'Storyboard', or 'Wireframes' method
- **Prepare your 2-min pitch (5 min)**

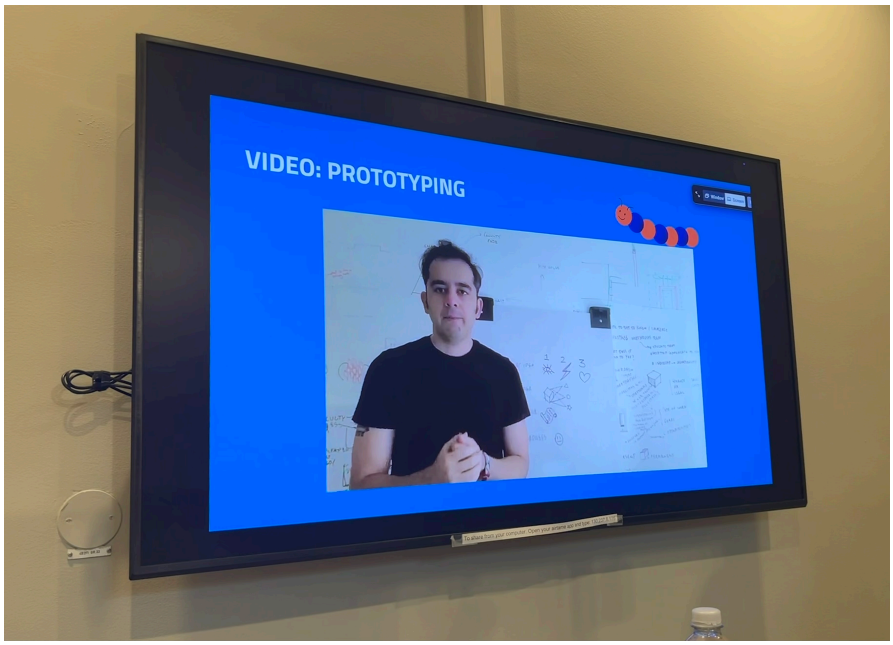


Figure 3.6: The supplementary prototyping video shown during the workshop

Before the prototyping began, an informative video* was shown explaining several aspects of prototyping. Then, the groups again were given the choice to choose one of three methods to follow as a group during the prototyping: Paper prototyping, Storyboard, and Wireframes.

The Paper prototyping method [60] was bound by constraints the least. Participants could create anything with the available paper and other creative supplies provided. This method was not used by any of the groups, as none of them chose it and was therefore also not evaluated in the participant data.

*https://youtu.be/Yu21ZxA1upk?si=u9Cu7ZQS0j1LQENg

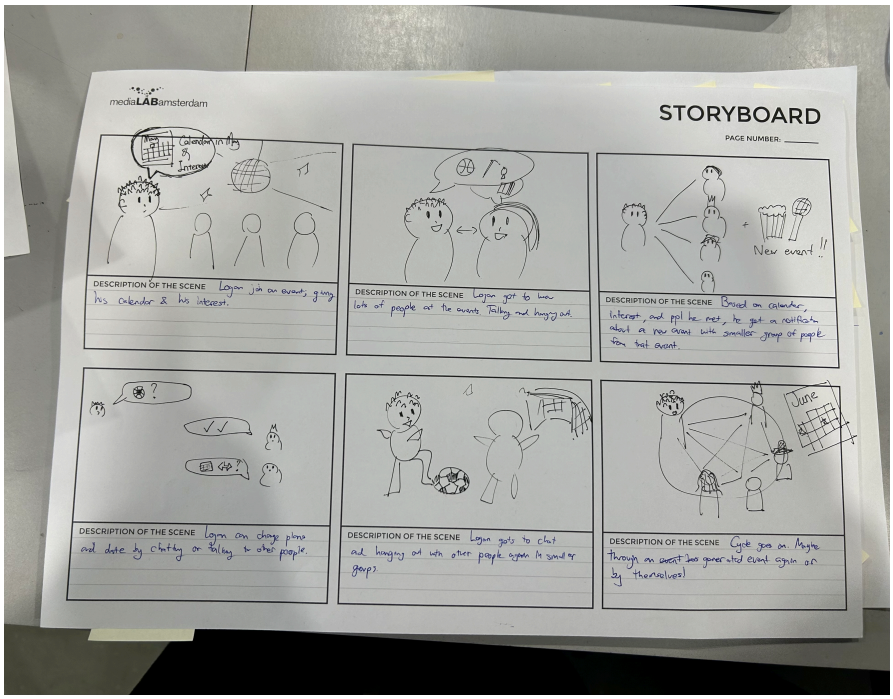


Figure 3.7: A storyboard created during the Prototype phase of the second workshop

The Storyboard method [61] was accompanied by two different templates offered on the DSS website: one for the main scene and one for a multi-scene storyboard, the latter being shown in *Figure 3.7*. Participants were allowed to choose which of the two templates they wanted to use.

For the Wireframes method [62], the participants could make use of the wireframe templates printed out or draw their own. The Wireframes method was mainly useful in case groups had app or website ideas that they wanted to design the interfaces for. This method was not chosen by any of the groups across the three workshops sessions and therefore has no evaluation data.

Once the prototyping came to an end, each group had to prepare a two-minute pitch for their final prototyped solution.

3.6.2.5 Test phase

The last phase of the design thinking process, the Test step, prompted groups to test each other's prototypes and give and receive feedback. This allows for the opportunity to empathize with the users more, based on the other group's responses. Activities included:

- **Pitches (5-10 min)**

- **Gallery walk (15 min)**: ‘Co-discovery’ method, accompanied by the ‘People Planet Profit’ or ‘Harris profile’ method
- **Share-out (5 min)**

After the pitches were given, the groups explored each other’s prototypes through the Co-discovery method, in which two participants from another group explore the other group’s prototype together, talking aloud through conversation to voice their thoughts, and asking questions to the group that made the prototype. This activity reveals a lot about what is clear and what is not, what is great and what maybe could be improved, which is useful for the other team. For the evaluation of the prototypes, the groups themselves could choose one of two methods that the other group had to use to evaluate them: either the People Planet Profit or the Harris profile method.

The People Planet Profit method evaluates the solution against three dimensions: impact on people, impact on the environment, and economic viability. A template for this method was provided from the DSS website. The People Planet Profit method was ultimately not chosen by any of the teams across the sessions and therefore no data on method perception exists for this method.

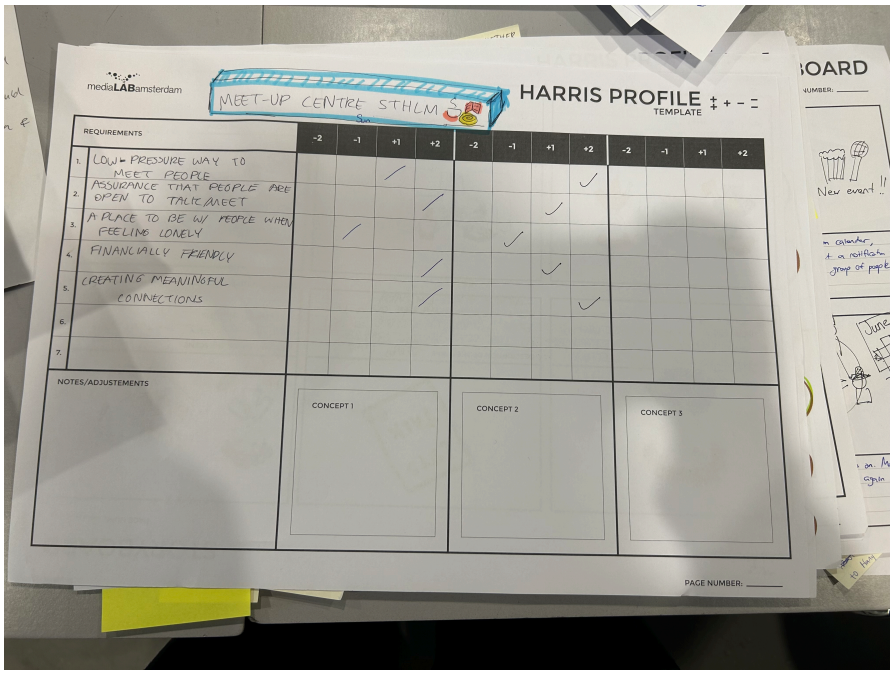


Figure 3.8: A result of the Harris profile method utilized during the second workshop

During the Harris profile method, the team who created the prototype(s) could list seven requirements they wanted their prototype to be evaluated on. The evaluating team would rate a maximum of three prototypes based on how well each requirement is implemented into the prototype on a 4-point matrix scale $(-2, -1, +1, +2)$, which can be seen in *Figure 3.8*.

After the evaluation, the groups would share their evaluation experiences and finish the post-workshop part of the questionnaire, depicted in *Figure 3.9*. The participants were also informed of the procedure regarding the five voice note questions that were requested to be answered by them at home.



Figure 3.9: Workshop participants filling out the post-workshop section of the questionnaire

Finally, the participants were thanked for their participation, and the company social media and contact information of BøthOfUs AB were shared, in case participants were interested in learning more about the company.

3.6.3 Design Method Kit methods

Each phase of the 5-step design thinking process utilized during the skills training workshop consisted of several methods from the Design Method Kit from DSS. The DSS Design Method Toolkit consists of five 'phases', with each method being assigned to one phase. The phases are the following:

- Define Intentions
- Know User
- Frame Insights
- Ideation & Concepts
- Prototype & Test

The methods are also categorized under two labels: either ‘Research’ or ‘Create’. These indicate the nature of the methods.

The Design Method Kit phases were mapped to the five steps of the design thinking process. Aligning the phases to the design thinking steps clarified what methods suited each design thinking step. This was crucial during the development of the skills training workshop.

The Design Method Kit phases were evaluated based on the general descriptions and the goals of each phase, in order to look for a correlation with the design thinking process steps. All the phases were relevant to the design thinking steps, except the ‘Define Intentions’ phase. This phase intends to define the challenge you will work towards. However, a step dedicated to defining the challenge does not exist within the design thinking cycle. Moreover, the challenge had already been formulated for the participants of the design thinking skills training, with the intention of keeping it the same between groups of participants. Therefore, the ‘Define Intentions’ phase was not relevant to integrate into the workshop.

In Table 3.1, an overview of how the Design Method Kit phases were connected to the design thinking steps can be found.

Table 3.1: Design thinking steps corresponding to the DSS Design Method Kit phases

Design thinking steps	**Corresponding DSS Design Method Kit phases**
Emphasize	Know User
Define	Frame Insights
Ideate	Ideation & Concepts
Prototype	Prototype & Test
Test	Prototype & Test

The ‘Empathize’ step corresponds to the ‘Know User’ phase, as both phases focus on understanding the user better. The ‘Define’ step and ‘Frame

Insights' share a similar focus, as both aim to draw conclusions from the research conducted and narrow down the gathered insights into the most valuable and important elements to build the problem definition from. The 'Ideate' step corresponds to the 'Ideation & Concepts' phase, as both focus on idea generation and developing concepts that address the defined problem. The 'Prototype' and the 'Test' steps are combined into one phase in the Design Method Kit ('Prototype & Test'). Therefore, this phase is listed for both steps. However, when assigning the methods from this phase to the steps, it was assured that the aim of each integrated method was specifically used for either prototyping or testing.

3.6.4 Implemented guidelines and recommendations

The design and facilitation of the design thinking workshop directly drew from the design facilitation constructs by Mosely et al. [48]. Several of these guidelines were implemented into both the preparation and execution of the workshop.

Firstly, Mosely et al. [48] identify the ability to be flexible and adapt within the creative process as an important quality to have in design facilitation due to its dynamic nature, as well as to account for situations that steer away from the general facilitation plan.

Furthermore, Mosely et al. [48] state that the facilitator should possess core design competencies, including a good understanding of design and its processes, as well as being able to design themselves. These competencies allow the facilitator to provide proper guidance throughout the design thinking process. This guideline was followed by the researcher, who is equipped with a design background and prior design thinking experience, facilitating the design thinking workshop.

The tasks recommended by Mosely et al. [48] for setting up a workshop, including determining the time planning, design activities, logistics and communication between the stakeholders and participants, and recruiting participants based on their suitability for the workshop's content and difficulty.

Remaining guidelines followed include:

- Creating conditions for a healthy co-creation environment by establishing a common set of rules at the start of the workshop [48].
- Promoting the creation of relationships between participants, done through an introduction round [48].

- The use of design tools and objects, which in the workshop consisted of the DSS Design Method Toolkit and readymade materials (sticky notes, pens, paper, etc.) [48].
- Facilitating in a spacious, physical workshop environment [48].
- Equipping over social-emotional abilities, such as empathy, leadership, self-awareness, open-mindedness, and confidence as the facilitator [48]. Participant feedback indicates that the facilitator aligned with these qualities, with one participant saying "the host was really fun and open".
- Maintaining neutrality and equal power [48]. The facilitator assured everyone was involved in the process, that participants would not overpower each other, and to stay neutral towards all participants.

3.7 Evaluation design

The workshop evaluation followed a mixed-methods approach, combining quantitative and qualitative data. Quantitative and qualitative data was collected through an extensive pre- and post-workshop self-assessment questionnaire. The questionnaire was created in Google Docs and was printed out to be distributed to the participants at the beginning of the workshop. The decision to print it out rather than create it digitally in Google Forms was made to reduce the risk of data loss due to the two separate moments (before and after the workshop) in which the participants have to fill in the questionnaire.

The questionnaire consisted of multiple sections, beginning with collecting basic information regarding the demographics of the participants, which aimed to support the cross-cultural comparison carried out in this thesis. Furthermore, the pre- and post-workshop sections also both included a Likert-scale that contained eight statements, covering design thinking and HCI knowledge, relevance of design skills to their field, as well as awareness of the European issue of loneliness among young people (the theme chosen as the design challenge of the workshop). This setup allows for a before and after comparison of each competency per individual, as well as a pre- and post-workshop comparison between European and Global South participant groups.

The Global South, according to UNCTAD can be defined as "developing economies in accordance with the UNCTAD country classification [22]." These developing economies include "Africa, Latin America and the

Caribbean, Asia without Israel, Japan, and the Republic of Korea, and Oceania without Australia and New Zealand [63]."

A map illustrating the Global South, as well as the Global North can be found in Figure 3.10.

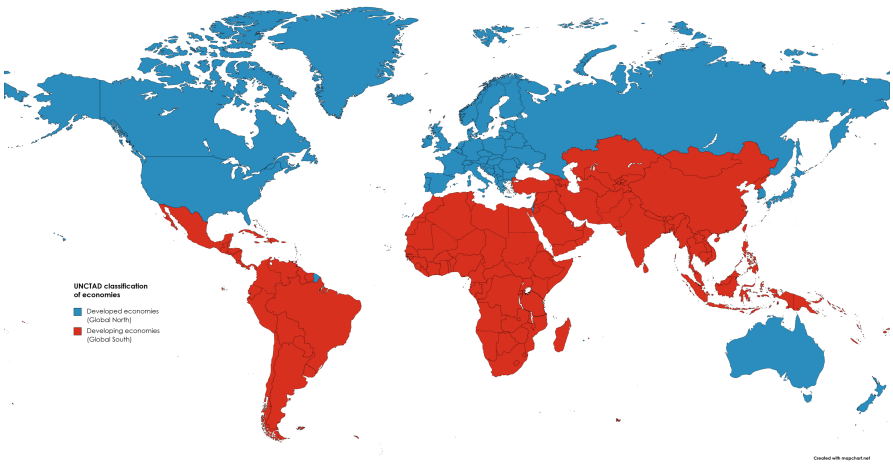


Figure 3.10: The Global North and Global South, according to UNCTAD classification [64]

Participants with at least one Global South nationality were classified as Global South participants (Section 4.2).

Additionally, both Likert-scale sections were paired with four open questions. Before the workshop, participants shared their interpretation of what design thinking is, whether they have ever tried to solve a problem for someone else, what they believe the word "prototype" means, and what their hopes for the workshop session are. After the workshop, they communicated what surprised them the most, what design thinking phase was the most challenging, the relevancy of the loneliness challenge to them, and how they imagined applying design thinking in the future.

Another section explored participants' broader personal context in relation to the workshop and their workshop experiences, including whether or not they have had prior exposure to design thinking, how useful they think the process is in their own country or community, their thoughts on the in-person format of the workshop, and their perceived connection between design thinking, digital tools, and HCI.

The final section allowed participants to reflect on the usefulness of the Design Method Toolkit and its methods used per each phase of the design thinking cycle, alongside questions including what unused method

they wished they got to use and why, their experience with the ability to choose methods, and whether they would use any of the methods in the future. The questionnaire ended with an open reflection on the participants' most memorable takeaway and suggested changes to the workshop.

Next to the questionnaire, the participants were also requested to send a voice note to the researcher after the workshop, which allowed the participants more time to reflect on their experience. This decision follows the broader recognition in HCI research that conventional feedback collection formats can contribute to survey fatigue and reduced data quality [65], motivating HCI researchers to explore more interactive and engaging ways for giving feedback [66]. Audio responses specifically have been found to consist of richer, more detailed responses than written ones, as identified by Hankeln et al. [67], who found that spoken answers were more extensive and contained more detail in their explanations than typed responses. This suggests that voice notes may be more fitting for receiving reflective, open-ended responses from this study's target population.

Since the questionnaire was already quite long, adding to the already lengthy 3-hour workshop, the initial idea of doing semi-structured group interviews in person to collect additional information on uncovered topics was discarded. The reasoning behind this includes the anticipation that making the intervention longer would attract less participants and that participants would be too fatigued to answer the questions, consistent with survey fatigue literature suggesting that lengthy data collection reduces response quality and completion rates [65].

The voice note questions were the following:

- Did the loneliness challenge feel relevant to your own country or community? Is loneliness talked about openly there, or is it something people tend to keep private?
- Which skills do you feel you practiced during the workshop, and do you see them as relevant to your future career or studies?
- What was the most effective part of the workshop for your learning, and what would you change if you could?
- The EU identifies critical thinking, digital skills, creative thinking and civic competences (= being an active member of your community) as key skills for young people today [1]. Do you feel today's workshop trained any of these, and if so, which ones and how?

- Would you use any of the design methods from today again outside of this workshop, and if so, in what situation?

Altogether, the open-ended questionnaire and the individual provide two separate qualitative sources of information, one captured in writing directly before and after the workshop, and the other in spoken form, recorded after a varying amount of days per participant since the workshop took place. Additional clarification regarding how long it took each participant to respond can be found in Section 4.2.

Ethical considerations were also made for the workshop. Before the workshop began, the researcher orally briefed the participants on the ethical procedures of this study. Participants were informed that they could withdraw from the study at any time without any consequences by telling the researcher or emailing them, upon which all the data collected from them would be deleted. Additionally, participants were told that identifying data, such as audio recordings, would be stored securely, would only be accessible to the researcher, would be deleted once the research was completed, and that transcripts would be anonymized. They were also informed that collected data would only be used for this thesis in a way that keeps them anonymous, and that only the final report and the anonymized data would be shared publicly.

3.8 Data Analysis

The quantitative data collected from the pre- and post-workshop questionnaire was analyzed with descriptive statistics due to its low sample size. The mean Likert-scale scores of the participants across each of the eight statements will be compared before and after the workshop. A positive shift in the mean score from before to after the workshop will be interpreted as an indicator of perceived skill development having taken place following the workshop. Moreover, these pre- and post-workshop comparisons will also be conducted within each demographic participant group, which are Europe and Global South. The demographic comparisons are made solely to determine whether the workshop had similar outcomes across cultural contexts at an anecdotal level, and not to measure their individual capacities for learning. This is particularly important to note, as even the participants within each group have very different backgrounds themselves, leading to confounding factors that cannot be controlled for.

Qualitative data consisted of the open-ended responses from the questionnaire and the individual voice notes.

The voice notes were put into the transcription tool Riverside* and were then retouched by removing filler words, false starts, and repetitions to make the text more comprehensible. This level of transcription editing is also known as intelligent verbatim. The questionnaires were filled out by hand by the participants and converted into digital text by retyping each questionnaire digitally in a text editor. The coding and analysis will be carried out in the qualitative data analysis software *ATLAS.ti*†.

The qualitative data was thematically analyzed following Braun and Clarke's thematic analysis framework [25].

The first phase of the thematic analysis was becoming familiar with the data [25]. This was done by actively reading through the data and preliminarily making connections, identifying patterns, and making note of fragments that could possibly be codes. In this phase, the data should also be transcribed, which was done for both the voice notes and the qualitative data from the questionnaire.

The second phase of the framework calls for creating initial codes. The transcriptions of each participant were imported into *ATLAS.ti* in separate documents. Several coding recommendations from Braun and Clarke [25] were followed here, including coding as many excerpts as possible, as it is initially not fully known yet what will be useful, and including some additional textual context in the coded elements as well to preserve clarity surrounding the context. Additionally, not every sentence was coded, only the extracts of data that called for a code, and coded data was used for as many themes as they were relevant to, again following Braun and Clarke's [25] recommendations. An overview of the resulting coded data is provided in 4.4.

Then, once all codes were generated, the third phase of the thematic analysis framework commenced. In this phase, the codes were thoroughly examined for patterns of shared meaning in the dataset to establish themes from, using *ATLAS.ti's* code and quotation reports to review each code alongside its coded text and participant coverage. Codes were grouped into themes based on conceptual meaning rather than surface wording, as codes describing the same underlying pattern did not use always the exact same wording across participants. During the initial coding phase, several candidate themes were already identified through noticing recurring patterns. However, throughout the theming phase, some of these initially broad candidate themes were narrowed into more specific ones once extensively compared against all codes and quotations across both the questionnaire and voice note data. In

*https://riverside.com/
†https://atlasti.com/

addition, new themes emerged from this phase that had previously not been identified.

In the fourth phase of framework, the themes were reviewed. Each candidate theme was reviewed at two levels, as suggested by Braun and Clarke's [25] framework. Level one calls for the researcher to review at the level of the coded data extracts, at which each candidate theme's supporting codes and quotations were re-examined to check whether they formed a coherent pattern around a single concept [25]. This review resulted in one candidate theme being narrowed in scope after its supporting evidence was less consistent than initially observed, and another being relegated from theme to an explicitly deviant instance instead after being identified as a single participant's divergence from an otherwise convergent pattern across other participants. At the second level, the coded data extracts were analyzed at the level of the entire dataset to check for overlap, insufficient distinctiveness, or themes combining two separate findings into one. The latter occurred with one candidate theme, which had combined both points of participant disagreement and consensus regarding the workshop design to be split into two themes. The result of this phase was eleven confirmed themes and one deviant instance, which were taken to the next phase.

In the fifth phase, the eleven identified themes from Phase 4 were defined further and names were established for the themes. A detailed definition was written on the story each theme tells, the scope of each theme relative to the other themes, as well as its relevance to the thesis' research questions. The theme names were aimed to convey the core meaning of each theme well, following Braun and Clarke's [25] indication of that a theme name should directly express what the theme is about. Instances in which a theme's scope closely bordered another, such as with the distinction between privacy in loneliness and the factors reducing its severity, definitions were specifically written in a way that explicitly created a clear boundary between the two themes. The deviant instance identified in Phase 4 was also given a definition in this phase, clarifying the relationship it has to the theme it diverges from.

The last phase of Braun and Clarke's [25] thematic analysis framework is writing the report of the finished analysis. In this part, the stories all the fully established themes tell through the data are concisely formulated and are supported by extracts from the data.

The qualitative data was coded across the entire participant sample using the aforementioned thematic analysis framework, identifying recurring themes related to participants' experiences in the workshop and the Design Method Toolkit, as well as their interpretation of the loneliness challenge. Thereafter,

within each resulting theme it was examined which themes are group-specific (Europe or Global South) and which ones cut across both geographic groups. Through the qualitative analysis, more depth surrounding the quantitative data on the perceived competencies was created, as well as the viewpoints of participants across cultural backgrounds on the various aspects of the workshop.

It must be noted that, as the data of the research consists of various multicultural perspectives and a cross-cultural comparison is made between two regions (Europe and Global South), it was important to be mindful of what position one has as the data analyzer [68]. The researcher who analyzed and interpreted the data has a cultural background lying both in Europe and the Global South, and can therefore be classified as a cultural insider rather than a cultural outsider [68]. Cultural insiders are more suitable for data analysis as they possess more cultural sensitivity to nuances when understanding the meaning of what is said by the participants.

Chapter 4

Results

In this chapter, the results from the formative study (Section 4.1), workshop participant data (Section 4.2), as well as the quantitative (Section 4.3) and qualitative 4.4 data analysis are described.

4.1 Formative Survey

The formative survey created in Google Forms, which was distributed to collect information about what skills the target population was interested in, was filled out by 56 respondents, aged 18 to 41 (M = 24.11, SD = 3.80). Although the target population of this study is 18–29 year olds, the survey was not capped at 29 years old, as data from all adults (aged 18 and above) was useful to BøthOfUs AB. That being said, only four respondents fell outside the target population of the study, with one 31 year old, one 33 year old, one 34 year old, and one 41 year old responding. The majority of the respondents identified as female (30), while 23 respondents identified as male, two preferred not to say, and one identified as non-binary.

As this study is meant to cover multicultural participants, the geographical distribution data includes both the country (or countries) in which the person claimed to live in, as well as all of their nationalities, for a more thorough report. Respondents were based across 13 countries in total, of which the majority was based in the Netherlands (25 participants, 44.64%) and Sweden (20 participants, 35.71%). Most of the remaining respondents were also based in other EU countries, including France (4 participants, 7.14%), Spain (3 participants, 5.36%), Germany (3 participants, 5.36%), Italy (3 participants, 5.36%), Portugal (2 participants, 3.57%), Ireland (1 participant, 1.79%), Romania (1 participant, 1.79%), and Finland (1 participant, 1.79%).

Out of the Global South-based respondents, three were based in Kenya (5.35%) and one in China (1.78%). Moreover, two respondents were located in the United States (3.57%) and overall 10 of the respondents claimed to be based in more than one country (17.86%).

In terms of nationality, the population had a total of 27 unique nationalities (as shown in Figure 4.1). In addition, 23 of the 56 respondents (41%) held at least one non-European nationality, while only 6 respondents were based outside Europe. The vast majority of the respondents were Dutch nationals, followed by Kenyan, German, Chinese, and Italian as the five most represented nationalities.

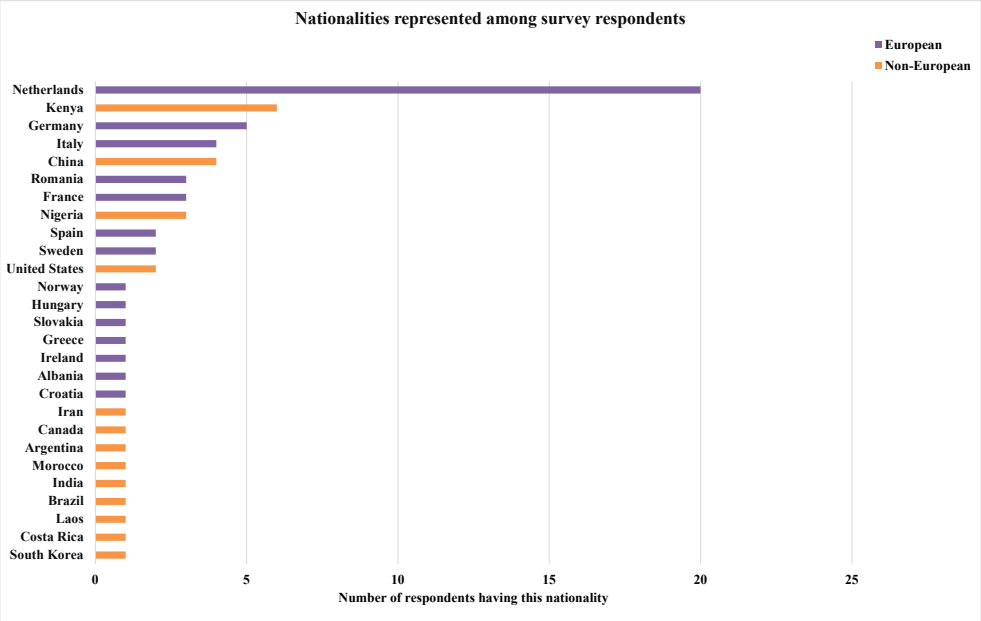


Figure 4.1: Nationalities of the survey respondents. Some participants reported having multiple nationalities.

As the initial plan was to include the workshop developed for this thesis as a part of a wider skills training program catered by BøthOfUs AB, skill interest was measured across four overarching skill categories (UX/UI (User Experience/User Interface), Communication & Interpersonal Skills, Professional & Career Development, Strategic, and Analytical & Project Skills) that participants would be able to choose from in the skills training. The researcher would only facilitate the part that would be relevant for the thesis.

Each skill category had a selection of skills listed under them. These skills

were synthesized beforehand through a brainstorming session in which the objective was to think of skills that are useful to individuals from multiple fields. Then, the skills were categorized to create a clearer overview for the respondents. The survey respondents could choose a maximum of three skills per category. Not every category had the same amount of skills listed, with the UX/UI category having eight options to choose from, while the Communication & Interpersonal Skills had 21 skills listed. This vast difference in the number of skills per category was caused by the open nature of the brainstorm, in which categories were not established yet, and the distribution of skills was only determined afterward.

The UX/UI category was the most important for this thesis, as it was determined beforehand that the results from this category would determine what skill the workshop would aim to teach.

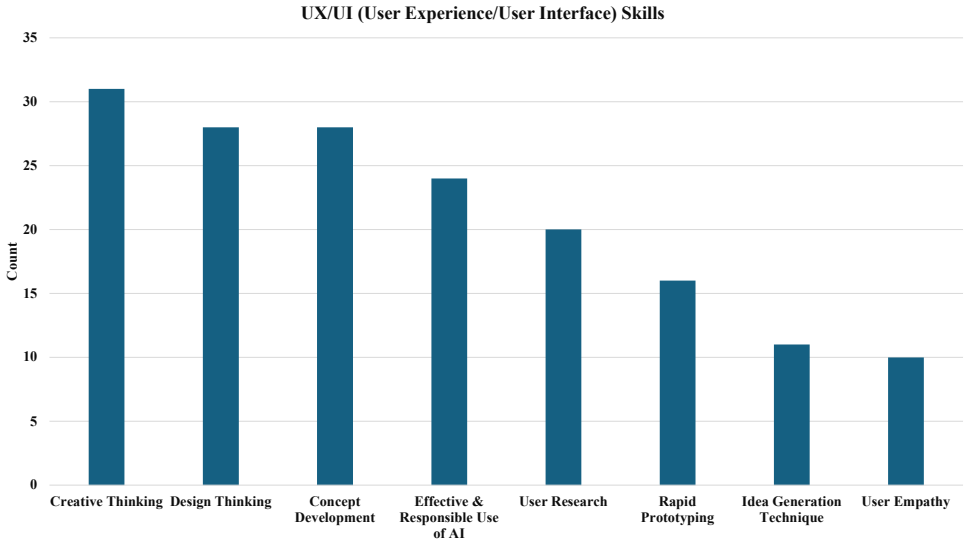


Figure 4.2: Survey results of the skills preferences within the UX/UI (User Experience/User Interface) category

The results (available in Figure 4.2) showed that respondents were mainly interested in learning creative thinking, followed by design thinking and concept development. 'Effective & Responsible Use of AI' was chosen by 24 of the 56 respondents, the fourth most chosen of the eight options. Creative thinking is a more abstract concept, depicted as the thinking process tied to creativity that relies on divergent thinking [69]. The divergent thinking process is less focused and relies on intuition [69]. On the other hand, design thinking is a more structured process, consisting of empathizing with the user,

defining the problem, ideating, prototyping, and testing the solution [7]. For a workshop, the structural aspect of design thinking was deemed as more attractive, especially for an introduction to a new skill. Therefore, design thinking was chosen as the core subject of the workshop. However, the creative thinking process was still preserved as the design thinking workshop utilizes methods from a design method kit, through which participants need to use their creativity. By deciding on a design thinking workshop, most of the other skills listed under the UX/UI umbrella in the survey could also still be incorporated in the process. Concept development is a part of the design thinking process, as well as user empathy and research, rapid prototyping, and idea generation.

Another aspect evaluated was the general preference towards the format of the workshop. Here respondents could select one out of four options: in-person only, online/virtual only, hybrid (mix of in-person and online), or no preference. Results showed that hybrid and in-person were the most preferred, with 30,4% leaning towards the hybrid option and 26,8% favoring an in-person workshop. Meanwhile, online-only was preferred by 25% of the survey population and 17,9% had no preference towards any of the three workshop settings.

4.2 Workshop Participant Data

A total of 14 participants were recruited to participate in the workshop through a WhenAvailable poll*. The poll was filled out by 14 people and an additional two people were interested in participating, but were either unable to participate or did not respond to the reminder to fill in the poll. Additionally, two participants who were initially scheduled to participate, were eventually unable to. Two others were contacted to replace the participants who canceled to assure the workshop time slot had enough participants for team collaboration. The availability spread resulted in a total of three design thinking workshops being organized and facilitated.

In (Table 4.1), the demographics of the 14 participants are described.

*https://whenavailable.com/

Table 4.1: Demographics of the participants of the design thinking workshop, color coded to distinguish between the three workshops

Participant	Gender	Age	Classification	Country of origin	Field of study/work
P1	F	26	Global South	Iran	HCI, HRI, Technology and Health
P2	M	20	European	France	Civil Engineering
P3	M	25	European	Germany, Croatia	Real Estate & Construction Management
P4	F	22	European	Italy	Structural Engineering, Civil Engineering
P5	M	20	European	France	Material Science, Engineering
P6	M	25	European	Sweden, South Korea	Innovative Tech for Healthy Living
P7	M	25	European	Austria	Physics, Computer Science
P8	M	29	Global South	China	Psychology, HCID
P9	M	24	Global South	Thailand	Computer Science
P10	M	30	Global South	Venezuela, USA, Spain	Civil & Architectural Engineering
P11	F	28	Global South	China	Interactive Media Technology
P12	F	23	European	The Netherlands, United Kingdom	Real Estate & Construction Management
P13	F	24	Global South	Sweden, Peru	Civil & Architectural Engineering
P14	F	27	Global South	Uganda	Civil & Architectural Engineering

The first workshop session was attended by seven participants, aged 20 to 26 years old. The majority of the participants in this session was male (5 participants), while two participants were female. Furthermore, the balance between European and Global South participants was uneven, with only one participant from a Global South country, namely Iran. The groups were split into two groups: one of four participants and one of three. Each group had one female participant to assure input from all participating genders within the groups. Due to the uneven number of participants, one group had four members, while another had three. The researcher participated in the 1-on-1 interview as the interviewer and interviewee with a participant of the group of three to assure the 1-on-1 format could still be carried out. Additionally, one participant (Participant 1, see Table 4.1) had to leave early, which resulted in them missing the Test phase. Therefore, there is no data regarding their experience of the Test phase.

In the second workshop, only three participants followed the workshop, as the fourth expected participant did not manage to join the session. Due to these unexpected circumstances, the researcher decided to form a duo themselves with Participant 10 to still allow all planned activities that need more than one team to take place, such as the testing and providing feedback to another team. It must be noted that the researcher was mindful to not let their design experience dominate the team dynamic, given that the original partner would also have been a non-designer. This is noted as a limitation for this specific participant, as it might have affected their experience, and thus qualitative results. In contrast with the first workshop session, the second workshop session only consisted of male participants with Global South origins.

A third workshop was held in which the participant body, in contrast, was all female. Three participants were from the Global South and one was European. Due to an unexpected infrastructure issue at the library, the room originally booked was not accessible at the expected time. In this sense, the participants had to be directly informed of a last-minute room change. This occurrence caused this session to have a different environment (project meeting area in another KTH university building) than the previous two sessions, which were both held in the same library project room, and did not allow for access to a large screen, prompting the researcher to present the slides on their laptop instead. This is reported for transparency in reproducibility, and the researcher acknowledges it also a limitation, since this group had a slight different experience which could have affected their qualitative results.

In every session, there was a diverse combination of fields of study or work, making multidisciplinary collaboration take place in every workshop.

The varying availability across the time slots, however, caused an uneven distribution of the number of participants, gender, as well as the balance between European and Global South participants.

As the study was conducted in Europe, the likelihood of more Europeans signing up was high. In an effort to capture meaningful Global South representation, all participants having at least one Global South nationality were classified solely as a Global South participant in this study. This resulted in an even split, with 7 European participants and 7 representing the Global South.

Another participant data point that must be included is the time it took for each participant to send in their voice notes to the researcher after their respective workshop session took place. The time it took to receive the voice notes per participant varied, as some participants forgot to send them and had to be reminded a few times. Below a table can be found specifying how many days after the workshop it took to send in their voice notes.

Table 4.2: Days between the workshop and voice note submission, per participant, grouped by session

P	Days
1	1
2	2
3	3
4	3
5	3
6	0
7	13

P	Days
8	8
9	6
10	21

P	Days
11	11
12	1
13	1
14	10

4.3 Quantitative data analysis

The quantitative data from the questionnaire consisted of the 5-point Likert scale statements in the pre-workshop section and the post-workshop section. These statements were the following:

1. I know what design thinking is.
2. I feel confident interviewing someone about their experiences.
3. I know how to define a problem from a user's perspective.
4. I feel comfortable generating creative ideas in a group.

5. I understand what a prototype is in a design context.
6. I know what HCI (Human-Computer Interaction) means.
7. I feel that design skills are relevant to my field of study or work.
8. I am aware of challenges young people face with loneliness in Europe.

After calculating every average Likert-scale score per statement from the pre- and post-workshop and per geographic group, the impact of the workshop was measured by determining the change in score averages. This was determined by subtracting the pre-workshop scores from the post-workshop scores per statement. This was done for the overall participants, but also per geographic group. The resulting data has been synthesized in (Table 4.3).

Table 4.3: Pre- and post-workshop mean Likert-scale scores per statement, overall (left) and by geographic group (center: European; right: Global South)

St.	Pre (All)	Post (All)	Δ	Pre (Eur.)	Post (Eur.)	Δ	Pre (GS)	Post (GS)	Δ
1	2.6	4.7	**+2.1**	2.1	4.7	**+2.6**	3.1	4.7	**+1.6**
2	3.5	4.1	**+0.6**	3.1	4.1	**+1.0**	3.9	4.0	**+0.1**
3	3.5	4.3	**+0.8**	3.3	4.4	**+1.1**	3.7	4.1	**+0.4**
4	3.7	4.4	**+0.7**	3.9	4.4	**+0.5**	3.6	4.3	**+0.7**
5	3.5	4.8	**+1.3**	2.9	5.0	**+2.1**	4.1	4.6	**+0.5**
6	3.1	4.0	**+0.9**	2.3	3.7	**+1.4**	3.9	4.3	**+0.4**
7	3.8	4.3	**+0.5**	3.4	3.9	**+0.5**	4.1	4.7	**+0.6**
8	3.4	4.4	**+1.0**	3.6	4.6	**+1.0**	3.3	4.3	**+1.0**

4.4 Qualitative data analysis

A total of 548 distinct codes were applied across 580 quotations across the questionnaire and voice note data (Table 4.4).

Table 4.4: Overview of the coded data

Measure	Questionnaires	Voice notes	Total
Quotations	345	235	580
Code applications	354	237	591
Distinct codes	318	232	548*

*Two codes were applied in both data sources; the total reflects each counted once.

The thematic analysis resulted in twelve themes. Each participant is referred to by their respective participant number assigned to them in Table 4.1.

Before presenting the twelve themes, it is important to mention a straightforward pattern that did not receive its own theme. Out of the four Union of Skills competences named in the fourth voice note question, creative thinking was the only competence unanimously confirmed as being practiced during the workshop. This competence was most commonly mentioned to be trained through ideation or another specific method, with P5 linking it to "some drawings" they did, and P6 to "the storyboard, coming up with a story or design or idea for the prototype." P11 described it as going beyond imagination, stating that it is "not just in using the imagination but also we create something and we test a bit about our creative thoughts." Critical thinking was also acknowledged as being trained by nearly all participants, with two exceptions, but neither this competence nor creative thinking presented the level of variation found in civic competences and digital skills, which are discussed in Themes 5 and 6.

4.4.1 Theme 1: Expertise gap

The first theme identified captures the notion of prior exposure to design thinking or related fields shaping the engagement of participants with the workshop. While the workshop was intended for non-designers, four individuals proved to have extensive prior professional or academic grounding in design thinking or closely related processes.

P1 had worked as a UX/User Interface (UI) designer and researcher, having previously performed participatory design work with vulnerable user groups, and provided a very precise definition of design thinking in the pre-workshop questionnaire: "the creative process of creating a product, platform, or even research from start to finish. It can include brainstorming, defining problem statements, making Minimum Viable Product (MVP)s or prototypes, testing and iteration." In contrast, participants without this background estimated or most commonly guessed the definition of design thinking. Similarly, P8 also gave an accurate description pre-workshop ("a process where ppl (e.g., end users, designers, engineers, and other stakeholders) define the problem and generate prototypes solutions iteratively. Divergently create ideas and then narrow down to certain plans."), having had prior applied design thinking experience through a design-related course and had used design thinking for redesigning a childcare center's service flow in a group project.

P9 and P11 also proved to have design expertise through prior experiences, with P9 stating they wanted to participate to "refresh some memories about design thinking," and had ideated and tested technical solutions before for a web app, and P11 describing participation in a master's course in which they had "prototyped a low-tech wearable device," apart from currently conducting an HCI study.

Notably, all four participants filled in "Agree" rather than "Strongly agree" to the statement "I know what design thinking is" on their pre-workshop Likert scale assessment, despite the prior academic or professional experience with the process.

The prior experience, however, appeared to have varying effects on the way the four participants evaluated the workshop afterwards. P1 indicated that, while "most of the things were familiar", some specific elements were still novel to them. Meanwhile, P8 provided a methodological reflection on the empathizing process, indicating that it was "hard to make people from different cultural backgrounds fully empathize and understand each other within a short period of time," and was the only participant making note of a potential limitation of the study itself, voicing that it is "possible that the responses in this questionnaire will change if the design topic changed in this workshop." P9 noticed their perception of the possible contexts design thinking can be used in was broadened after the workshop, having learned the process in the context of the business field: "design thinking was only taught to me in business perspective. This changes the idea of how design thinking can be used." P11 reported that, despite their reported previous experience and HCI background, they learned new things: "I got a complete view of the design process, and learned new design methods."

It must be noted that this theme is based on only four of the fourteen participants, and is thus not presented as a majority pattern, but substantial nonetheless as a third of the total population. Additionally, it is relevant to the interpretation of the outcomes of this study as it suggests that participants who enter the workshop with sizable prior experience may evaluate the workshop differently compared to completely inexperienced participants. This is viewed as a relevant consideration when interpreting the self-reported learning gains for the participant sample of this study.

4.4.2 Theme 2: Relocation, not culture

Another theme established through the data concerns the reasoning as to why the loneliness challenge felt relevant to participants. Rather than attributing its

relevance to cultural reasons, multiple participants referred to the experience of relocation as a factor contributing to loneliness, by having moved away from their trusted social network, either internationally or domestically.

This pattern was most explicitly expressed by P14, who noted that the challenge was "100% relevant because I just moved here and experienced it myself." P1 similarly described their experience, stating that "there are still moments where the loneliness hits, even when I'm surrounded by people," which was a feeling specifically connected to living "far away from my parents and childhood friends" rather than a factor related to loneliness in their home country. P12, an international student, had a response that followed this narrative, indicating that this challenge felt "very relevant to us as international students, having to move abroad and then having to find new friends, new community." P3 and P4 further enforced this theme, with P3 highlighting how "moving to a new city and how organized events helped connecting with people" were relatable aspects of the loneliness challenge for them, and P4 described the challenge as "very relevant considering I'm a student living abroad far from my friends and family."

This theme notably shows up in both geographic groups, rather than specifically one of both. P1 and P14 were classified as Global South participants, while P3, P4, P12 were classified as European, yet all five describe the same underlying factor that gives relevance to the challenge for them. This suggests that within this population of young, mostly internationally mobile participants, relocation may matter more than cultural background alone for the perceived relevance of the challenge. It also suggests that the differentiating factor of Europe versus the Global South may not be the main factor in explaining the relatability of the design challenge.

4.4.3 Theme 3: Loneliness, between privacy and openness

The third theme describes how discussing the topic of loneliness sits on a spectrum between privacy and openness, and the varied mechanisms determining its position within this spectrum, in turn shaping the way participants experience dealing with loneliness. One participant (P7) did not address the factors of openness or privacy in loneliness, deciding to only describe the relevance of the loneliness challenge instead. The following draws on the thirteen participants who did address privacy or openness as factors in loneliness.

Several participants noted that loneliness was something kept private or

surrounded taboo. French participant P2 stated that "I never really talked about it to people," and indicated that it is "maybe okay to people you're very near with or like with very close friends," but that "we cannot really talk about it in public" as it would be "a bad scene." Another French participant, P5, reinforced this, stating that loneliness is "not really spoken about in France, like in school or whatever." P4 directly linked the silence surrounding the topic to shame: "nobody is talking about it because they're ashamed," an idea reinforced by P14: "people don't want to be vulnerable." P9 acknowledged a more specific distinction in Thailand, with formal stigma not existing, but reluctance to discuss loneliness simultaneously being present: "loneliness is not a taboo in Thailand, but people are not really willing to openly talk about it that much." P10 and P13 comparably framed the situations in Venezuela and Sweden respectively as privacy or taboo, with P10 voicing that "it's not really a topic people bring up," and P13 addressing shared awareness of loneliness under the public silence in Sweden regarding the topic: "I think everyone deep down knows," referring to the notion that that feeling lonely is normal, despite it not being spoken about.

P3 identified a related case, which can be interpreted as a paradox between openness and stigma, stating that "in Germany, and generally in the Western world where it's probably discussed the most openly, I would say that it still has a bit of a stigma," suggesting that openness of discussion and freedom from judgment are not the same thing.

Furthermore, the mechanism of relational closeness was identified through accounts from P3, which make it clear that openness depends more on the level of closeness in a relationship in order to discuss loneliness than on national culture. P3 indicated that "if it's your friends I would say it's easier to talk about the topic, but if it's with strangers or people you don't know that well, it might be a bit more difficult to open up," a pattern they also linked to the workshop, explaining that already knowing almost everybody in the session, and being friends with most of them, made it "easier to open up with them." P3 observed a further effect to this: "if you face loneliness, then you might not even have people that you can talk with" in the first place.

On the other hand, other participants described the opposite, which was genuine openness surrounding discussing the topic. P6, who has Korean and Swedish heritage, highlighted the contrast within their own background, noting that the "white side" of their family was "more open to talk about it," while their Korean side was more private about it. P1, while not originally from Sweden but based there, felt that "in Sweden it is something that people talk about quite openly." Quite interestingly, this characterization of

Sweden as a country where it is talked about more openly was not shared by P13, who has Swedish heritage and described their situation as the exact opposite. Furthermore, P11 indicated that it is "not a very shameful or hidden experience, at least among the young generation" and that technology further supports the openness among younger people regarding the topic: "people will talk about it openly and also use an app or other software to meet new friends."

Another mechanism highlighted the generational change surrounding the topic over time, with P14 describing a shift towards openness happening within their respective culture, noting that "these days there is less stigma surrounding the mental health conversation in Uganda."

Lastly, two other specific mechanisms were identified. P13 described that concern for a lonely friend is usually expressed without ever naming loneliness directly. Another distinct pattern emerged in P12's description of how openness depends on personal timing rather than attributing it to culture, claiming that it is talked about "after the facts," meaning that "people tend to keep private when they are actually experiencing loneliness," and said that "later on they will talk about it" once a person is "more comfortable and actually less lonely."

All in all, the presented evidence shows that the discussion surrounding loneliness in this sample is shaped by a multitude of mechanisms: cultural norms, the simultaneous existence of openness and stigma, relational closeness, generational change, communication style, and individual timing.

4.4.4 Theme 4: What increases or reduces the likelihood of loneliness

Several fragments from participant data discuss what factors increase or reduce the likelihood of loneliness occurring in a given context. These factors included family structure, size of the country's population, and the norms in giving support in communities.

P10 and P11 both noted investing in family as a factor, with P10 describing their national culture as one with a strong family culture that reduces the possibility to feel lonely, and P11 reasoned that the cause of lower loneliness among the older generation in China is that people "put a lot of effort to build a family." Another account on China from P8 pinpointed the country's population scale and collectivist values: "China's large population and rich variety of leisure activities provide many opportunities for people to find communities," and people "naturally see themselves as part of groups." P9 highlighted the norm of providing support to one another in Thailand: "people

are willing to help each other more." P14 noted that community familiarity is built over time in Uganda and suggests that the community will only be a protective factor if one is familiar, but that this factor is initially absent for newcomers: "for someone who is new to a community, it (loneliness) would be there in the first period you're there," but "as time goes on, people are warm and you become friends instantly," after which "it's very rare to have it because everything is familiar."

Other participants shared factors that increase loneliness. P4 expressed that social pressure towards extroversion is isolating for introverts: "if you are an introvert, people feel like you're weird mainly. So they kind of isolate you,". In their view, it should be placed alongside bullying in schools and physical accessibility barriers, as well as lack of caregivers enforcing loneliness among the older population in Italy. Meanwhile, P13 described the culture in Sweden as reserved, particularly in the larger cities, and observed how it contrasts with more extroverted southern European countries, establishing that this makes it "more easy to feel lonely" due to smaller social circles and fewer shared social events. P8 recognized that both migrant workers and those living away from their hometowns in China "may be more vulnerable to feelings of loneliness and a lack of belonging" in China's megacities. P7 acknowledged the social narrative that is stereotypically pushed, especially within student life, oftentimes contrasts with the actual lived experience of many people and its impact: "everybody is talking about how it's the best time and you will make so many friends, but some people seem to have struggles with that and then may feel left out a lot."

Thus, factors such as family values, community support, population size, social norms in providing support, and social or physical accessibility all have an influence on the likelihood of loneliness.

4.4.5 Theme 5: Civic competences were defined, but not consistently certain

The fourth question for the voice notes participants answered was: "The EU identifies critical thinking, digital skills, creative thinking and civic competences (i.e., being an active member of your community) as key skills for young people today [1]. Do you feel today's workshop trained any of these, and if so, which ones and how?" The definition of civic competences was explicitly provided, as it was expected that this term would not be equally familiar for all participants. This theme concerns the notion that the definition might not have provided sufficient self-assessment confidence among all

participants. Additionally, three participants (P1, P8, P11) did not address civic competences at all in their response.

Multiple participants applied the definition confidently and provided specific reasoning. P4 discussed practicing civic competences in the workshop through working in a group: "applying civic competences in order to cooperate to arrive to the common goal." P6 also voiced that civic competences were trained, stating that working in a group equated to "being an active member of that community" to them. P7 tied practicing the competences to methods that require collaboration: "having certain methods that actually force you to do it in a group," mentioning "brain writing" specifically as an examplar method for this, and stating that it "becomes a more meaningful thing than if you maybe would have just done it alone" due to collaborating while practicing the method. P10 identified the practiced competence of empathy as a civic competence, highlighting that "getting into the mindset of other people, understanding other people's problems, and being engaged in your community in a way that is not just completely self-centered" are competences that can be classified as civic competences. P14 felt that the workshop "developed and strengthened" their civic competences regarding inclusivity and providing community support: "it made us think of how we can support people in our communities and create more inclusive environments." P2 and P12 agreed that there was a presence of the civic competences through broad claims, rather than providing elaboration: "yes, we trained all of these" (P2) and "those were definitely key skills" (P12).

On the other hand, other participants were less certain, despite a definition being formulated in the question. P5 said: "I don't really know of being an active member of a community, but I think that the debates go in this category," thereafter confirming the workshop helped with debating skills. P13 also expressed uncertainty: "I don't know if we really trained... the civic competences, but definitely it made one think of them." Furthermore, P3 clearly stated: "I actually don't know what exactly civic competences means," and P9 determined that they did not feel civic competences were trained due to the low amount of people involved in their specific session (the workshop consisting of three participants): "not so much because there's not so much people in the workshop that you feel (or) act (as) being active for a community."

As a whole, the answers range from confident and reasoned, to uncertain regarding the definition, to providing a reasoned rejection. This suggests that the difficulty might not have lain in understanding the term, but rather in connecting it to the small-scale workshop experience.

4.4.6 Theme 6: Digital skills, absent by design

The sixth theme established was about the agreement across some of the participants regarding absence of digital skills training in the workshop, ascribed by the participants to the workshop's paper-based format, rather than to how the workshop was designed or facilitated. Three participants (P1, P8, P11) did not address digital skills in their responses.

Six participants clearly stated that digital skills were not trained, most attributing this to the paper-based format. P4 indicated that the workshop trained "almost all of them, except digital skills because we were not working on computers, we were mainly working on paper." P6 and P10 gave an almost identical clarification, with P6 saying "everything we did was paper and pen" as a reason for its absence, while P10 said the skills were not "touched upon at all. Most of the things we did were, talking openly, using pen and paper, and colors." P5, P7, and P9 also confirmed its absence, without providing further elaboration.

One participant contradicted these consistent claims, making the statement "yes, we trained all of these," without however providing any argumentation.

Two other participants confirmed the presence of digital skills, but only incidentally. P3 stated that their group's solution happened to involve digital skills, as the group had designed an app, but "that was only because of the approach that we chose and it could have been a different approach that didn't use any digital media," indicating that it "is probably out of the four ones what we trained the least." P14 noted that it was "less central in my opinion. Although we got to use some methods that maybe require some digital devices." P14 did not specify which methods this referred to. In the Empathize phase, P14 used the 1-on-1 interview and the Break up/Love letter method, and in the later phases their group used the Empathy map, Brain writing, Storyboard and Harris profile methods.

P12 and P13 were uncertain about the skills' presence, with P12 being "not entirely sure how the digital skills were integrated in this specific workshop," and P13 stated that they "don't know if we really trained the digital skills," but that "it made one think of them."

In conclusion, the participant accounts imply that the digital skills mostly being claimed as absent in the workshop can mainly be attributed to the workshop's design deciding to use paper-based materials, rather than that the design thinking process being inherently unnable to include or teach digital skills.

4.4.7 Theme 7: Empathizing is difficult, for two different reasons

Across participant data, the Empathize phase was widely considered a challenging phase of the design thinking process, for two distinct types of reasons.

A part of the participant body ascribed this difficulty to the emotionally exposing aspect of the phase. P4 said that the Empathizing phase "was the most challenging because is also the start of the process and it always brings something out of yourself." Similarly, P12 described it as asking you to "relate to the problem yourself and be vulnerable."

Other participants expressed that the phase is difficult in a cognitive sense. P1 claimed that it is "hard to genuinely remain neutral with no bias, and listen to what matters to the user." P8 indicates that cross-cultural empathizing is especially complicated, stating that "it's hard to make people from different cultural background fully empathize and understand each other within a short period of time," specifically for "experiences or perspectives they've never personally encountered." P8 also made a cautionary note to keep in mind when empathizing, highlighting how complex the process truly is: "Empathy is extremely challenging, and we should be cautious about assuming that we fully understand others' experiences and perspectives. True empathy requires continuous effort and reflection."

Both types of difficulties encountered while empathizing hold valuable implications for facilitation guidance, indicating that addressing one type of difficulty does not directly resolve the other.

4.4.8 Theme 8: Disagreement on pacing

Two aspects of the workshop design related to its pacing were frequently commented on: the length of the workshop and the number of method choices offered per design thinking phase in relation to the length. A notable level of disagreement was noticed between participants regarding these two aspects.

Regarding the length of the workshop, the majority who commented on the aspect wanted more time. P2 shared "maybe more time but it was really good overall," P3 suggested to "increase time or make presentation more concise," and P7 proposed "more time," as a possible improvement. P4, P6, and P10 all asked for the possibility to explore each phase with more depth, with P4 suggesting to "extend the time duration, having more time to explore each phase options," P6 requesting to "maybe make it a little longer to really dive

into each step in depth," and P10 preferring a longer workshop "to fully dive deep into each phase," paired with "adding some breaks" to avoid having to rush through the content.

Meanwhile, P8 requested more time, but for getting to know their fellow team members instead: "taking more time to get to know team members before and during collaboration is important," adding that "building trust and mutual understanding" makes it "easier to work together effectively."

Two other participants in contrast indicated that the workshop was too long, with P5 being of the opinion that "three hours is a bit long and maybe after two hours you can lose the attention of the people," suggesting the workshop to be made "shorter with a bit less activities," and P9 similarly voiced that the workshop felt "a bit too long."

Another disagreement between participants, which was distinct but related, was regarding the amount of method choices offered in each phase. P3 stated that the choice of methods made it "harder since we need to consider which method to use," but also appreciated the degree of autonomy given, expressing that it is "generally good to give the choice." P7 and P12 both proposed solutions regarding method selection connected to saving time, with P7 saying "less methods to be evaluated," as an alternative to offering "more time," and P12 suggesting that the possibility of choosing methods should be removed in its entirety, instead offering a fixed set of relevant methods followed by everyone "so it's easier to finish the workshop on time." Furthermore, P9 voiced that the time constraint slightly limited the method choice effectiveness, but that the ability to choose methods was still "the most effective part of the workshop," despite the time factor.

Lastly, time pressure was also named for specific phases by two participants. P9 expressed that the length "feels too short for the test phase to be thoroughly enough," and P11 experienced the Lotus blossom method as "harder in a time-limited step."

The disagreements within the aspect of workshop length and method choice in relation to time are tensions within the participant feedback that do not produce one clear recommendation to move forward with. Relating the positions to the participant backgrounds in Table 4.1, the six participants who asked for more time or depth to work through the phases (P2, P3, P4, P6, P7, and P10) were all among the ten participants without substantial prior design thinking experience (Theme 1), while none of the four participants with such experience made this request. Region and field of study or work did not divide the positions in this way, which is discussed further in Section 5.1.2.

4.4.9 Theme 9: Hands-on delivery and clear instruction, consistently praised

Several elements of the workshop were consistently praised by participants across the three hosted sessions.

Firstly, the hands-on aspect of the workshop was valued over theoretical delivery. P2 expressed that this aspect in combination with loneliness among young people as the challenge made it feel "real because we actually now know how to use it." P7 similarly valued this: "active doing, having an actual case study and working on that. So you have the feeling of actually solving a real world problem instead of just talking about different procedures theoretically." P10, P12, P13, and P14 answers were also in agreement with this. P10 acknowledged that "doing it all hands-on was very effective," P12 found "actually having to do all of the things" to be effective, P13 specifically mentioned enjoying "the interactiveness of the workshop," and P14 experienced prototype generation as "engaging and fun," rather than "difficult and boring," as they had expected. Additionally, P14 also praised the workshop's format, expressing that "being an interactive and creative workshop made it much easier" to participate.

Another consistently appreciated aspect was the clarity of instruction. P3 expressed that "the steps were clearly explained so we knew what to do." Additionally, P4 said "there was a big explanation between every step so everybody could fully understand what they were going to do," and that this assured that everybody "had the objective clear in their brain" before starting. P13 gave praise to the presentation and its supplementary examples, saying "it was easy to follow thanks to the PowerPoint! Good with the examples!" P9 also agreed on the point of ease, stating that the workshop's presentation of the design thinking process made it "easy to digest and learn."

Despite P9's appraisal, one suggestion to improve engagement and interactivity during the introduction of the workshop was made by the participant: "I feel at first it was a bit boring I would say, but maybe it's because you have to explain everything. But I maybe would make it more interactive or maybe make people think 'What's gonna happen next?' Like there's not enough hook before going to methods."

Thus, hands-on delivery and clarity of instruction were consistently confirmed as consistent strengths of the workshop by the qualitative data in all sessions, with one participant making a suggestion to improve the engagement and interactivity in the introduction of the workshop specifically.

4.4.10 Theme 10: Differing session sizes shaping perceptions

The participant availability determined the group sizes, which varied across the workshop: one group had seven participants (P1-P7), a second had three (P8-P10), and a third had four (P11-P14). This variation is reflected in the qualitative data.

P7, part of the session with the highest attendance, answered the question on whether anything about the workshop format made it harder or easier to participate by stating that "the group size was good." P9, part of the session with the lowest attendance, answered the same question in two parts: "Yes" for the way the workshop presented design thinking, which was "easy to digest and learn," and "No" for how the workshop was "designed for a small group of participants." P9 therefore perceived the workshop as designed for a small group, which is read here as an aspect that increased difficulty in participation. This assumption of the workshop intentionally catering to a low amount of participants, while in reality not occurring purposely and not being part of the workshop design, was only made by a participant from the session with the lowest attendance. A consequence of this group size discrepancy was that it also impacted other parts of the workshop experience as well, with the same P9 crediting the low attendance for limiting the community feeling, and in turn, the lack of practicing civic competences: "there's not so much people in the workshop that you feel act being active for a community."

These differing experiences are therefore likely due to the vastly different conditions participants experienced in group size, rather than merely due to their standalone, personal standards for group size, and is further touched upon in the Discussion (Chapter 5).

4.4.11 Theme 11: Difficulties synthesizing information using the Empathy map

Several participants voiced that they experienced difficulties synthesizing and organizing information using the Empathy map method, which was one of the method options for insight sorting in the Define phase.

P2 described it as "the most challenging" part of the whole design process, and P5 and P12 both identified that the structure of the method caused difficulties, with P5 stating that there were "many colums/part we need to fulfil so it's a bit complicate to find many ideas," and P12 saying that despite it helping with organizing thoughts, it was "difficult to equally fill all sections."

Additionally, P9 indicated that it was “hard to categorize some topic that came up” into the Empathy map.

This suggests that the difficulties while using the Empathy map lie in the high cognitive load required while structuring the data into the fixed template. These appeared through difficulties when categorizing the high amount of sections in the map, and not having data that seemed to fit certain sections causing the imbalance in how completely filled each section was.

4.4.12 Theme 12: Transferability is expected by almost all participants

Another theme established through analyzing the data was how almost all participants were confident the acquired design thinking knowledge would be applied by them beyond the workshop. Participants had a reuse intent of the knowledge for a wide range of professional applications, including HCI/HRI research (P1), medical engineering (P6), interpersonal dynamics in professional teams (P8), architectural and civil engineering (P10, P13), user research (P11), and user-centered project work (P14), among others.

However, one participant (P4) from the structural engineering field explicitly indicated twice that the workshop’s methods would not be applicable in their work: “probably not because my job is very standardized. We mainly follow the laws and regulations in structural design,” and also further expressing “I don’t think there is a real situation where I can actually apply the methodologies we used for my future job,” due to their future career being “mainly based on legislation concerns.” Furthermore, in their perception, the methods felt tied to designing a specific product, rather than being generally applicable, saying “you can use this only if you have to probably design a product.” Other participants from civil and architectural engineering fields were more positive about applying design thinking in their work. P10 could see it being used “to help solve problems in the user experience of a building,” and P13 answered “Definitely! In civil engineering for sure.” P2, also from civil engineering, described it as “more an architect’s job,” but noted that civil engineers are also part of the design process, “trying to assess the user needs of the space.” P4 was the only participant who named laws and regulations as a reason for limited applicability, which is based on their own description of their future job.

Another participant was more nuanced rather than skeptical. P12, following a study program in real estate, did overall not view the methods used in the workshop as relevant to their field, generally preferring other

frameworks: “I find other methods e.g. SWOT more appropriate for my field easier to use.” However, the Persona method was deemed as undoubtedly useful to their real estate work due to the less directly personal nature of the method (“if you’re making a persona, it’s easier to relate to, but it also keeps your private life private”), therefore making it “very relevant for real estate.” This example illustrates that even when a workshop generally has a low perceived transferability to a field, it does not directly imply every part of it to be not useful or irrelevant.

To conclude, the overall transferability of the workshop was perceived to be high, with most participants identifying relevant aspects, and two (P4, P12) seeing limited relevance to their field.

Chapter 5

Discussion

This chapter discusses and interprets the findings from Chapter 4, connecting them to the four sub-research questions from Chapter 1 which support this thesis. The main research question is answered in the Conclusion (Section 6.1). Themes 2 to 4 concern the participants' views of loneliness itself, rather than the workshop and are not further discussed here, as they are not tied to the four sub-research questions. Limitations are discussed in Section 5.6.

5.1 Structuring a design thinking workshop for non-designers (sub-RQ1)

This section discusses the findings relevant to how a design thinking workshop should be structured to introduce design thinking to non-designer young adults, in relation to the four related studies on design thinking for non-designers as discussed in Section 2.2.3, as well as the findings specific to this study's implementation of the DSS Design Method Toolkit.

5.1.1 Process difficulties

Firstly, it was observed that in this study participants indicated that the Empathize phase was generally experienced as a challenging phase through Theme 7 of the thematic analysis, either emotionally or cognitively. This contrasts with Henriksen et al.'s [11] findings, who did not report any difficulties with the phase. This difference may be attributed to their participants working with self-selected problems related to their own professional practice over the span of an entire semester [11]. In comparison, this study's participants did not self-select the challenge, instead being

assigned a recognizable, but not necessarily personally relatable challenge (loneliness among young people) within a single, three-hour session. The latter is arguably a harder task, in line with P8's indicating that cross-cultural empathizing specifically is difficult "within a short period of time." However, Henriksen et al. did not describe their participants as cross-cultural, as they were graduate students in one online course who empathized with users in their own professional context [11]. The cross-cultural composition of the groups in this study may therefore also have contributed to the difficulty, and the type of challenge, the available time, and the cross-cultural composition cannot be separated as explanations.

On the other hand, the difficulties with empathizing were consistent with Morehen et al. [12], who similarly found non-linear, empathetic thinking difficult for non-designers. The two difficulties reported in their study, fear of failure and team leadership negotiation, however, did not emerge in this study, possibly due to the short timespan of this workshop not allowing for these difficulties to emerge compared to their long-term undergraduate course.

The difficulties synthesized in Theme 11 during the Define phase closely matches some results of Guaman-Quintanilla et al. [10], who found that the Define phase was also experienced as one of the least pleasant phases, due to the cognitive load that convergent thinking required. This theme also aligns with Henriksen et al. [11]. Despite the overall positive findings in their Empathize phase, they reported difficulties specifically in the Define phase, with one participant calling it "the hardest step for me," struggling to "narrow it down without being too broad or too constrained." This is a phenomenon that also emerged in two of the four related studies: convergent phases heavily relying on synthesis are difficult for non-designers, not necessarily tied to the specific toolkit being used.

5.1.2 Pacing and time

The disagreements shown in Theme 8 regarding workshop length and the option to choose methods are not addressed by any of the four related studies. Most studies were conducted over the span of a semester or multiple days [10, 11, 13], which avoided any time pressure that may arise from a single session. On the other hand, Morehen et al. [12] ran a two-hour workshop and did not report pacing as a theme either. For the existing literature body, this suggests that pacing might not be a point of examination in general, especially for longer design thinking formats that allow for more dedicated time towards the design thinking process.

Specifically, for the DSS Design Method Toolkit, however, the suggested time indications on the method cards provide a strong reason behind the time pressure frequently experienced by the participants, with most of the toolkit methods used in the workshop having an indicated duration of one hour or more [16]. Despite all the methods being completed within a shorter time, this suggests that the methods included in the toolkit are likely more suitable towards longer design thinking interventions to reduce the time pressure felt by those participating.

The preferences in Theme 8 can also be set against the participant backgrounds in Table 4.1, only to look for a possible reason behind a pattern and not to prove a relationship, as the groups are very small. The six participants who asked for more time or depth to work through the phases (P2, P3, P4, P6, P7, and P10) were all among the ten participants without substantial prior design thinking experience, as were the three who found choosing between methods harder (P3, P7, and P12). A possible explanation is that participants less familiar with design thinking needed more time to understand, choose between, and apply the methods, while those with prior experience could work through them faster. The pattern is tentative, however, as P5 also lacked prior experience but found the workshop too long. Moreover, the third workshop, in which none of the three participants without prior experience (P12, P13, and P14) commented on the overall length, was also the all-female one, so neither prior experience nor gender can be fully separated from the workshop attended. Region and field of study or work did not separate the positions.

5.1.3 What worked consistently

Theme 9 exposed that hands-on delivery and clear instructions were praised by the participants, and these responses were consistent with findings from the four related studies [12, 10, 11, 13]. Collectively, this convergence illustrates that applied, experiential engagement can be highly valued across varying design thinking interventions. The preference for hands-on work over theoretical delivery (Theme 9) can also be related to Freire's [70] contrast between "banking" education, in which students receive, memorize, and repeat what the teacher narrates, and praxis, "the action and reflection of men and women upon their world in order to transform it". This remains a loose parallel: Freire writes about the education of oppressed people and treats action without reflection as activism rather than praxis, while the comments in Theme 9 describe the doing but not reflection on it, so this study cannot show

that the workshop worked as praxis.

5.1.4 Variation in participants not addressed by related work

Theme 1 (expertise gap), Theme 10 (differing session sizes shaping perception), and Theme 12 (transferability is expected by almost all participants), all directly relate to the heterogeneous participant body of this study, with workshop sessions being varied in size, as well as the people taking part, who brought varying amounts of prior knowledge and originated from different fields. This variation is not seen in the four related studies, as the studies consisted of single institutional cohorts. The findings suggest that publicly recruiting as done in this study, rather than from one class or study, may produce a more varied non-designer sample than existing studies would typically evaluate, and that transferability does not depend on the field as a whole and rather on the constraints in the field. This is a valuable consideration for future non-designer design thinking research that recruits beyond a fixed, homogeneous institutional population.

5.2 Measurable improvement in perceived HCI skill competencies (sub-RQ2)

This section discusses the quantitative Likert-scale findings (refer to Table 4.3), addressing sub-RQ2, in combination with the qualitative findings from Theme 1 where relevant, as well as compared to two related works from Section 2.2.3 that include a comparable self-assessment of measured skill outcomes. Differences between the two geographic groups are discussed in Section 5.3.

Two related studies have similarly performed self-assessment for skill/competence improvement. Guaman-Quintanilla et al. [10] describe the perceived skill improvement of students in their study as “highly satisfactory” across all six measured skills (human-centered problem solving, prototyping and validating, creativity, communication, teamwork, and getting out of comfort zone). In Noweski et al. [13], the design thinking condition similarly had positive implications, with gain-scores in 18 out of the 21 social-competency scales favoring the design thinking condition, with four reaching statistical significance ($p < .05$) and four scales approaching it ($p < .1$).

While this study’s design does not have a control condition that allows

for statistical comparison, due to the exploratory and qualitative nature of the study, the positive direction of the post-workshop Likert-scale scores compared to the pre-workshop scores across the eight statements, as seen in Table 4.3, aligns with the overall pattern of improvement both studies report. I.e., gains from self-assessment are seen across all competencies rather than being concentrated in only a few. Evidently, there was not a single statement across the eight Likert-scale statements in this study that maintained or lowered its score in comparison to its analogous pre-workshop results.

Overall, the results support a positive answer to sub-RQ2: self-assessed scores increased on all eight statements across both European and Global South participants, which is in accordance with the positive outcomes in the two related studies [10, 13].

5.3 Differences between Europe and the Global South (sub-RQ3)

This section discusses the differences in skill development and the workshop experience between European and Global South participants, based on the findings described in Chapter 4. The Likert-scale questionnaire scores (Table 4.3) addressed the differences in skill development, and the qualitative themes reported on the participants' experience.

5.3.1 Differences in the quantitative results

Several interesting observations can be made regarding the gain scores between the geographic groups. As these differences were not submitted to statistical analysis, they are interpreted and discussed here only anecdotally concerning the current sample, rather than generalized or representative of their respective demographics.

Firstly, five of the eight statements showed quite uneven gains, with European gains exceeding Global South gains by 0.7 or more points across five of the eight statements. These statements include Statement 1 ("I know what design thinking is"), Statement 2 ("I feel confident interviewing someone about their experiences."), Statement 3 ("I know how to define a problem from a user's perspective"), Statement 5 ("I understand what a prototype is in a design context"), and Statement 6 ("I know what HCI (Human-Computer Interaction) means").

The largest difference in gains was found for Statement 5, with a gain of

+2.1 in the European group compared to +0.5 in the Global South group. In all five of these statements, the Global South group also started from a higher pre-workshop score, by 0.4 to 1.6 points. Post-workshop means were within 0.4 points between the groups on Statements 1, 2, 3, and 5, while on Statement 6 the Global South stayed ahead by 0.6 points, as it was the European group's second lowest pre-workshop mean (2.3) out of all questionnaire statements.

Theme 1 arguably explains these patterns, as it was identified in this theme that all of the four participants who had substantial prior professional or academic design thinking experience were classified as Global South, of which three of these participants were from fields of study related to HCI (see Table 4.1). Their increased base knowledge likely heightened the pre-workshop scores on these knowledge-related questionnaire items, skewing the results. This can be interpreted as a higher starting point caused by those with additional prior expertise happening to collectively be concentrated in the Global South group, leaving less room for gain, rather than as evidence that the workshop was less effective for Global South participants.

Statement 8 ("I am aware of challenges young people face with loneliness in Europe"), a statement tied to the workshop's non design-related content, gained exactly +1.0 for both groups, and Statement 4 ("I feel comfortable generating creative ideas in a group") showed similar gains in both groups (+0.5 for Europeans, +0.7 for Global South). This contrasts with the five knowledge-dependent statements above, as awareness of the loneliness challenge grew evenly regardless of background. This is consistent with Theme 2's finding that the challenge's relevance was recognized broadly across the sample. Statement 7 ("I feel that design skills are relevant to my field of study or work") followed a different pattern, with gains being similar between groups (+0.5 for Europeans, +0.6 for Global South), but with the Global South group rating the relevance of design thinking to their field higher, both before and after the workshop (see Table 4.3). As this statement relates to the relevance of design to one's own field rather than the knowledge of design thinking, this difference can be attributed to the presence of more participants in HCI and design-related fields in the Global South group, as design skills would likely already be relevant to them.

5.3.2 Differences in workshop experience

Regarding the participants' workshop experience, the qualitative themes show little deviation specifically between the European and Global South groups. Most themes regarding workshop experience showed alignment between both

groups.

The workshop pacing preferences (Theme 8) were divided within each group: participants requesting more time or depth included European (P2, P3, P4, P6, P7) and Global South (P8, P10), while opinions that the workshop length was too long came from one participant from each group (P5, P9). Difficulty with empathizing (Theme 7) was described by both groups, alongside hands-on delivery and clear instruction (Theme 9). Themes 5 and 6 regarding the opinions on the presence of civic competences and digital skills practice had a similar response range across both groups. Moreover, the difficulties experienced synthesizing information with the Empathy map (Theme 11) were reported by both European (P2, P5, P12) and Global South (P9) participants.

One pattern does align with geographic group, namely the skepticism of transferability seen by two European participants (P4, P12), but this is supported by very few participants, and the reasoning given by both points to their fields being the determining factor, rather than the region.

Overall, no theme connected to workshop experience was clearly connected to one geographic group apart from the prior-expertise gap (Theme 1), which is also better explained by field rather than region. The logistics of the workshop sessions and uneven distribution of participants with prior knowledge therefore were more clarifying to the results than the geographic classification of the participants.

The limited role of region in the qualitative themes can be placed in the context of cross-cultural research on design thinking. Thoring et al. [71] compared the criteria of design thinking with Hofstede's cultural dimensions, based on the judgement of three experienced design thinking teachers, and concluded that every dimension can both support and complicate parts of the method, for example that a high power distance may conflict with its flat hierarchies. Their framework describes national cultures, and they note that individuals do not necessarily behave as the dimensions of their country would suggest. The grouping in this study is much coarser: participants with at least one Global South nationality formed one group, which included participants from several countries across Asia, Latin America, and Africa, and several participants listed more than one country of origin (Table 4.1). Such a group is unlikely to share one cultural profile, which may contribute to the limited differences found. As cultural dimensions were not measured in this study, it can neither confirm nor contradict this framework.

5.4 Alignment with the Union of Skills priorities (sub-RQ4)

In this section, the workshop's alignment with the four competences taken from the Union of Skills, that were deemed as relevant to evaluate, is discussed. This is evaluated based on the qualitative responses received from the voice note question inquiring on this, and in relation to the broader Union of Skills policy context discussed in Section 2.1.

Firstly, the workshop itself as a format fits into the EU's own definition of the delivery format it is meant to use. The Union of Skills policy acknowledges non-formal education as a valid addition to formal education, with the UNESCO Institute for Statistics defining it as "education that is institutionalized, intentional and planned by an education provider" and typically "short in duration" and "provided in the form of short courses, workshops or seminars" [5]. This workshop closely matches this definition. Additionally, the EU Youth Strategy 2019-2027 provides additional support to non-formal education, naming it essential for young people's skill development. This positions this study not only as an evaluation of a specific design thinking intervention, but also as an evaluation of a format the Union of Skills policy already identifies as one that can be used for the development of the competences it prioritizes.

To address the data from the voice note question on the four competences (creative thinking, digital skills, civic competences, and critical thinking), the creative thinking competence was unanimously confirmed as being practiced by the participants, as noted in Section 4.4. This is a positive result, especially considering that creative thinking is specifically named a high-value, in-demand skill by 57% of the surveyed employers in the World Economic Forum's 2025 Future of Jobs report, with its importance expected to grow [30]. This suggests that participants perceived the workshop as practicing a competence that is relevant to policy goals and in demand on the current labor market. As this rests on the participants' own reports and not on a skill test, it shows perceived rather than demonstrated practice.

The digital skills competence was often reported as not being practiced (Theme 6), with participants consistently naming the workshop's paper-based materials as reasoning to this, rather than it being a limitation to the design thinking process itself. As the European Commission states that nearly half of young people in Europe lack basic digital skills [2], it is important that these skills are practiced. Since the existing gap in this study is due to a design

decision for the workshop, rather than a limitation of design thinking as a method, it suggests that a future iteration of this workshop can implement digital skills training by incorporating digital tools within its existing structure to address this gap.

Comparisons of prototype fidelity and medium have so far mainly examined how well prototypes help users uncover usability problems. In an experiment by Walker et al. [72], it was found that lo-fi and hi-fi prototypes are equally good at this, regardless of whether they were presented on paper or on a computer, and Chen and Yoon [73] note that such comparisons generally have found no significant differences. None of these research outputs examined the digital skills of the people building the prototypes, so it has not been shown whether the medium affects them. The literature does suggest what might change when paper is replaced by digital tools, Chen and Yoon's [73] interviews with practitioners and educators describe a shift towards digital-first prototyping, while arguing that paper still helps designers slow down and focus on function over appearance, and they suggest combining both in HCI education. Walker et al. [72] add that participatory design is more accessible to novices on paper, since most people can sketch. Hundhausen [74] argues that generative AI has made hi-fi prototypes quick to produce and encourages educators to let students combine such tools with simple art supplies. Using digital tools could therefore be expected to give participants the hands-on digital practice that they identified as absent in this study's workshop (Theme 6), but may also shift attention towards how a prototype looks rather than the idea behind it, and take up part of the 20 minutes available for building prototypes, especially for participants less used to the tools.

Furthermore, civic competences were also evaluated for their presence. Theme 5 found that, despite the term being defined in the question, responses ranged from the competences being practiced, to participants being uncertain or unfamiliar with what these competences entail, and one reasoned rejection. As civic competences (also named as citizenship skills) are listed by the Union of Skills policy as basic skills, it is important that these skills are addressed. Some participants clearly understood what civic competences entail and responded to the question with specific reasoning. These showed that the concept can be recognized and applied once they realized how it was experienced within the context of the workshop. However, confusion and uncertainty surrounding the term caused several participants to not be able to give a definite answer as to whether the competences were trained or not.

Lastly, the critical thinking competence is named in the Union of Skills framework as one of the "skills for life", alongside media, digital

literacy, and basic cybersecurity, and is described as "vital for Europe's overall preparedness in the face of crises [1]." Nearly all of the participants acknowledged that the workshop trained critical thinking, with two exceptions (see Section 4.4), indicating that generally the workshop supported the skill priority.

5.5 Facilitation in practice

Deemed as an important quality by Mosely et al. [48], the ability to be flexible and adapt within the creative process was tested in several instances throughout the design thinking workshop sessions. During the Empathize phase of the first workshop session, one group of three was short on one group member for the 1-on-1 interview method. After considering several options, the researcher stepped in as an interview partner for the affected participant, to preserve the original 1-on-1 format, as a group interview was expected to be more chaotic and less personal than intended. Similarly, last minute adaptations had to be made when a fourth expected participant did not attend the second workshop, resulting in the researcher participating as the fourth participant, as further described in Section 4.2.

Another smaller occurrence also happened in the first session, with P1 having to leave early, causing them to miss the Test phase, which therefore did not produce data for this phase.

Not every unplanned situation arose within the workshop sessions themselves. Before the third session, the library room that had been booked closed earlier than expected, resulting in a new room having to be found at short notice, while participants were already on their way. The participants were immediately informed of the change. The screen in the new room could not be accessed, prompting the researcher to display the workshop slides on their laptop instead.

Apart from these specific occurrences, the researcher exercised general flexibility throughout each workshop session, managing time and deciding on when to move forward depending on each unique situation. Additionally, the flexibility aspect was also present in the general structure of the workshop, with mandatory, fixed activities alternating with the ability to choose between several methods in each phase.

5.6 Limitations

This study faced several limitations. Firstly, partnerships with HEIs and VET providers, which were initially planned, were difficult to start. Reasoning behind this is partly due to the institutional bureaucracy and lack of agility in approving activities which are not part of the curriculum, which is why participants were recruited through open advertisement in Stockholm instead. The sample was small (14 participants across three sessions of uneven size) and includes one 30-year-old participant, just outside the 18–29 target group. Additionally, ages 15-17, which are part of the official definition of the term youth according to the European Commission [75] were excluded for the ethical concerns of including minors in user experiments. Additionally, this age group is generally not targeted by BøthOfUs AB, the company this thesis was written under.

Secondly, the quantitative results relied on participants' self-assessment, without a control group and without statistical testing due to the small sample. This therefore means that, while the score gains indicate perceived skill development, this cannot be generalized beyond the specific conditions and participants of this workshop, given the multiple confounding factors inherent to the exploratory and qualitative experimental protocol used.

The comparison between European and Global South participants in this study was conducted by first coding the data across all participant data and then examining which themes aligned or cut across the geographic groups, rather than themes first being generated within each cultural group before identifying cross-cultural patterns, as Wutich et al. [76] recommend. A more established cross-cultural strategy may have strengthened this comparison.

Furthermore, voice notes were submitted by participants at varying amounts of time: between 0 to 21 days after the workshop (Table 4.2), which likely has affected their individual recall and reflection of their unique experiences. Additionally, four of the offered method options (namely Emoji story, People Planet Profit, Paper prototyping, Wireframes) were never chosen across all three workshop sessions, resulting in no data being produced on them by this study.

Another limitation is the short definition of civic competences in the fourth voice note question also not having fully clarified the term, as a few participants were still uncertain after the definition was presented to them. A fuller definition might have reduced the uncertainty seen in Theme 5.

The researcher facilitated all sessions, and stepped in as a participant twice: for the 1-on-1 Interview method in the first workshop, and for the whole

workshop in the second, as described in Section 4.2, and was the only analyst. Thus, group dynamics and data interpretation may reflect the researcher's own influence and biases. Because the thesis was written under a company that planned to use the workshop in its own program, the company's interests may have shaped choices such as the survey categories and the age range. The company hosted the thesis but did not fund it, and the drawbacks found are reported alongside the strengths (Section 6.1).

This study did not address the role of AI. The workshop did not include AI tools, and neither the questionnaire nor the voice note questions asked about participants' use of or views on AI, so the findings cannot show how AI affects the skills trained in the workshop or how its use would change the workshop. This is a limitation, as the Union of Skills announces an AI literacy framework and notes that 68% of teenagers already use AI while education systems lack the frameworks for it [2]. The data contains only indirect indications of the topic's relevance: AI was among the skills respondents could choose in the formative survey and was chosen by 24 of 56 (Figure 4.2), and P11 named ChatGPT and P14 named AI chats when asked about digital products that could be designed with more empathy.

Chapter 6

Conclusion and Future work

In this chapter, the research is concluded (Section 6.1) and possible avenues for future work (Section 6.2) are described.

6.1 Conclusion

This thesis investigated how a design thinking workshop aligned with the Union of Skills framework can support HCI skill development among young people aged 18–29 from different cultural backgrounds. A formative study (n = 56, of whom 52 were within the 18–29 target age range) showed that people were overall most interested in learning creative thinking, followed by design thinking and concept development. Based on this, a three-hour, in-person workshop was designed around the Stanford *d.school* Design Thinking Process and the DSS Design Method Toolkit, with loneliness among young adults serving as the design challenge. The workshop was run in three sessions with 14 participants, of which seven were classified as European and seven as Global South, and evaluated with a pre- and post-workshop questionnaire, open questions, and voice notes as a response medium.

Regarding sub-RQ1, hands-on delivery and clear instruction were consistently praised by the participants who commented on them. The Empathize phase, experienced as emotionally exposing for some participants and cognitively demanding for others, and synthesizing information with the Empathy map in the Define phase were both found particularly difficult. This difficulty experienced within the Define phase was also seen in earlier studies on design thinking for non-designers. Participants disagreed on the workshop length and the number of method choices, so no single pacing recommendation could be extracted from the data alone. The toolkit's time estimates, which

indicate a duration of one hour or more, were much longer than the time available in the three-hour workshop.

Concerning sub-RQ2, self-assessed knowledge scores increased for all eight 5-point Likert statements for both groups, between +0.5 and +2.1 gains overall. In regards to sub-RQ3, the groups differed mainly in the gains on five knowledge-related statements, where European gains were larger and the Global South group starting higher from the beginning. This is possibly explained by the prior experience, as all four participants with substantial prior experience with design thinking were classified into the Global South group. The themes on workshop experience that were qualitatively established drew on participants from both groups, with no significant differences being found between groups. Prior experience, field, and session logistics were all factors explaining variation better than geographic classification.

Regarding sub-RQ4, the workshop format matches the Union of Skills' description of non-formal education. Creative thinking was confirmed as practiced by all participants and critical thinking by nearly all. Digital skills were mostly reported as not practiced due to the paper-based materials used, and civic competences produced varied perceptions, ranging between confident, uncertain, and rejecting responses, despite the term being defined the same way between sessions.

Regarding the main research question, the findings suggest that a short, hands-on design thinking workshop based on the Stanford d.school process and the DSS Design Method Toolkit can support perceived HCI skill development among non-designer young adults from Europe and the Global South. This is supported by the increase in self-assessed scores on all eight statements in both groups and by the consistent praise of the participants who commented for the hands-on delivery and clear instruction, while differences between the groups were small and possibly explained by prior experience rather than by region. The workshop also matched the Union of Skills' description of non-formal education, and participants reported practicing creative and critical thinking, but not digital skills.

The strengths of the workshop lay in its hands-on structure and clear guidance, the positive change in the self-assessed scores across all statements, and the expected transferability of what was learned in the workshop for almost all participants. The drawbacks of the workshop were time pressure, the difficulties in the Empathize and Define phases, and the absence of digital skills practice. As this study is small, relies on self-assessment, has no control group, and had uneven session sizes and prior experiences among its participants, its findings are ultimately exploratory and cannot show that the

workshop caused the changes that were seen in the scores. The findings are not to be generalized beyond the specific protocol, conditions and population tested with.

For other researchers or educators designing similar workshops, the current findings suggest to: 1) incorporate extra support for the Empathize phase (preparing the participants on the emotional exposing aspects and cognitive demands) and for phases requiring participants to synthesize several pieces of information (such as the Define phase); 2) treating the toolkit's time estimates as indicative only in short formats; 3) recording participants' prior experience beforehand; and 4) keeping the session sizes comparable. In the case of study repetition by the researcher, they would recruit through institutional partners for a larger, more balanced participant body that is evenly distributed across sessions, as well as defining civic competences more fully in the voice note questions, collecting voice notes in a fixed time frame, and coding each geographic group separately before comparing them, as recommended by Wutich et al. [76].

6.2 Future work

Below several suggestions for future work are listed:

- A future workshop including the use of digital tools to train digital skills, which is a key skill according to the Union of Skills framework, within the existing design thinking structure.
- Testing alternative pacing, such as a longer session or a multi-session format. Alternatively, a session in which the groups have more autonomy in deciding how much time is spent on each phase, to address the disagreements on length and method choice (Theme 8).
- Evaluating the methods none of the groups chose (Emoji story, People Planet Profit, Paper prototyping, and Wireframes).
- Developing and testing facilitation support for the Empathize phase that addresses both the emotional exposure and cognitive difficulty participants experienced in this study (Theme 7).
- A larger evaluation with a control condition, similar session sizes, a more balanced European and Global South sample, prior experience indicated by participants beforehand, and other measures next to

self-assessment, with each cultural group coded separately before comparison [76].

- Setting up a workshop with HEIs and VETs as a part of a skills training program as originally planned in this study (Section 3.3), for example between the Netherlands and Kenya, which would also allow for more directly connecting young people from Europe and the Global South.
- Measuring participants' socioeconomic background alongside their nationality, so that differences related to cultural background can be distinguished from differences related to economic circumstances, which the nationality-based classification used in this study cannot do.
- Studying the role of AI in learning design thinking, for example by comparing versions of the workshop with and without generative AI tools in the Prototype phase, as Hundhausen [74] proposes for prototyping education, or in the activities participants found difficult (empathizing and synthesizing with the Empathy map), while recording participants' prior use of AI. The strengths and difficulties reported in this study (Themes 7, 9 and 11) offer a baseline for such a comparison.

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Appendix A

Participant questionnaire answers

A.1 Participant 1 (Global South)

Open questions (before)

In your own words (please do not look online!), what do you think design thinking means?
”It’s the creative process of creating a product, platform, or even research from start to finish. It can include brainstorming, defining problem statements, making MVPs or prototypes, testing and iteration.”

Have you ever tried to solve a problem for someone else? What did you do?
”I have worked as a UI/UX designer and researcher for some years, and we had to design applications for different target audiences. One for children and teenagers with suicidal thinking and we had to hold sessions with psychologists, their families, and do participatory design.”

What does the word ‘prototype’ (please do not look online!) mean to you?
”It’s used to test ideas before final implementation. It can be a polished design of an app in Figma for example, or a physical artifact.”

What do you hope to get out of this workshop?
”I’m interested in working in a group.”

Open questions (after)

What was the most surprising thing you learned or experienced today?

”Most of the things were familiar, but there were also many new and interesting things. The one where each group member built on the previous group member’s three solutions and ideas was new and very fun. Also I was surprised how we all had similar ideas.”

Which phase of the design thinking process did you find most challenging, and why?
”Empathizing. I think it’s hard to genuinely remain neutral with no bias, and listen to what matters to the user.”

How relevant did the loneliness challenge feel to your own life or context?
”As someone who lives in a country that is far away from my parents and childhood friends, I try to stay busy and connected, but there are still moments where the loneliness hits, even when I’m surrounded by people.”

Can you imagine using design thinking in your studies or future work? How?
”Yes, definitely. I will be using it in my future participatory research on integrating robots into elderly care. We plan to use tools like storyboards and conduct interviews with both caregivers and older adults to ensure the technology fits their actual needs.”

Design thinking in your context

Had you heard of or used design thinking before today? If yes, in what context?
”Yes, as a UI/UX designer and researcher, when designing applications. And also university projects.”

Do you think design thinking could be useful in your country or community? Why or why not?
”I think it can always be useful. However, in Iran, companies always rush to create new products without an appropriate design thinking process. Hopefully, it will be used.”

Was there anything about the workshop format (in-person) that made it harder or easier to participate?
”Everyone was so friendly, which made it very easy to participate.”

Design thinking and digital / HCI skills

Design thinking is often used to design digital tools and technologies. Does that connection make sense to you after today? Why?
"Yes. Because these tools need to be designed FOR users. It's important to understand their needs and pain points."

Can you think of a digital product or service in your life that could have been better designed with more empathy for users?
"AR/VR headsets (Meta Quest Pro) support eye tracking but people with glasses cannot benefit from this."

The design methods

Which method did your group use in the Empathize phase? How useful did you find it, and why?
"Empathy map. It was challenging, but fun."

Which method did your group use in the Define phase? How useful did you find it, and why?
"Personas. It was very useful as we defined goals, frustrations, and we could see and define the problem from somebody else's point of view."

Which method did your group use in the Ideate phase? How useful did you find it, and why?
"I think the name was brainwriting. Each group member wrote three ideas and the next person wrote three more ideas built upon previous ones, It's useful to finally see different ideas and agree on one."

Which method did your group use in the Prototype phase? How useful did you find it, and why?
"Storyboarding. It's useful to imagine a whole scenario and imagine its potential."

Which method did your group use in the Test phase? How useful did you find it, and why?
"-" (Participant had to leave early and did not take part in the Test phase).

Was there a method you wanted to try but did not? Which one and why?
"Writing a love letter for something. It was something new and sounded fun."

Did having a choice of methods make it easier or harder to work? Please explain.
”Easier. It also helped getting familiar with the methods.”

Would you use any of these methods again outside of this workshop? Which ones and in what situation?
”Yes. Storyboards, personas. In research.”

Final reflection

What is the one thing from today that you will remember most?
”The fun activities. The ideas, messy notes and drawings. And nice conversations and people.”

If you could change one thing about the workshop, what would it be?
”Having A/C? :D (Kidding!)”

Is there anything else you would like to share with the researcher?
”No thanks! :)”

A.2 Participant 2 (European)

Open questions (before)

In your own words (please do not look online!), what do you think design thinking means?
”According to me design thinking means the process of trying to adapt as much as possible on an object to a user’s need or utilization. The goal is to make it as easy as possible for the user. ’User-friendly”.”

Have you ever tried to solve a problem for someone else? What did you do?
”I don’t remember trying to solve a problem for someone else.”

What does the word ‘prototype’ (please do not look online!) mean to you?
”It’s a first design stage that is then getting tested and assessed by users. It’s meant to evolve.”

What do you hope to get out of this workshop?
”To understand more what design thinking is. It’s still a bit mysterious to me.”

Open questions (after)

What was the most surprising thing you learned or experienced today?
”The amount of steps and process in design thinking (it’s a long and very detailed process)”

Which phase of the design thinking process did you find most challenging, and why?
”Empathy map was the most challenging one, especially finding main ideas of the interviews”

How relevant did the loneliness challenge feel to your own life or context?
”A lot especially as an only child, I always had to find ways to occupy myself being alone at home.”

Can you imagine using design thinking in your studies or future work? How?
”I think it’s more an architect’s job but civil engineers are also part of the whole design process, trying to assess the user needs of the space.”

Design thinking in your context

Had you heard of or used design thinking before today? If yes, in what context?
”I have quickly heard of it in class. It was a sustainability course where we had to assess different factors and find solutions on a map. (It’s kind of the same idea)”

Do you think design thinking could be useful in your country or community? Why or why not?
”Yes of course, it’s literally adapting to the user so it’s more accurate and closer to what the people wants.”

Was there anything about the workshop format (in-person) that made it harder or easier to participate?
”It’s good to be in person so we can debate and talk, not only writing.”

Design thinking and digital / HCI skills

Design thinking is often used to design digital tools and technologies. Does that connection make sense to you after today? Why?

”Yes a lot, we need to understand what the user needs/feels before designing something.”

Can you think of a digital product or service in your life that could have been better designed with more empathy for users?
”For France: all the governmental websites and helps, it’s so confusing.”

The design methods

Which method did your group use in the Empathize phase? How useful did you find it, and why?
”Interviews, it was nice and we really had time to discuss about a lot of topics and go deeper into it.”

Which method did your group use in the Define phase? How useful did you find it, and why?
”Empathy map which is a good way to sort all ideas and really understand what all of this is about in a more global approach.”

Which method did your group use in the Ideate phase? How useful did you find it, and why?
”3 ideas per person on the team => it was hard to find different ideas, we were missing inspiration at the end.”

Which method did your group use in the Prototype phase? How useful did you find it, and why?
”The storyboard. It’s a good and fun way to actually imagine how people would behave with our solution.”

Which method did your group use in the Test phase? How useful did you find it, and why?
”We used Harris profile, nice and easy way to assess how realistic the proposed solution is.”

Was there a method you wanted to try but did not? Which one and why?
”I think doing more storyboards per group would be fun so we could also have more than one concept in the Harris map.”

Did having a choice of methods make it easier or harder to work? Please explain.
”Easier of course. We always choose the best one that is the most fitted one to the initial problem.”

Would you use any of these methods again outside of this workshop? Which ones and in what situation?
”In group projects maybe but I can’t really picture myself doing them alone.”

Final reflection

What is the one thing from today that you will remember most?
”The storyboard”

If you could change one thing about the workshop, what would it be?
”Maybe more time but it was really good overall.”

Is there anything else you would like to share with the researcher?
”GL for the thesis!”

A.3 Participant 3 (European)

Open questions (before)

In your own words (please do not look online!), what do you think design thinking means?
”Brainstorming design ideas for a specific problem.”

Have you ever tried to solve a problem for someone else? What did you do?
”A lot of everyday activities - help with moving, uni tasks, financial aid, etc.”

What does the word ‘prototype’ (please do not look online!) mean to you?
”A model that is developed in a test environment to fulfil a certain task before it becomes a product that goes into mass production and sale”

What do you hope to get out of this workshop?
”Find out what exactly design thinking is”

Open questions (after)

What was the most surprising thing you learned or experienced today?
”How quickly you can dive into a new topic come up with a first prototype to a specific problem”

Which phase of the design thinking process did you find most challenging, and why?
”It was most challenging to come up with a good concept that solves all the defined issues and it’s also not easy to define the requirements in the first place.”

How relevant did the loneliness challenge feel to your own life or context?
”There were quite a few relevant aspects such as moving to a new city and how organized events helped connecting with people.”

Can you imagine using design thinking in your studies or future work? How?
”Could be relevant for investment cases or property development but more focusing on how to do it and not what to do.”

Design thinking in your context

Had you heard of or used design thinking before today? If yes, in what context?
”No.”

Do you think design thinking could be useful in your country or community? Why or why not?
”I think it can be useful in every country or community, it rather depends on the concrete topic whether it is useful or not.”

Was there anything about the workshop format (in-person) that made it harder or easier to participate?
”The steps were clearly explained so we knew what to do, but it maybe was a bit much for the time so we could not always think about everything in depth.”

Design thinking and digital / HCI skills

Design thinking is often used to design digital tools and technologies. Does that connection make sense to you after today? Why?
”Definitely does make sense according to the implemented methodology. Every tool needs to first grasp an issue that it should tackle and then identify user’s needs before developing a prototype”

Can you think of a digital product or service in your life that could have been better designed with more empathy for users?
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The design methods

Which method did your group use in the Empathize phase? How useful did you find it, and why?
”Interview + Persona - Useful to grasp the initial problem but can be not necessarily representative of everybody’s need => risk of bias / not grasping all relevant aspects of the issue.”

Which method did your group use in the Define phase? How useful did you find it, and why?
”Sticky notes / Empathy map, POV statement - Very useful to order the ideas from previous phase and lay foundation for our solution.”

Which method did your group use in the Ideate phase? How useful did you find it, and why?
”Brain writing + Dot voting - useful as every idea is heard, decided objectively and also allows possibility to combine ideas into one concept.”

Which method did your group use in the Prototype phase? How useful did you find it, and why?
”Story board - Good to illustrate a certain scenario/use case but might have limited capability to present the concept in depth with all its features.”

Which method did your group use in the Test phase? How useful did you find it, and why?
”Harris profile

> - Can be problematic as it highly depends on the previously selected requirement which can introduce some bias
>
> + Easy to rank”

Was there a method you wanted to try but did not? Which one and why?
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Did having a choice of methods make it easier or harder to work? Please explain.

”Due to limited time maybe rather harder since we need to consider which method to use but generally good to give the choice.”

Would you use any of these methods again outside of this workshop? Which ones and in what situation?
”Especially rating method and brainstorm can be useful.”

Final reflection

What is the one thing from today that you will remember most?
”General process of design thinking.”

If you could change one thing about the workshop, what would it be?
”Increase time or make presentation more concise.”

Is there anything else you would like to share with the researcher?
”Good job!”

A.4 Participant 4 (European)

Open questions (before)

In your own words (please do not look online!), what do you think design thinking means?
”I think it means a brainstorming about a specific topic in order to find a solution.”

Have you ever tried to solve a problem for someone else? What did you do?
”Considering we are in an academic environment this kind of challenges daily. As students we try to collaborate everyday in order to make the problem easier to solve, considering there are more brains trying to solve it.”

What does the word ‘prototype’ (please do not look online!) mean to you?
”A first solution to a problem that will be tested thereafter and modified to adjust it in case something is missing.”

What do you hope to get out of this workshop?
”A new view and creative way to solve problems collectively.”

Open questions (after)

What was the most surprising thing you learned or experienced today?
”A new methodology of designing solutions. Empathy & sympathy, being passionate about the problem and solution is fundamental”

Which phase of the design thinking process did you find most challenging, and why?
”I think the empathizing part was the most challenging because is also the start of the process and it always brings something out of yourself”

How relevant did the loneliness challenge feel to your own life or context?
”Very relevant considering I’m a student living abroad far from my friends and family”

Can you imagine using design thinking in your studies or future work? How?
”Probably not because my job is very standardized we mainly follow the laws and regulations in structural design”

Design thinking in your context

Had you heard of or used design thinking before today? If yes, in what context?
”Never, this was the first time”

Do you think design thinking could be useful in your country or community? Why or why not?
”Yes this methodology is pretty broad and could be applied to multiple context and countries”

Was there anything about the workshop format (in-person) that made it harder or easier to participate?
”Absolutely the host was really fun and open helping the participants get a clear view of their ideas”

Design thinking and digital / HCI skills

Design thinking is often used to design digital tools and technologies. Does that connection make sense to you after today? Why?

”Yes, because having multiple brains brainstorming about the same topic, makes it easier to arrive to the solution.”

Can you think of a digital product or service in your life that could have been better designed with more empathy for users?
”Toilets for example, I don’t think the shape actually matches the user needs considering I always get cramps after ten minutes sitting there”

The design methods

Which method did your group use in the Empathise phase? How useful did you find it, and why?
”Interview method: very useful because it is also easier to empathize with a person when they are in front of you.”

Which method did your group use in the Define phase? How useful did you find it, and why?
”1: writing down, 2: Empathy map, 3: POV statement - 1: helps get your ideas straight; 2: categorizing the ideas; 3: creating a new persona to visualize the issue better”

Which method did your group use in the Ideate phase? How useful did you find it, and why?
”Brainwriting and dot voting: each person had the chance to propose their ideas and vote, giving the result of both collaboration and personal.”

Which method did your group use in the Prototype phase? How useful did you find it, and why?
”Storyboard helps putting your ideas in the real world.”

Which method did your group use in the Test phase? How useful did you find it, and why?
”Harris profile: very useful cause you have your pillars giving you a reliable opinion on your ideas”

Was there a method you wanted to try but did not? Which one and why?
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Did having a choice of methods make it easier or harder to work? Please explain.
”Easier, so you could explore different options choosing the most suitable for your case scenarios”

Would you use any of these methods again outside of this workshop? Which ones and in what situation?
”Not really as I said because my job is mainly based on legislation concerns”

Final reflection

What is the one thing from today that you will remember most?
”The empathizing process really catched me”

If you could change one thing about the workshop, what would it be?
”Probably extend the time duration, having more time to explore each phase options”

Is there anything else you would like to share with the researcher?
”GOOD JOB!!! and good luck!!!”

A.5 Participant 5 (European)

Open questions (before)

In your own words (please do not look online!), what do you think design thinking means?
”For now, I don’t have any idea but with the meaning of the two words, I can imagine that it mean to design our thinking / to being able to realize our ideas.”

Have you ever tried to solve a problem for someone else? What did you do?
”I help peoples with school problems or love problem. Every time, I just firstly listen their pov and then I explain mine / I bring my knowledge on the subject.”

What does the word ‘prototype’ (please do not look online!) mean to you?
”Just something not realize, but in project to be realize.”

What do you hope to get out of this workshop?
”Some new knowledge.”

Open questions (after)

What was the most surprising thing you learned or experienced today?

”I doesn’t know what to expect coming here today, but I learn many new things especially the difference between empathy & sympathy”

Which phase of the design thinking process did you find most challenging, and why?
”The most challenging thing was to find many ideas for the Empathy map. They are many colums/part we need to fulfil so it’s a bit complicate to find many ideas.”

How relevant did the loneliness challenge feel to your own life or context?
”It can be great when in my future, if I start to being lonely I can think of all the things we’ve discussed today.”

Can you imagine using design thinking in your studies or future work? How?
”Maybe yes to find some solution in an engineering problem. Thinking out of the scope.”

Design thinking in your context

Had you heard of or used design thinking before today? If yes, in what context?
”I didn’t know the term design thinking but thinking out of the scope was already used sometimes in school for some project.”

Do you think design thinking could be useful in your country or community? Why or why not?
”In France, actually we have a big political & economical issue. So if the politicians start to think in another way, they can maybe found some solutions where everyone can be ok with.”

Was there anything about the workshop format (in-person) that made it harder or easier to participate?
”For me I appreciate the format and the fact we can debate with other ppl not only write smthg on paper.”

Design thinking and digital / HCI skills

Design thinking is often used to design digital tools and technologies. Does that connection make sense to you after today? Why?

”Yes obviously because I think that all the revolutionary product was thinking out of the scope.”

Can you think of a digital product or service in your life that could have been better designed with more empathy for users?
”Maybe the reels on Instagram, before entering in the app, a little questionnaire should be made to see the mood of the people and after that show some reels in the same mood as the people.”

The design methods

Which method did your group use in the Empathise phase? How useful did you find it, and why?
”The interview method, it was useful to understand the other & feel this behavior.”

Which method did your group use in the Define phase? How useful did you find it, and why?
”We use the empathize map, useful to have every point of view & see what each person thinks in this subject”

Which method did your group use in the Ideate phase? How useful did you find it, and why?
”We each write 3 ideas, and once again it was nice to have every pov and have multiple ideas.”

Which method did your group use in the Prototype phase? How useful did you find it, and why?
”The storyboard. It was the funniest part to recreate with our knowledge try to build a story, it can be nice so that the next time you can know what to do if you feel lonely.”

Which method did your group use in the Test phase? How useful did you find it, and why?
”The Harris profile - useful to see which thing is really relevant.”

Was there a method you wanted to try but did not? Which one and why?
”Not really, I think all the method we used was relevant and help us to catch the subject.”

Did having a choice of methods make it easier or harder to work? Please explain.

”Easier because we could choose the one we thought more easy to tackle with.”

Would you use any of these methods again outside of this workshop? Which ones and in what situation?
”I don’t think so, because all these methods are really precise for a certain usage, we can’t use it alone. Maybe the only way to used it again is for other project groups.”

Final reflection

What is the one thing from today that you will remember most?
”I think of how to escape loneliness, some really good advices was give, so in my future if I feel lonely I can think to that.”

If you could change one thing about the workshop, what would it be?
”Maybe some part was not really useful especially at the end, we just say again the same things.”

Is there anything else you would like to share with the researcher?
(left blank)

A.6 Participant 6 (European)

Open questions (before)

In your own words (please do not look online!), what do you think design thinking means?
”Thinking in terms of design, both user and creator perspectives. Also how users will use the design. Looking/thinking about user scripts and how actual use may deviate from that.”

Have you ever tried to solve a problem for someone else? What did you do?
”Yes, apply similar approach as if it was my problem, unless there are obvious constraints depending on context.”

What does the word ‘prototype’ (please do not look online!) mean to you?
”Early iteration of a design. Usually made with the intention to fail so you can improve from its shortcomings”

What do you hope to get out of this workshop?

”Always good to learn new things. - design thinking; - Better understanding of the process involved with design.”

Open questions (after)

What was the most surprising thing you learned or experienced today?
”That design thinking is so multi-faceted and involves lots of theories, from e.g. ergonomics all the way to psychology and everything in between.”

Which phase of the design thinking process did you find most challenging, and why?
”I think boiling ideas down to a core problem statement was hard, because you need to identify the root cause.”

How relevant did the loneliness challenge feel to your own life or context?
”Not very relevant personally, but I know its a big issue in general.”

Can you imagine using design thinking in your studies or future work? How?
”Yes, in medical eng you need a human centric approach and understand the users wants and needs. (e.g. when developing healthcare apps) you need to understand what they really want and need.”

Design thinking in your context

Had you heard of or used design thinking before today? If yes, in what context?
”Yes, in my social cultural perspectives in tech and design class at KTH.”

Do you think design thinking could be useful in your country or community? Why or why not?
”Yes, anything that involves design is applicable to almost everything, both community wise and industry wise”

Was there anything about the workshop format (in-person) that made it harder or easier to participate?
”Having honest, open, and good people made the vibes better and the overall workshop a pleasurable experience”

Design thinking and digital / HCI skills

Design thinking is often used to design digital tools and technologies. Does that connection make sense to you after today? Why?
”Yes, many things are becoming digitized so it makes sense these design processes are being applied to design digital tools and tech.”

Can you think of a digital product or service in your life that could have been better designed with more empathy for users?
”Yes, paper straws and other renewable straws are really badly designed. User experience was not thoroughly thought of and/or empathized. Also need to fix apps like Facebook to reduce useless notification and spam.”

The design methods

Which method did your group use in the Empathise phase? How useful did you find it, and why?
”Interview — most useful to hear others real experiences and perspectives.
Fake user persona — less useful, nice to roleplay and make scenarios to understand the user more.”

Which method did your group use in the Define phase? How useful did you find it, and why?
”Empathy map
— not very useful but cool to visualize perspectives and solutions.”

Which method did your group use in the Ideate phase? How useful did you find it, and why?
”Dot voting & Brain writing — Nice idea to build off other peoples ideas. Forces you to collaborate more”

Which method did your group use in the Prototype phase? How useful did you find it, and why?
”Storyboard — fun activity, harder to test hypothesis with a cartoon but good way to quickly visualize and show potential solutions”

Which method did your group use in the Test phase? How useful did you find it, and why?
”Harris profile
— sort of useful. By nature of the storyboard its hard to actually test prototype since these are all conceptual exercises with no real test data. But its a fun

thought experiment."

Was there a method you wanted to try but did not? Which one and why?
"Not particularly."

Did having a choice of methods make it easier or harder to work? Please explain.
"Easier, nice to have some structure and instruction to work through the premeditated steps."

Would you use any of these methods again outside of this workshop? Which ones and in what situation?
"I would use interviews to understand user needs and concerns before embarking on almost any design project."

Final reflection

What is the one thing from today that you will remember most?
"People's perspectives on loneliness and their individual stories. Also the process of design thinking."

If you could change one thing about the workshop, what would it be?
"Workshop was great. Maybe make it a little longer to really dive into each step in depth."

Is there anything else you would like to share with the researcher?
"N.A."

A.7 Participant 7 (European)

Open questions (before)

In your own words (please do not look online!), what do you think design thinking means?
"Strategy for a ideation process, where you don't focus on technicality, but design first."

Have you ever tried to solve a problem for someone else? What did you do?
"Tried to get good understanding of the problem / Brainstorm ideas without any commitment to them / Evaluate the ideas"

What does the word 'prototype' (please do not look online!) mean to you?
"First version — First product that shows basic workings and idea of a product"

What do you hope to get out of this workshop?
"Learn what design thinking is / Maybe get some tools to use in future idea-finding processes."

Open questions (after)

What was the most surprising thing you learned or experienced today?
"That formulating problems as stories can help understanding them and find better solutions"

Which phase of the design thinking process did you find most challenging, and why?
"Finding good questions in the interview process, because it defines also how the answers are going to look."

How relevant did the loneliness challenge feel to your own life or context?
"Medium relevant. I felt lonely before but never that intensely or long."

Can you imagine using design thinking in your studies or future work? How?
"I can imagine using it especially in future work contexts."

Design thinking in your context

Had you heard of or used design thinking before today? If yes, in what context?
"Yes, once in a work context for ideating new product ideas."

Do you think design thinking could be useful in your country or community? Why or why not?
"I think it's mostly useful in a work context or when problems are solved, so could also be helpful in small community context like a municipality"

Was there anything about the workshop format (in-person) that made it harder or easier to participate?
"Having a comfortable atmosphere made it very easy to participate, I also think the group size was good"

Design thinking and digital / HCI skills

Design thinking is often used to design digital tools and technologies. Does that connection make sense to you after today? Why?
”Yes it makes sense. I think tackling societal issues, like the loneliness challenge often leads to ideas that have to be more abstract (’make meaningful connections’) and can be better represented digitally.”

Can you think of a digital product or service in your life that could have been better designed with more empathy for users?
”No.”

The design methods

Which method did your group use in the Empathise phase? How useful did you find it, and why?
”Interview + Empathy map. Interview very useful because we can dig into the problems. Empathy map I didn’t really get the purpose.”

Which method did your group use in the Define phase? How useful did you find it, and why?
”Empathy map, and statement sentence. Abstracting ideas from the interview into concrete use cases makes sense. The Empathy map not useful, didn’t know what it should achieve.”

Which method did your group use in the Ideate phase? How useful did you find it, and why?
”Storyboard. Brain writing: Useful. Forces you to be creative and allows for your brain to spin ideas of other people further. The ideas got refined.”

Which method did your group use in the Prototype phase? How useful did you find it, and why?
”Storyboard. A bit useful to understand how the product should impact a person’s life. But this alone is not enough to have a valid product imo.”

Which method did your group use in the Test phase? How useful did you find it, and why?
”Harris profile. Could be useful but needs better definition of ’requirement’ → requirement for building the product → requirement to be fulfilled by the product? Maybe too vague of an evaluation”

Was there a method you wanted to try but did not? Which one and why?

”For physical prototyping the paper prototyping would also be interesting.”

Did having a choice of methods make it easier or harder to work? Please explain.
”Without knowing about the methods it was harder and felt more like a random choice.”

Would you use any of these methods again outside of this workshop? Which ones and in what situation?
”Interview. Needs statement. Brainwriting. I think they help having a clear goal and intended outcome before diving into developing a product.”

Final reflection

What is the one thing from today that you will remember most?
”That I can look up design thinking in the future if I need creative methods for ideating a product.”

If you could change one thing about the workshop, what would it be?
”More time or better to have less methods to be evaluated.”

Is there anything else you would like to share with the researcher?
”Super nice workshop. I also liked the part of finding the worst idea.”

A.8 Participant 8 (Global South)

Open questions (before)

In your own words (please do not look online!), what do you think design thinking means?
”It’s a process where ppl (e.g., end users, designers, engineers, and other stake holders) define the problem and generate prototypes solutions iteratively. Divergently create ideas and then narrow down to certain plans.”

Have you ever tried to solve a problem for someone else? What did you do?
”Yes. I’ve in a group project where we redesign a service flow for a childcare center (i.e., Norlandia) to improve their work flow and children’s experience. We partially adopted the DT method and I mainly contribute to the brainstorming and documentation.”

What does the word 'prototype' (please do not look online!) mean to you?
"Something which can reflect the idea of the solution, which makes it easier for others to understand and test."

What do you hope to get out of this workshop?
"Friendship. Creative experience."

Open questions (after)

What was the most surprising thing you learned or experienced today?
"I learned about many interesting tools and methods in the workshop, some of which I had never heard of before."

Which phase of the design thinking process did you find most challenging, and why?
"I think the first phase of Empathise is the most challenging. For very personal emotional experiences or abstract concepts, it's hard to make people from different cultural background fully empathize and understand each other within a short period of time. It can be hard/demanding to empathize with experiences or perspectives they've never personally encountered. The topic will be difficult to go deeper."

How relevant did the loneliness challenge feel to your own life or context?
"It's relevant, and I believe everyone experiences loneliness to some extent. However, I think ppl understand loneliness differently. Personally, I believe loneliness is inevitable and cannot be completely separated from human life, nor does it need to be eliminated. We only need to learn how to live with it. Loneliness itself is not necessarily painful; what causes suffering is often our unmet desires and expectations."

Can you imagine using design thinking in your studies or future work? How?
"There are some useful tools and methods that I can apply in the future, especially during creative activities. However, the quality of the outcomes also depends heavily on the teammates involved."

Design thinking in your context

Had you heard of or used design thinking before today? If yes, in what context?

”I have took a design-related course in which we were introduced to and experienced the design thinking process.”

Do you think design thinking could be useful in your country or community? Why or why not?
”I think DT is useful. But again, the quality/effectiveness of this approach depends on the requirements of the specific project and the way the team collaborates, rather than on the country or community context. For example, if the needs and goals of a project have already been clearly defined by higher-level stakeholders and do not require extensive exploration, DT may not be the most fit approach.”

Was there anything about the workshop format (in-person) that made it harder or easier to participate?
”In-person workshop is the most effective format because it allows ppl to share and visualize ideas more quickly and naturally, especially those activities which require instant responses.”

Design thinking and digital / HCI skills

Design thinking is often used to design digital tools and technologies. Does that connection make sense to you after today? Why?
”I think the statement makes sense. DT places strong emphasis on exploring and defining users’ needs, which aligns well with the analytical mindset required for digital products.”

Can you think of a digital product or service in your life that could have been better designed with more empathy for users?
”For example, some self-ordering systems in restaurants are designed to encourage customers to add more items, while often providing insufficient details about the food itself.”

The design methods

Which method did your group use in the Empathise phase? How useful did you find it, and why?
”I used the persona method. Creating a persona helps visualise the target audience in a more intuitive and structured way by capturing different aspects of their needs and characteristics. It also makes it easier to revisit and reflect on the information later in the whole design process.”

Which method did your group use in the Define phase? How useful did you find it, and why?
”Empathy map. I found it useful, as it helped us categorise different ideas in a structured way. However, our team was relatively small, so I don’t think we were able to fully realize its potential, most out of it.”

Which method did your group use in the Ideate phase? How useful did you find it, and why?
”Lotus blossom. It helped us explore ideas step by step and develop more concrete directions/solutions. However, there were moments when we experienced a creative block and simply couldn’t come up with more ideas, which made the discussion feel a little awkward.”

Which method did your group use in the Prototype phase? How useful did you find it, and why?
”We used a storyboard to illustrate how our solution works. It was helpful for communicating the main user journey and interactions. However, when the solution becomes more complex, a short storyboard may not be able to show all the functions and details effectively.”

Which method did your group use in the Test phase? How useful did you find it, and why?
”Harris profile. I found it useful cuz it allows evaluation criteria to be qualified to some extent, making it easier to compare different solutions and assess their strengths and weakness from multiple perspectives.”

Was there a method you wanted to try but did not? Which one and why?
”I’d have liked to use wireframe prototypes. For solutions that involve digital tech, I think wireframes make it much intuitive for ppl to visualize how specific features and user interactions would work in practice.”

Did having a choice of methods make it easier or harder to work? Please explain.
”Having a diverse set of tools is very valuable. Different tools are suitable for different situations and needs, so having a comprehensive toolbox makes it easier to choose the most appropriate approach for moving a project forward.”

Would you use any of these methods again outside of this workshop? Which ones and in what situation?
”I think tools in the ideation and prototyping stages especially helpful. They are great for generating a wide range of ideas and quickly demonstrating different concepts.”

Final reflection

What is the one thing from today that you will remember most?
”Empathy is extremely challenging, and we should be cautious about assuming that we fully understand others’ experiences and perspectives. True empathy requires continuous effort and reflection.”

If you could change one thing about the workshop, what would it be?
”Taking more time to get to know team members before and during collaboration is important. Building trust and mutual understanding can make it much easier to work together effectively throughout the DT process.”

Is there anything else you would like to share with the researcher?
”I think it’s possible that the responses in this questionnaire will change if the design topic changed in this workshop.”

A.9 Participant 9 (Global South)

Open questions (before)

In your own words (please do not look online!), what do you think design thinking means?
”Design thinking is a process where you ideate the idea, come up with a problem and find a solution to solve the problem based on the idea/major problem you have identify with.”

Have you ever tried to solve a problem for someone else? What did you do?
”Yes. Creating a web app for a mental service app for the health center at the university. The health center was having a hard time reaching out for students, so me and my friends ideated some solution and try to test it with their services.”

What does the word ‘prototype’ (please do not look online!) mean to you?
”A minimum and viable product/solution that can be used or tested for the idea that you have come up with.”

What do you hope to get out of this workshop?
”Hope to refresh some memories about design thinking. Also trying to understand how design thinking skill is important in young people and whether

there are some specific elements in design thinking that is significant in young people/adolescent."

Open questions (after)

What was the most surprising thing you learned or experienced today?
"How design thinking can be used to solve an actual problem. Usually, design thinking was only taught to me in business perspective. This changes the idea of how design thinking can be used."

Which phase of the design thinking process did you find most challenging, and why?
"Ideating; finding it challenging because I always struggle with coming up with something new or creative."

How relevant did the loneliness challenge feel to your own life or context?
"Somewhat relevant. From my own context, I don't generally feel lonely because I participate in multiple activities/hobbies that connect with other people. With that being said, sometimes joining those activities can still make me feel loneliness if there's not meaningful connection."

Can you imagine using design thinking in your studies or future work? How?
"Yes. I can see how design thinking can be used to solve social problem which is something I really interested and usually working on it in some extent."

Design thinking in your context

Had you heard of or used design thinking before today? If yes, in what context?
"Yes, usually in business ideation context."

Do you think design thinking could be useful in your country or community? Why or why not?
"Yes, design thinking can be used to solve some problem within the community especially one where the whole community are experiencing it (e.g. youth loneliness epidemic, public transport): the problems that are truly personal."

Was there anything about the workshop format (in-person) that made it harder or easier to participate?
”Yes, in a way how the workshop present the design thinking which is easy to digest and learn. No, in a way how the workshop is designed for a small group of participants.”

Design thinking and digital / HCI skills

Design thinking is often used to design digital tools and technologies. Does that connection make sense to you after today? Why?
”No, since the topic today is more about trying to solve the EU youth loneliness.”

Can you think of a digital product or service in your life that could have been better designed with more empathy for users?
”Maybe some electronic tools that are catered towards differently-abled people. Or social media/application that care more about user’s mental health.”

The design methods

Which method did your group use in the Empathise phase? How useful did you find it, and why?
”1-on-1 interview; quite useful since you got to hear what other people think and see things in different perspective. Also with love letter, it gets you to think more about the situation/problem you are in.”

Which method did your group use in the Define phase? How useful did you find it, and why?
”Empathy map. Somewhat useful; it helps define and visualize the problem from the empathy phase better, sometimes its hard to categorize some topic that came up.”

Which method did your group use in the Ideate phase? How useful did you find it, and why?
”Lotus blossom. Useful, it helps you narrow down from bigger idea to smaller ideas that works.”

Which method did your group use in the Prototype phase? How useful did you find it, and why?

”Storyboard. Useful, it helps visualize the idea from the ideate phase ever bigger and I can go on in more details on how the idea from ideate phase can solve the problem.”

Which method did your group use in the Test phase? How useful did you find it, and why?
”Harris profile. Somewhat useful; it’s nice having other people rate the idea but due to time constraint, the phase feels too short for the test phase to be thoroughly enough.”

Was there a method you wanted to try but did not? Which one and why?
”Mash-up in ideation phase. I want to see how different methods can/may result in different ideas than what I have thought.”

Did having a choice of methods make it easier or harder to work? Please explain.
”Easier, since we get to choose and decide what to do. It makes the workshop more interactive as well.”

Would you use any of these methods again outside of this workshop? Which ones and in what situation?
”All of it especially ideation phase. To solve social situation problem or something me and the team can related to the most, not other people’s problem.”

Final reflection

What is the one thing from today that you will remember most?
”The final idea of the team and other people’s idea. Also the perspective of my colleague during the interview in the empathise phase.”

If you could change one thing about the workshop, what would it be?
”Maybe the length of the workshop; feels a bit too long.”

Is there anything else you would like to share with the researcher?
”Super interesting! Really like the workshop. Although I’m a bit confused whether the workshop is about the loneliness or the EU youth loneliness.”

A.10 Participant 10 (Global South)

Open questions (before)

In your own words (please do not look online!), what do you think design thinking means?
”Design thinking is the mindset needed to create something that users will interact with. It is thinking in a way that creatively solves addresses user needs.”

Have you ever tried to solve a problem for someone else? What did you do?
”Yes, I tried to create a communication system to keep track of tasks for my boss. In order to help I had to put myself in his shoes so I could come up with ideas about what would work wouldn’t work.”

What does the word ‘prototype’ (please do not look online!) mean to you?
”Prototype is a model that simulates how something will function/look in the future. It is the ”first draft” useful for thinking through how it functions.”

What do you hope to get out of this workshop?
”I hope to learn more about design thinking and learn more about how others approach design.”

Open questions (after)

What was the most surprising thing you learned or experienced today?
”Not sure I’d call anything I learned ”surprising” but I did enjoy learning about the best way to empathize with others and its importance in designing.”

Which phase of the design thinking process did you find most challenging, and why?
”I found the Ideate phase most challenging. I specifically found it difficult to take existing technologies problems and blend them to create a novel solution.”

How relevant did the loneliness challenge feel to your own life or context?
”I feel it is very relevant. I have experienced periods where I’ve felt lonely, so it gave context to others’ experience of loneliness as well. I could pull from my prior experience to empathize with others.”

Can you imagine using design thinking in your studies or future work? How?
”Yes, I can imagine using it to help create solutions to engineering problems. In the field of architectural engineering I can see this being used to help solve problems in the user experience of a building.”

Design thinking in your context

Had you heard of or used design thinking before today? If yes, in what context?
”Not exactly, but the concept of placing myself in the shoes of others to try to solve problems I have. When designing space layouts for an office I inquired & empathized with office workers, identified problems & potential solutions and created prototypes of layouts for testing to evaluate if it was the best solution.”

Do you think design thinking could be useful in your country or community? Why or why not?
”Yes, I think its a good approach to solving problems. It can be used to form creative solutions to seemingly intractable issues.”

Was there anything about the workshop format (in-person) that made it harder or easier to participate?
”A short break would have been helpful to get some time to think and process what we were doing.”

Design thinking and digital / HCI skills

Design thinking is often used to design digital tools and technologies. Does that connection make sense to you after today? Why?
”Yes, digital technologies require good user interfaces for them to function well. Hence, design thinking is a good approach to this.”

Can you think of a digital product or service in your life that could have been better designed with more empathy for users?
”Not at the moment.”

The design methods

Which method did your group use in the Empathise phase? How useful did you find it, and why?
”The love letter/break up letter method. It was useful because it felt like I was putting myself in their shoes to directly talk about something good and something bad.”

Which method did your group use in the Define phase? How useful did you find it, and why?
”Post its and classifying them into sections. I found it useful though some sections ended that useful for our specific problem. It helped clearly identify the main theme in the problem we are trying to solve.”

Which method did your group use in the Ideate phase? How useful did you find it, and why?
”Mash-up. I found it useful to visualize needs, problems, and technologies to create a mix to solve the issue, but I still found it difficult to come up with something novel.”

Which method did your group use in the Prototype phase? How useful did you find it, and why?
”The storyboard. I don’t know if I found this too useful as a prototype. I could see it being more useful with more details but in our exercise I think we kept it too basic for it to be useful.”

Which method did your group use in the Test phase? How useful did you find it, and why?
”I cannot remember the test phase we did.”

Was there a method you wanted to try but did not? Which one and why?
”Yes, the Lotus Flower method to ideate. I thought it was an interesting way to come up with a detailed look into a problem.”

Did having a choice of methods make it easier or harder to work? Please explain.
”Easier since we could choose one that made most sense to the problem we were trying to solve.”

Would you use any of these methods again outside of this workshop? Which ones and in what situation?
”I would use the post-it method to help me define a problem. It could be

applied to a variety of situations from design, to work, to personal issues."

Final reflection

What is the one thing from today that you will remember most?
"The importance of empathizing with people, and the idea that empathizing is more about feeling together rather than to solve someone else's problem."

If you could change one thing about the workshop, what would it be?
"Add a break and make it a little longer to have more time to fully dive deep into each phase."

Is there anything else you would like to share with the researcher?
"It was a great workshop!"

A.11 Participant 11 (Global South)

Open questions (before)

In your own words (please do not look online!), what do you think design thinking means?
"A creative thinking model that aims to bring solution to a certain problem for a certain group of users."

Have you ever tried to solve a problem for someone else? What did you do?
"Yes. In my master courses we tried to bring up a solution for older people who have chewing problems. We prototyped a low-tech wearable device that visualize chewing motion and help family member aware the difficulty and give emotional support."

What does the word 'prototype' (please do not look online!) mean to you?
"It means a very simple abstract of the solution, that represent the core idea the designer wants to deliver, can be by physical or virtual."

What do you hope to get out of this workshop?
"I hope to practice design thinking and get inspiration for my master project as well."

Open questions (after)

What was the most surprising thing you learned or experienced today?
”I got a complete view of the design process, and learned new design methods.”

Which phase of the design thinking process did you find most challenging, and why?
”Ideate, because it’s hard to find the ’best’ idea and every idea has some value. Dropping any of them makes the problem not fully resolved.”

How relevant did the loneliness challenge feel to your own life or context?
”Very relevant.”

Can you imagine using design thinking in your studies or future work? How? ”Yes, my future work will also be in relevant field and solve users’ problems. I’ll recall the process to make sure the solution is grounded.”

Design thinking in your context

Had you heard of or used design thinking before today? If yes, in what context?
”Yes, in my HCI study.”

Do you think design thinking could be useful in your country or community? Why or why not?
”Yes, our culture usually rush to an outcome, but the most important is getting empathy with user first instead of just imagine.”

Was there anything about the workshop format (in-person) that made it harder or easier to participate?
”It’s easier to engage myself in a in-person workshop. (Also might help with meeting new people).”

Design thinking and digital / HCI skills

Design thinking is often used to design digital tools and technologies. Does that connection make sense to you after today? Why?
”Yes, our life is full of digital tools and technologies, but service and experience design also need this thinking a lot.”

Can you think of a digital product or service in your life that could have been better designed with more empathy for users?
”ChatGPT. It’s difficult for users to navigate through history and know about what is wrong if the outcome is not ideal.”

The design methods

Which method did your group use in the Empathise phase? How useful did you find it, and why?
”Interview, very useful for me to learn about new experience from others, and their feeling. Persona, not that useful because it’s hard to extract a general persona and feel satisfied with it.”

Which method did your group use in the Define phase? How useful did you find it, and why?
”Empathy map. I find it useful in organizing our insights and see which ones are common and important.”

Which method did your group use in the Ideate phase? How useful did you find it, and why?
”Lotus blossom. I find it useful in deep thinking about our ideas, but it need some training to come up with proper concept for the first layer, so it can be extended meaningfully.”

Which method did your group use in the Prototype phase? How useful did you find it, and why?
”Storyboard. I find it very useful to visualize our service or experience design and put the idea into reality to get more concrete.”

Which method did your group use in the Test phase? How useful did you find it, and why?
”Harris profile. I find it very useful to quickly test the prototype based on exactly what we care about, not just usability or general criteria.”

Was there a method you wanted to try but did not? Which one and why?
”I also wanted to try brain writing because I think building ideas based on teammates helps form consensus and know about the team’s diversity.”

Did having a choice of methods make it easier or harder to work? Please explain.

”Lotus blossom is harder in a time-limited step and also too concrete on the first layer makes it hard to generate secondary layer.”

Would you use any of these methods again outside of this workshop? Which ones and in what situation?
”Yes in my future work.”

Final reflection

What is the one thing from today that you will remember most?
”New design methods.”

If you could change one thing about the workshop, what would it be?
”Everything is good!”

Is there anything else you would like to share with the researcher?
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A.12 Participant 12 (European)

Open questions (before)

In your own words (please do not look online!), what do you think design thinking means?
”Thinking about what design would work best for users and developers alike.”

Have you ever tried to solve a problem for someone else? What did you do?
”Yes, either in professional context for e.g. a group project in university, or in a social context e.g. giving advice to friends and family about their problems, or to help a stranger out.”

What does the word ‘prototype’ (please do not look online!) mean to you?
”The first design, that should be tested, evaluated and improved upon. To develop the final product, several versions of prototypes should be made , until the client is satisfied with the final product.”

What do you hope to get out of this workshop?
”To know what design thinking is and to see if I can apply it within the context of Real Estate.”

Open questions (after)

What was the most surprising thing you learned or experienced today?
”The importance of empathy vs sympathy.”

Which phase of the design thinking process did you find most challenging, and why?
”The first phase, because you have to relate to the problem yourself and be vulnerable.”

How relevant did the loneliness challenge feel to your own life or context?
”Relevant in the way that I really needed the type of events organised right after I moved abroad didn’t have friends yet in a new country.”

Can you imagine using design thinking in your studies or future work? How?
”Yes, I think the part about having to relate to your user/client, coming up with ideas, making prototypes, testing and improving them is universal in every field.”

Design thinking in your context

Had you heard of or used design thinking before today? If yes, in what context?
”No.”

Do you think design thinking could be useful in your country or community? Why or why not?
”Yes, because it ensures that a solution is made with the user/client in mind it makes it easier to be creative with solutions, as it is more low-pressure to work with prototypes.”

Was there anything about the workshop format (in-person) that made it harder or easier to participate?
”Yes, it was a little confusing how many options for frameworks there were for each phase that we had to choose ourselves which one to use, even though I’m not familiar with them.”

Design thinking and digital / HCI skills

Design thinking is often used to design digital tools and technologies. Does that connection make sense to you after today? Why?
”I think it would make sense to use in all contexts, so I do not necessarily see why it wouldn’t be used for technology.”

Can you think of a digital product or service in your life that could have been better designed with more empathy for users?
”Almost any product, as profit remains the main priority for many digital products.”

The design methods

Which method did your group use in the Empathise phase? How useful did you find it, and why?
”1-1 Interview + Persona Interview → Useful, but could be intrusive in a professional context. Persona → Useful.”

Which method did your group use in the Define phase? How useful did you find it, and why?
”Empathy map → Helped organise thoughts, but difficult to equally fill all sections.”

Which method did your group use in the Ideate phase? How useful did you find it, and why?
”Brain writing + Dot voting. Brain writing → Didn’t allow for a lot of improvements/different ways of the same solutions. Dot voting → Easy, but often a compromise is better; you can’t vote on that.”

Which method did your group use in the Prototype phase? How useful did you find it, and why?
”Storyboard → Fun to do; good to use in a pitch.”

Which method did your group use in the Test phase? How useful did you find it, and why?
”Harris profile. Easy, but doesn’t provide a lot of context.”

Was there a method you wanted to try but did not? Which one and why?
”No.”

Did having a choice of methods make it easier or harder to work? Please explain.
”Harder to work, as all the methods were new to me I was not always sure what would be the easiest/most relevant one.”

Would you use any of these methods again outside of this workshop? Which ones and in what situation?
”Maybe the persona one, otherwise I find other methods e.g. SWOT more appropriate for my field easier to use.”

Final reflection

What is the one thing from today that you will remember most?
”How relating to people can make you feel less alone how fun it can be to work creatively. Especially the storyboard method was fun!”

If you could change one thing about the workshop, what would it be?
”Don’t provide different methods, just choose the most relevant ones for the specific scenario, so it’s easier to finish the workshop on time you could spend more time working on the design phases evaluating.”

Is there anything else you would like to share with the researcher?
”Good luck :)”

A.13 Participant 13 (Global South)

Open questions (before)

In your own words (please do not look online!), what do you think design thinking means?
”Maybe it is the first step in the design process of a product? Thinking how the design should work and what purpose it fulfils.”

Have you ever tried to solve a problem for someone else? What did you do?
”It has mostly been small tasks, like helping with lab reports or similar, or personal problems by giving advice and try to help them see solutions/alternatives to their problems.”

What does the word ‘prototype’ (please do not look online!) mean to you?

”Prototype means to me the first version of a product? Like a beta-version, so the first product you make and see if it works the way it is thought/meant to work.”

What do you hope to get out of this workshop?
”To learn about design thinking, and learn the link there is between that and human interaction.”

Open questions (after)

What was the most surprising thing you learned or experienced today?
”How in-to-depth you can really go when thinking of a problem and the solutions to it. There are There are many alternatives and different outcomes to each one. Design thinking is more complex than I thought!”

Which phase of the design thinking process did you find most challenging, and why?
”To phrase the actual problem, and finding the different solutions. But mostly, the part where we went in depth and thinking how the solutions themselves can be affected by its surroundings and immediate factors. The lotus-blossom method is what I’m talking about.”

How relevant did the loneliness challenge feel to your own life or context?
”I have felt lonely before, and this challenge made me think about how one can try and combat it. It gave me another perspective on things!”

Can you imagine using design thinking in your studies or future work? How?
”Definitely! In civil engineering for sure, in the sense of designing buildings and the purpose they will fulfill.”

Design thinking in your context

Had you heard of or used design thinking before today? If yes, in what context?
”No I had not heard of it!”

Do you think design thinking could be useful in your country or community? Why or why not?

”I think so; Sweden can have a lot of use of thinking about loneliness and how to combat it. Maybe even integrate it into schools and start from an early age.”

Was there anything about the workshop format (in-person) that made it harder or easier to participate?
”It was easy to follow thanks to the PowerPoint! Good with the examples!”

Design thinking and digital / HCI skills

Design thinking is often used to design digital tools and technologies. Does that connection make sense to you after today? Why?
”Yes it does! Digital tools fills a purpose to us humans, but we have to think from the beginning what it will lead to and what the problem actual is.”

Can you think of a digital product or service in your life that could have been better designed with more empathy for users?
”Instagram?”

The design methods

Which method did your group use in the Empathise phase? How useful did you find it, and why?
”1-1 interview → it was very useful, easy to connect and understand the other.”

Which method did your group use in the Define phase? How useful did you find it, and why?
”Empathy map and personas → clear to see the different factors that lead to loneliness.”

Which method did your group use in the Ideate phase? How useful did you find it, and why?
”Lotus blossom → clear, in-depth of both the problem and the solutions.”

Which method did your group use in the Prototype phase? How useful did you find it, and why?
”Storyboard → easy to see how we can go from the idea and the outcome.”

Which method did your group use in the Test phase? How useful did you find it, and why?
”Harris-profile → it was easy as well, but a bit hard to distinguish between -1 and 1.”

Was there a method you wanted to try but did not? Which one and why?
”No, I thought they all seemed interesting!”

Did having a choice of methods make it easier or harder to work? Please explain.
”Yes, because I think each problem has different factors, and therefore not every method is easily applicable to it. Having a choice of methods helps to come up with a solution more effectively.”

Would you use any of these methods again outside of this workshop? Which ones and in what situation?
”Yes I liked the lotus blossom! Maybe in like a design context for a building, or an everyday problem?”

Final reflection

What is the one thing from today that you will remember most?
”I really liked the concept of design thinking, and I will remember how crucial it is to have design thinking when pin-pointing a problem that you want to solve. And lotus-blossom, a good method!”

If you could change one thing about the workshop, what would it be?
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Is there anything else you would like to share with the researcher?
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A.14 Participant 14 (Global South)

Open questions (before)

In your own words (please do not look online!), what do you think design thinking means?
”Thought process that involves thinking about how a product would be used by the end user and how they would use it.”

Have you ever tried to solve a problem for someone else? What did you do?
”Yes I have. This was through helping someone film their performance because they did not have anyone else to do it.”

What does the word 'prototype' (please do not look online!) mean to you?
"The dummy stage of a product showing how it would work once completed."

What do you hope to get out of this workshop?
"I'm curious what the research and workshop is about so I hope to gain more knowledge about it."

Open questions (after)

What was the most surprising thing you learned or experienced today?
"That it wasn't so difficult and boring to come up with a prototype and was actually an engaging and fun experience."

Which phase of the design thinking process did you find most challenging, and why?
"I found the Ideate phase challenging because I felt like I had to think on the spot."

How relevant did the loneliness challenge feel to your own life or context?
"It was 100% relevant because I just moved here and experienced it myself."

Can you imagine using design thinking in your studies or future work? How?
"Yes I would use design thinking in my project based work that involved working directly with people. I'd use this to come up with a solution people actually need and would actually use to actually solve their problem."

Design thinking in your context

Had you heard of or used design thinking before today? If yes, in what context?
"No."

Do you think design thinking could be useful in your country or community? Why or why not?
"Yes very useful. Most times organizations come up with solutions that aren't feasible, and the targeted group doesn't actually use. With design thinking, human centered solutions could be developed that would actually provide real applicable solutions."

Was there anything about the workshop format (in-person) that made it harder or easier to participate?
”Being an interactive and creative workshop made it much easier.”

Design thinking and digital / HCI skills

Design thinking is often used to design digital tools and technologies. Does that connection make sense to you after today? Why?
”Yes, because it is centred around making a product user oriented so it is easier for them to use since it actually meets their needs.”

Can you think of a digital product or service in your life that could have been better designed with more empathy for users?
”Maybe a therapy app but one that doesn’t use AI chats but rather real people.”

The design methods

Which method did your group use in the Empathise phase? How useful did you find it, and why?
”1 on 1: enabled me to see the other person’s feelings/experiences outside just words but also through expressions and tone. Break up/love letter: I was able to put my feelings and experiences into words to better explain how the app (TikTok) was aiding my isolation.”

Which method did your group use in the Define phase? How useful did you find it, and why?
”Empathy map: allowed us to categorise the experiences into different categories to better understand the problem.”

Which method did your group use in the Ideate phase? How useful did you find it, and why?
”Brain writing: we had an opportunity to write down and develop solutions to the problem.”

Which method did your group use in the Prototype phase? How useful did you find it, and why?
”Story report board: allowed us to play out how the selected solution would actually play out and how it would solve the problem.”

Which method did your group use in the Test phase? How useful did you find it, and why?
”Harris method: enabled us to see how useful and impactful the solution would be.”

Was there a method you wanted to try but did not? Which one and why?
”The lotus method. Seemed too complex at first glance.”

Did having a choice of methods make it easier or harder to work? Please explain.
”Yes, otherwise it would put more pressure.”

Would you use any of these methods again outside of this workshop? Which ones and in what situation?
”Yes, the storyboard with developing solutions for my communities back home.”

Final reflection

What is the one thing from today that you will remember most?
”I’d remember the story board and brainwriting method.”

If you could change one thing about the workshop, what would it be?
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Is there anything else you would like to share with the researcher?
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Appendix B

Participant voice note transcriptions

B.1 Participant 1 (Global South)

”About the first question, I’m not sure if loneliness is statistically a crisis in my home country, Iran. But I guess in Sweden it is something that people talk about quite openly, and it’s a thing that many people might feel lonely.

For the second question, I think it was a very interesting way of practicing design thinking and the different stages that we have to do, for example, how to brainstorm, ideate, how to define problem statements, and how to, for example, make a persona, to think how to define the problem that you’re representing a target audience that are dealing with that problem. And I think it’s very relevant for my research, for my work as well.

The third question, I think overall, it was very fun, it was very useful, and it was a quite effective way of framing a problem and finding a potential solution for it and I wouldn’t change anything probably.

And for the question number four, I think we kind of practiced how to think critically and also creative thinking was something that I think we practiced during the phases this different stages that we were supposed to do.

And for the last question, I would definitely use a few methods from the workshop in my own work and in my own research

because I am also going to interview people. I am going to have co-design activities with them where, for example, we might use storyboarding and we want to define different problems that my target audience is dealing with. And yeah, for sure I am going to use them. Thank you."

B.2 Participant 2 (European)

"Hello, I hope you're doing well. so you sent me the questions, I'm gonna answer them. so the loneliness challenge for the own country or community. Yeah, I don't think so. I mean in France, I don't know, like no one talked with me about loneliness, you know. But I still think a lot of people are facing it. Like when I was a child, I mean, still now I'm an only child, so but especially when I was a child, I had to play alone. I didn't have any siblings at home and I still don't. So yeah, I was either with my parents or alone. And it's true that having siblings is way better when you're a child, right? You can play with them, interact with them, and sometimes I was just alone and I never really talked about it to people. I mean I've always said yeah, being an only child, you're often alone and blah blah blah. But I don't know, I feel like we cannot really talk about it in public. I would say it's a bad scene or maybe okay to people you're very near with or like with very close friends. But like talking about the country or community as you say, I think it's more a private topic.

So what was really good during the workshop is that you divided the people in two teams and then you did the whole presentation with the slides, you introduced us to new methods, techniques, the whole design thinking process. And what was really nice is that we actually used it in our team. It was very real, you know, it felt real because we actually now know how to use it, because we did an example with the loneliness of young people.

And so I don't know if it's gonna be relevant for my future career, but I feel like what's really good is the critical approach, critical thinking in a group of people, right? Because this is something you need a bit everywhere in life, I would say, trying to discuss with people about a way of thinking or a way of doing something. Basically that's it. Like working as a team, this is really good.

And as a team on a specific topic and trying to agree or disagree on each other's opinion. This is nice. And I feel like I also answered the third question. the most effective part of the workshop for your learning, basically for me the teamwork was really nice and it wasn't boring, that was really good.

Okay, and for the fourth one, yes, we trained all of these. And how because we were in teams of people, and we actually used what we learned and not only listened to your presentation, what was really good and helpful.

And finally for the fifth question, yes, I think I'm gonna use it later, maybe in my work. I don't know if it makes sense. But as a civil engineer, I feel like we're gonna have plans, maps from the architects, and then we could maybe discuss about them, change them, try to find some better ideas with the architects to have something that fits more to the people, to the clients, right? If the client requests something, then we have to discuss and find a good design. So I think maybe it's also a way to do design thinking, trying to find a good solution to a problem. I feel like it's quite the same idea, but not the same field as the one we worked with. But yeah, that's how I see the thing right now. And yeah, the workshop was really nice. Thank you, for everything. It was really good. Bye bye. Have a nice day."

B.3 Participant 3 (European)

"To do the first question, I think it definitely was a relevant challenge. I mean Germany and Sweden I would say it's probably very similar in terms of addressing the topic of loneliness. I think also in Germany, and generally in the Western world where it's probably discussed the most openly, I would say that it still has a bit of a stigma and for the workshop we were like in a pretty comfortable setting. For me personally I knew almost everybody and most of the people that were there I was even friends with, so it was easier to open up with them. But I would say like depends like on the level of relation that you have with somebody. So if it's your friends I would say it's easier to talk about the topic, but if it's with strangers or people you don't know that well, it might be a bit a bit more difficult to open up to them and also in general

maybe not the easiest topic to talk about and especially if you face loneliness, then you might not even have people that you can talk with. So I would say it's definitely like a relevant challenge.

And then for the second question I would say that we generally practiced numerous skills, but I would say the most important or the biggest focus was on if you have a certain topic then we were identifying what's an actual problem is in this field and then we try to make it like more concrete and break it down to a subject or a specific case that you can solve. And then we basically defined the problem and then we looked into possible ways to solve this problem. And I think this in my opinion is a skill that is necessary for almost everything you do. In every field that you study, in every field that you work in, you will always have problems and you always need solutions. And so I think it's definitely very relevant to my study, my career and also in general every field.

Then for question three, I would say, what I think was most effective was the overall layout of the workshop. Because, you walked us through all the different phases. And then we also got different methods that we could choose from to fulfill the next step. And then I think it was also good that we were split in groups, or two groups in our case. And then each group worked on every part there was. So you have to come up with your own ideas and you have to try to find a solution for yourself. But then after that you get presented with the idea of the other group and then you have to give feedback on what they did. I think it's quite nice that you have to think for yourself and give feedback also, and then something that, as far as I remember we didn't do, but what might be helpful that based on this, you could come up with a final draft or something that is like based on your own ideas or based on what the others did, and the feedback you give and then you could say a final draft that is a good solution for the problem. Maybe we did that, but I don't think we did. Maybe that's good idea.

Question four. I actually don't know what exactly civic competences means. So maybe I was looking it up, I think it didn't match that well. Maybe you can give me a definition and I could like look over it again. But I would say from the four things that I mentioned, I would say that critical thinking and

creative thinking were the most relevant ones for the workshop. Of course creative thinking is important to come up with an idea and brainstorming within our group and thinking about a specific problem and how we could solve that. And I think critical thinking maybe goes a bit hand in hand with that because of course you need the creativity to come up with a solution but critical thinking is also relevant for it to judge if it's actually a suitable solution for the problem or not. And critical thinking is also of course important in evaluating the other groups' ideas and giving feedback on what they thought about. So this is something we definitely trained. And then for digital skills I would say it was somewhat involved in our case but not necessarily because we were talking about loneliness and our solution we had was digital, I don't know if it was a website or an app or whatever, so it did involve some digital skills, but that was only because of the approach that we chose and it could have been a different approach that didn't use any digital media. That is probably out of the four ones what we trained the least because we were open to use it but it wasn't necessarily a part of it.

And then for the last question, I think especially the persona thing that we did was quite nice if you look into a specific problem or you're trying to create a product or something. I think it was quite nice to create fictional persona that we describe like who, how do they live, what is their lifestyle? What are their needs and stuff and then we create this persona and look at whether our product fulfills their needs or how relevant is our product to a certain demand or what kind of people would use our products or, I guess, also for identifying potential target groups and stuff like that. I'd say it's quite useful and something that I might be doing again, depending on what type of project I would do. Maybe not necessarily in my field, but overall a quite useful technique I would say. I hope that was helpful."

B.4 Participant 4 (European)

"Answer to question number one. I feel like the loneliness in Italy is a very big challenge because considering that people are really outgoing and stuff here. So if you are an introvert, people feel like

you're weird mainly. So they kind of isolate you. There is a big issue of bullying in schools. So yeah, I feel like the there is a lot of loneliness mainly among older people. So grandmas and stuff like this, they maybe they don't have anybody caring for them. And maybe they live in a place where it's not really accessible. They have a lot of stairs to go down and they don't really exit the house because they're old and stuff. So that's a big issue and I feel like nobody is talking about it because they're ashamed, I guess. And there is no such thing as trying to help these people, you know, and nobody's talking about this.

I feel like one of the biggest skills that we practiced was empathy. Because as we were talking, there is a huge difference with empathy and sympathy. And I feel like this is a very core situation, something that we have to keep in mind whenever we do anything. because it's important to know the difference between the two. And during the workshop, mainly in the first part where we had to put ourselves in other people's shoes to understand their position, we had to actually, you know, work with our empathy. And for the future, I feel like by the fact that I'm mainly working in a field where you need to do group work in order to get a job done because you cannot plan a whole building by yourself: empathy, understanding, and teamwork, I feel like are always based on empathy and putting yourself in other people's shoes, understanding the position, and then at that point you are able to work together.

I feel like the most impactful part, the most effective part of the workshop was the fact that there was a big explanation between every step so everybody could fully understand what they were going to do and if they had questions, they could just ask you. So everybody, before even starting the task, had the objective clear in their brain. So I guess this is the most important thing. And I feel like it was really well organized. I think I wouldn't change anything, it was really well organized. You did a great job. There was nothing I think, mainly probably just imposing the methodologies to use, but this is not the point of the study, so I don't know. So everybody could use a different methodology? I don't know if this is the point of the study or if this is even relevant.

I feel like we trained almost all of them, except digital skills

because we were not working on computers, we were mainly working on paper. But of course creative thinking and civic competence, those definitely, and critical thinking was trained because we were in a very heterogenic group, so the people had to work together and applying civic competences in order to cooperate to arrive to the common goal as we were saying and the critical thinking of course, because it was a new thing for I think all the people that were present so they basically everybody had to put their critical thinking in order to fully understand what they were doing. And the last part was the digital skills I told you we cannot apply because we mainly worked on paper.

For question five, I'm not sure because, for example, you can use this only if you have to probably design a product as we were saying, but like coming out with an workshop like you have to I don't know, because in my field I don't know how I could apply this kind of thing. So I was also as we were also talking during the workshop, I don't think there is a real situation where I can actually apply the methodologies we used for my future job."

B.5 Participant 5 (European)

"I don't know how many times I'm take the voice note but I'm gonna answer the question. For the first one, for the loneliness challenge, I'm from France and I think that the loneliness challenge is not really spoken about in France, like in school or whatever. We didn't really speak about that. I never have had a course or a lecture about that in my country and yeah, it's not really spoken about in my country maybe the only way to be informed about it as a French person is to watch something on TV or search something for you to inform yourself because in the school or whenever you won't have a specific lecture about the loneliness challenge.

For the second question, I think that I have practiced my communication a lot. Exchanges with other people were interesting to have different point of view. And I think that it's going to be helpful for my future.

For the third question, here also, I think that the most effective part was to debate with the other members of the group to have

different point of view that can really help us to understand, practice also the communication skills and yeah that is very very helpful in the future for the work and maybe the only thing that I can change is the length of the workshop. Three hours is a bit long and maybe after two hours you can lose the attention of the people, so maybe doing a bit shorter with a bit less activities can be better.

For the fourth one I think that the digital skills I don't really think that I trained during the workshop. The critical thinking, yes, I think I trained it because, as I said before, we debate with other people of what we think is useful for different points of view. The creative thinking, here also we have made some drawings and some other things before thinking, yeah, so I think, yeah, it helped.

And the civic competence. I don't really know of being an active member of a community, but I think that the debates go in this category. So I think that, it helps with that. And yes, I think that for the last question, the ability of talking with other people, sharing our point of view, the exchange of that can be helpful in my future."

B.6 Participant 6 (European)

"So for question one. I think there's kind of two sides because I think since I'm half Korean, half Swedish, from our Korean side, it's definitely getting better now. But when I was younger, mental health was quite a taboo concept. And so, you know, if you would go to your parents or your grandparents and say, "Hey, I'm feeling depressed," they would kind of not like ignore you, but they'd be like, "Just go outside, like go talk to your friends." It's like a privilege to be able to be depressed because some people are out there like struggling for money and like to put food on the table. So like if you're just like moping around in your room feeling depressed, you should be grateful that you have a roof over your head and food to eat, because for some people that's like real depression, that's like real pressure. But then obviously going to international schools and then the white side of my family, they're a bit more compassionate and people are more self-centered or

more aware of mental issues or they're at least more open to talk about it. so I guess it is still pretty relevant, but I think from my Korean side it is a bit more of a private thing and it's one of those things where you might be going through stuff, but if you look at the big picture, everyone goes through stuff and so it's like you just gotta find ways to deal with it. And I think in a way that does also make you a bit tougher and more resilient, just because you learn to find ways to deal with it and manage with loneliness or depression.

'What skills do I practice during the workshop and do I see them as relevant to my future career or studies?' I think the process of design thinking is pretty important in almost anything because I think no matter what you do, you're gonna have to design something in one way or another. In my studies, since I'm sort of in the medical engineering field, I think it's really important to think of the design process as not just from step A to B, but you gotta take into account lots of different perspectives, especially if you're making a device or product, you gotta think about the users and how they wanna use it.

The most effective part of the workshop was I think just having these different structured methods for each step. So for empathizing, you know, you could do an interview, you could do these different boards. For prototyping, you can do the storyboard or make designs. So I think just having these different structures helped lead the workshop. Cause if you just said, okay, make a prototype for this or okay, empathize with this, it's a bit harder because then you have to think, okay, how can I do this? How can I do that? So I think having stuff like the Harris board, et cetera, was pretty helpful.

For question four, I think critical thinking, creative thinking, and civic competence were definitely touched on. Digital skills, maybe not as much, just because everything we did was paper and pen, but the others were I think pretty well covered and practiced. I think stuff like critical thinking is just when we did the Harris board and you had to think of seeing, doing, feeling, like you had to think critically about how you could fit loneliness into that. Creative thinking, obviously, with the storyboard, coming up with a story or design or idea for the prototype. And then also civic

competence, obviously, because we have to work in a group. So you're being an active member of that community. So I think all of those were pretty comprehensibly covered.

'Would I use any of the design methods from today again outside of this workshop? And if so, in what situation?' Yeah, I think I'll definitely use these techniques. Some of them I think I've covered before, but some of them were completely new to me, which is always very interesting to learn new techniques. And I think just in day-to-day life, you can use it because design thinking doesn't necessarily have to be in work or studies, although that's some of the main applications for it. But even just in day to day life, if you want to, you know, design something for yourself or for your own life, it's always good to use. So I think these are skills that are pretty invaluable and you can use them almost anywhere. So I think it was in general a really good workshop and good skills to learn just for life I would say."

B.7 Participant 7 (European)

"So okay, first question: 'Did the loneliness challenge feel relevant to you, your own country?' I think it is relevant to my country and community, especially students from Austria also struggle with loneliness. For me personally, I was lucky that I have never had extended lengths of loneliness. But especially in the student life, everybody is talking about how it's the best time and you will make so many friends, but some people seem to have struggles with that and then may feel left out a lot. So I feel it's relevant.

Second question: 'Which skills do you feel you practice during the workshop?' I feel the skill of ideating things and trying to find solutions to problem in a team is an important skill and I feel like that has been practiced during the workshop. Oftentimes we try to solve problems on our own and I think it's a good approach to also train how to do it in a group, or more or less be forced to do it in a group and I can imagine that it can be relevant for future career or studies also especially like if you have like a certain set of tools that you can use and you can fall back on to tackle specific problems.

The most effective part of the workshop, question three, for me was just the active doing, having an actual case study and working on that. So you have the feeling of actually solving a real world problem instead of just talking about different procedures theoretically. 'What would I change if I could?' I think it was a bit stressful, like the time was not enough for the things we wanted to do. So maybe focus on less things and do them more extensively. I feel like it could be nice to really dive into one of these tools in more depth.

Question four. I feel like the workshop trained mostly, not necessarily critical thinking and digital skills, but the creative thinking and civic competences I think were trained more in the workshop, especially obviously the creative thinking process, trying to find ideas, trying to understand a problem and solve it from a user's perspective, from a problem perspective. Not just of we have some technology and try to do something, but we actually wanna solve this. And also the community part, doing it in a group, having certain methods that actually force you to do it in a group, like the brain writing, where you have to just dump your ideas and then give them to the next person basically and you can see how that grows and how that becomes a more meaningful thing than if you maybe would have just done it alone.

And the last question: 'Would you use any of the design methods from today again outside or outside this workshop?' I can imagine myself doing that, maybe less in a study perspective, but more at work or something. I feel like especially if you work in a product development job, some of these methods can be really useful, and I actually enjoyed hearing about them, even if you don't remember every detail, but the knowledge of there's something there that I can look up, for example, especially for me, the brain writing or doing certain personas of what could our customers actually be and what problems could they have, and 'how can we solve that very specifically?' Especially in a work context, I can definitely see myself using the methods again."

B.8 Participant 8 (Global South)

”In my country, I believe loneliness certainly exists, but it may not be as widespread or severe compared to some other contexts. From a demographic perspective, China’s large population and rich variety of leisure activities provide many opportunities for people to find communities with shared interests. Even niche hobbies and subcultures can have substantial communities because of the sheer population size. From a cultural perspective, Chinese society is generally characterized by collectivist values. People tend to naturally see themselves as part of groups and are often willing to invite others into their social circles. That said, loneliness may be more visible in megacities such as Shanghai, Beijing, Shenzhen, and Hong Kong. In particular, migrant workers and people living away from their hometowns may be more vulnerable to feelings of loneliness and a lack of belonging.

I believe that the quality of a design thinking process depends heavily on teamwork and communication. In this workshop, these were probably the skills I developed the most. Decision-making, in particular, can be challenging. Teams constantly need to justify why one idea is chosen over another, why certain ideas should be combined, and why some features need to be abandoned. It is not always easy to help everyone understand and accept these decisions smoothly. In real-world projects, subtle interpersonal dynamics and communication issues can easily lead to awkwardness or conflicts. Therefore, managing communication and maintaining alignment within the team are important aspects that should not be overlooked.

I found the Lotus blossom method in the ideation stage particularly interesting, as it made the transition from divergent thinking to convergent thinking very intuitive. However, I also feel that with a larger team, we might have reached different decisions and come up with different outcomes, simply because a greater diversity of perspectives would have influenced the process.

I think today’s workshop was mainly centered around creative thinking. Critical thinking was involved as well, but because of the limited time and the fact that we were meeting each other for

the first time, people tended to be polite and somewhat reserved. As a result, we did not really challenge each other's ideas or explore them in great depth.

I will definitely apply these methods in my future work, particularly during the ideation phase. I plan to start my own business in the future, and I think the overall mindset of design thinking, together with many of the tools introduced in the workshop, can be very helpful during the early stages of research and preparation. They provide a structured way to explore opportunities, understand users, and gradually build and refine a project."

B.9 Participant 9 (Global South)

"For question number one, I would say since I feel like Thailand is a bit more progressive than other countries in the Global South, I think loneliness is not a taboo in Thailand, but people are not really willing to openly talk about it that much, but people are willing to help each other more. So I would say yes and no. Yes in a sense that it's a challenge because people don't really talk about it. It's a part of culture where you try to avoid or hide the problems that you have, but then know as in people are willing to help each other as well. So that's the answer.

For number two, I feel like the skills that you practice the most is try to empathize with people. Like empathizing is one skill that I think I practiced a lot because I really feel like when I do an interview with the other guy, I feel like that's something that you have to empathize for and that's something you practice. Also during the ideation phase, finding solutions, pitching, try to make other people understand what you want, also trying to see how to solve the problem. I think that's something that was practiced during the workshop. And I think it's relevant for your future careers in terms of not really a hard skill, but more soft skill on how you solve the problem dealing with other people. So yes, that's the answer.

For question number three, I think the most effective part of the workshop is you let people do the methods and choose the method by themselves. I mean not entirely because of the time constraint,

but I feel like that's the most effective part of the workshop. One thing I would say that maybe I would change is the presentation. I feel at first it was a bit boring I would say, but maybe it's because you have to explain everything. But I maybe would make it more interactive or maybe make people think 'What's gonna happen next?' Like there's not enough hook before going to methods before doing the workshop. So I would say that's probably something I would change in the workshop.

For question number four. I would say, yes, that definitely critical thinking is there, creative thinking is there. because you know, you have to ideate stuff, talking with other people, try to thinking what you can do, what you can what have you been or have you done to solve the problems. And I think it's really practicing it. Maybe on the civic competence is a bit not so much because there's not so much people in the workshop that you feel act being active for a community. Maybe if there's more, and maybe some way you design a workshop that can make more people joining in and make everybody participate, which I know is really hard, I think that would practicing my civic competence more. And for digital skills, I don't see it as of now. So yes.

For questions number five, I would say yes, definitely. I don't know the situation, but I wrote in the questionnaire that maybe for solving social problems, that kind of stuff more. I feel like you show me in a way that you can use design thinking for these problems as well, because when I first see design thinking, I thought it's for designing or I thought it's for business, basically. So I think this workshop really shows how you can use design thinking as a tool to solve those kind of problems, rather than just business, which I think is really nice. And then again, I really like the workshop. And yeah, I really appreciate you asking me to join. I really love it. So good luck with your thesis."

B.10 Participant 10 (Global South)

"For the first question I feel like the loneliness challenge is relevant to my own country, and community. I feel like loneliness is not very talked about in my birth country of Venezuela. In general, in the communities, it's not really a topic people bring

up. I think it might be a little taboo to talk about. People feel uncomfortable talking about it. But at the same time I do feel like loneliness is less of a larger issue in Venezuela 'cause I feel the culture kind of like ingrains a lot of family culture in people and people spend a lot of time with their extended family, their family. So they're always with people. So I feel like the way the cultural values of the country where people value family and stuff, don't allow for a space where people feel lonely. Although I'm sure people still feel lonely and it's not very common to talk about it openly.

For the second question, I feel like the skills I practiced during the workshop were empathizing and putting myself in other people's shoes to try to understand what they need. And then coming up with ideas of how to address a specific need. I definitely do see that being applied to my future career studies. As a building designer, it's important to design things so that the users of the building can use the building as effectively as possible and to do that you need to basically empathize with what a user would experience walking through a building, living in a building, working in a building and all of that.

I think the most effective part of the workshop was having a group of four people. I think it was a nice number to talk and work out ideas with. It wasn't too big, but it also wasn't too small. And the hands-on experience, after you discussed everything on a PowerPoint, doing it all hands-on, was very effective in my opinion. Something I would change about it if I could would be maybe the length of it. It would have been maybe better if it was a little longer, so that we could like not rush through some of the parts and maybe adding some breaks if you make it longer, you know. That I think would have been a little bit better so that we could take a little bit more time hashing through ideas and thinking about things together.

For the fourth question, I definitely think that critical thinking and creative thinking were trained in the workshop, as the design thinking process is one of critical thinking and leads to creative solutions. And then maybe also civic competences, since the whole idea of empathy I think is important. For civics, getting into the mindset of other people, understanding other people's

problems, and being engaged in your community in a way that is not just completely self-centered and also you can take on this perspective of someone else. So I think those three things were touched. The only one is digital skills. I feel like that one wasn't touched upon at all. Most of the things we did were, talking openly, using pen and paper, and colors and stuff.

For the fifth question, I would say I would definitely use design thinking again. outside of this workshop. For my job, I think it would be very helpful to define problems and try to address them through a perspective of the users of buildings. And also I would say it could be very helpful for solving personal problems as well about how I'm feeling about a specific thing in my life. I know that's not the intended application, but I do feel like some of the methods, like writing stuff on post-it notes and classifying them into different buckets and then looking at them to try to come up with a common theme, I think that was a very helpful tool for really defining a problem of any sort. It doesn't necessarily have to be a problem that needs a specific design. But so I think I think that that's something I definitely would use a lot for those type of situations in my personal life and as well as work my work life."

B.11 Participant 11 (Global South)

"I feel this loneliness challenge is more relevant to our younger generation, rather than the country or community. I feel in China, where I came from, people are not very lonely generally because they have family and they put a lot of effort to build a family. But for the young people, because it's a lot of work and very little free time, so people find it very hard to meet new friends or have some relationships with others. I think so it's more common in the younger generation. And I think people will talk about it openly and also use an app or other software to meet new friends. I think it's not a very shameful or hidden experience, at least among the young generation.

I feel I have practiced all the design workflow in the workshop. It's a very comprehensive design and I think especially for the evaluation part I tried a new method that I haven't tried before. I forgot the name but it's a table that we used. And I feel it's

very efficient when I can put forward the criteria that I feel it's important for my design solutions and let others give the score to the criteria. I think it can definitely be used in my future work, because my future work will also relate to the user research and gathering feedback, et cetera.

I think it's very good that we first read some materials or watched some videos and then we practice and see if it really works in the real life or do we meet some challenges. So I think it's very effective to learn by doing. And I think if I could change the workflow, the workshop design, it could be that to give us each one of the participants some materials that we can have time to read and to digest by ourselves. So maybe we can also come up with our own questions or challenges during our practice and then discuss together.

I think the workshop definitely trained critical thinking. For example, the sympathy and the empathy part and it led us to jump out of our own world and our own logic and try to listen to others' stories and really understand their problems and try to give support or solutions by design. And so I think the critical thinking has been trained and also the creative thinking because we are encouraged to bring up whatever form of the solutions and we have lot of tools to try to visualize the solutions and make the idea and to see if this idea can really work out. So it's a very valuable training of the creative thinking. So not just in using the imagination but also we create something and we test a bit about our creative thoughts.

And I think the fifth question is kind of similar to the second one. And so I think I will definitely use evaluation method, the table that we used in the workshop, in my future work to gather some user feedbacks and evaluate our prototype. And I think there's also a lot of different design methods that we haven't explored or we didn't have time to try them, but I feel if I have opportunity in the future I will also browse all the different design methods and try to find the more suitable one. But I also think, to find the right design method, is also a skill that we need to learn from this workshop. The current setting is just that we got some alternatives and you also recommended some design methods, but I think maybe it would also be helpful if we could also learn how to

choose different design methods and why it is suitable for our solution."

B.12 Participant 12 (European)

"Okay, so first question. I think the loneliness challenge was very relevant to us as international students, having to move abroad and then having to find new friends, new community. And is it talked about openly? Maybe not. I'd say it's something people talk about after the facts, but once they're more comfortable and actually less lonely, then they might be more okay talking about it. So I think it is something people tend to keep private when they are actually experiencing loneliness. And then later on they will talk about it.

The skills practiced in the workshop are maybe less relevant for my future career. Some of the skills to help brainstorm are nice, but other than that I feel like it's not very relatable for real estate.

Okay, number three. The most effective parts were, I mean, it being a workshop itself and actually having to do all of the things and then seeing what the other group did and explaining it to each other. What I would change is not have as many methods for each step because I think it made it a bit confusing. And also you'll be short on time.

And then number four, I think those were definitely key skills and I'm just not entirely sure how the digital skills were integrated in this specific workshop. But other than that, they were integrated.

And for number five. I think I like the persona thing a lot because it makes you feel like you have like a client in mind, but it's very specific. And then also you can put it slightly further away from yourself. So with the one-on-one interview, that's pretty personal. And depending on the topic, I would not like to get too personal in a professional context. But if you're making a persona, it's easier to relate to, but it also keeps your private life private and I think the persona thing is very relevant for real estate. They do a lot of, where can I build houses for this couple, and this couple's income is this and this, and their hobbies are blah blah blah blah blah. And so that can be used a lot in real estate to kind of describe the

type of client they're building for, the type of occupants a building would have. Okay, good luck."

B.13 Participant 13 (Global South)

"So for the first question, which was if the loneliness change feels relevant to my own country or community, I would say yes, because overall Sweden as a country, or if you generalize it, it's a very solitude mindset here. you have your own bubble, your own circle. I mean Sweden isn't really known for being the most extroverted type of society where you do small talk with people just like that, especially not in the bigger cities like Stockholm. So it definitely is very relevant because I think here since people don't really make their way to meet new people or to reach out in a more persistent way than maybe a person from a more extroverted country like Spain or Italy I think it's definitely more easy to feel lonely because you spend more time by yourself or with a very much smaller circle or not really having the same social events or the same feeling as if you are from a southern country where being with people is part of the culture. And I think this is something people tend to keep quite private. It's not something we say if we reach out, 'Hey I'm lonely, what are doing?'. It's more like we maybe ask if someone feels lonely they might reach out and just be like, 'Hey, what are you doing? How does your week look like or your month look like? You know we should catch up sometime.' More like trying to make plans but still very private or not really making a big deal of it like 'Hey, what are you doing tonight? We should meet because I'm feeling lonely.' Yeah. But also overall if it's private or if it's talked more openly here. I wouldn't say that we actually talk about being lonely as a thing here in Sweden. Although I think everyone deep down knows that yeah it's very normal that you can maybe feel lonely or that you don't have this big group of people that you always hang out with or that you do stuff all the time. Because people have their routine and I don't know what and stuff like that. So I would say it's definitely something people tend to keep more private if they feel lonely or not.

And the next question about which skills I felt like I practiced

during the workshop and if I see them relevant to a future career or studies. I would say it definitely made me think more a bit outside of the box. First to really pinpoint what is the problem, 'cause that sometimes can be diffused because one problem may be five problems, but you have to narrow it down to one problem because maybe it's all related to one another. And then also to, not just find a solution, but also think about the solution of what it could lead to and if there are alternative solutions to it. So I definitely feel like it made me think more in-depth and I think this definitely is very relevant to a future career when you are in, let's say that you are a project leader and you stumble upon a task that is problematic and you have to choose like what is the best solution to this problem that appears or whether it's a physical thing that happens or a team thing that happens, a problem. To be more critical but also logistic and having empathy. You have to think about all the factors that are gonna be affected. And definitely it's very relevant in a career, where you work with other people, especially in a team.

For the third question about what the most effective part of the workshop was for my learning. I'm a bit unsure of the question if I understand it correctly, but if I interpret it correctly, I feel I learned the most effectively about design thinking, by that you get a problem, and I like the interactiveness of the workshop that we get the problem or we get a task to do and we define the problem, we have to think, brainstorming and talk about it. Definitely made me learn more about, okay, this is actually how it works and how you can actually think about it in the future if something like this is stumbled upon. I don't think I would really change anything. I think it was good. If I understood the question correctly.

And so for the fourth question, if I feel like today's workshop trained any of these skills and which ones and how, I would say definitely like I mentioned before, the critical thinking and the creative thinking were definitely two things that I trained in the workshop by thinking and writing down and using the templates, having a good guideline and a path on how you can organize the problem and structure it, both the problem and the solutions. I feel like that really helped me learn a lot about it. The critical thing and then digital skills and civic competences. I don't know

if we really trained the digital skills or the civic competences, but I mean definitely it made one think of them like okay this are ways that we can solutionize a problem with these tools, like using digital tools or being more civic and stuff like that.

And then for the last question, if I would use any of the design methods from today again outside of the workshop, I would say I like the lotus blossom method, where we have the problem and then come up with the solutions or writing down the factors that can affect the outcome of the problem. Maybe I remember it wrongly how it worked, but that we wrote down the different things to achieve a solution to the problem and then go in-depth for every solution, seeing that okay, but what is needed, what is the outcome for each solution as well. And I think that is definitely very applicable in real life or if you're working in a bigger group or in a task that you have to be more precise and go in-depth. So definitely I would use that. If I was gonna be a project leader and we have a problem, I would definitely use the lotus blossom. Okay, these were all my answers to these questions. Thank you so much again for having me part of the workshop and good luck with everything. I hope this helps. Okay, bye."

B.14 Participant 14 (Global South)

"So for question one, in Uganda, it's not really common for someone to talk about loneliness or it's there but it's not like a thing people talk about. Anyway, I guess for someone who is new to a community, it would be there in the first period you're there. But then as time goes on, people are warm and you become friends instantly and stuff like that. That said, I do think it's still very relevant to people who just come without having grown up there, although it's not as much as I have first here. And also people usually keep it private because these are not things we usually talk about in the Ugandan community. And people don't want to be vulnerable and stuff like that. However, these days there is less stigma surrounding the mental health conversation in Uganda. So people opening up more and talking about it. So like we talked about, as an international student, it's really common

if you're away from your family, but otherwise if you're in a community where you grew up and you know your way around and you're used to it in general, it's very rare to have it because everything is familiar.

So for the workshop, I feel like it was nice that I got to work in a team. I wasn't on my own entirely and in the conversation we had, I got to exercise empathy, we got to communicate and solve everything in real time. And were able to share ideas and build on them and then see different perspectives and stuff like that, which is really good because in a way we did build something to solve a problem, which is a very good thing. In my career, you have to be creative, work in a team, and solve problems on the daily. Because it's not all about technical knowledge, but you have to understand the different people you work with, their needs and how to handle them. So yeah, that was nice. So for me, for the workshop, I liked, like I've said before, the most effective part was talking with the person I was partnered up with and yeah, listening to them, listening to their story and just hearing them. And also when we were trying to solve this thing using the different methods that were given, we were able to go into deep discussions and at the end, I felt like I contributed something. I had a product at the very end, which was good. I guess it also works on my confidence that you don't need to know something entirely to do it because you gave us these steps and we were able to follow them and came up with something. Maybe it was not the best, but it was something. I did feel the feeling of accomplishment.

For the fourth question, yeah, yeah, I think so. I think the workshop developed many of them. The critical thinking, 'cause we're able to analyze different situations with the different tools. And then creative thinking, 'cause we're literally generating ideas, not on the spot, but immediately.

Then yeah, it made us think of how we can support people in our communities and create more inclusive environments. So it developed and strengthened our competences in that area. So for the digital skills, in my case, it was less central in my opinion. Although we got to use some methods that maybe require some digital devices and stuff, but it wasn't very much there for me.

And then finally yeah, I think I would. I don't remember the name

of them the design method, but I liked the method where we had to brainstorm ideas and then keep on building on that as a team and then we had to vote on which one fits best for the final solution. So that's something I would use because it meant it resonated with me. And then also the empathy talk is something I would do in case I ended up in a situation like that. Yeah. That's it."