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Empowering change for future-making: Developing agency by framing wicked problems through design

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Abstract

As the world and its challenges are becoming more complex, students and practitioners alike need to develop a more nuanced understanding of how to navigate problems today for envisioning desirable futures. Design's inherent focus on future-making and dealing with ill-defined problems has been identified as a potential way forward. Yet, there is a paucity of

studies looking at what elements support (or hinder) students developing agency when it comes to framing and identifying problems. By taking the UN's Sustainable Development Goals as an example of ill-defined problems, we studied a multidisciplinary student body in a higher education institution attending a three-week intensive course focusing on how design can serve as a catalyst for social and environmental change. Our findings suggest future-oriented problem framing is dependent on the following aspects: combining theory and practice, engaging with the world and its complexities, reciprocal trust in design teams, self-reflection, changing perspectives, and emotional investment. Based on the findings, a model is crafted to illustrate how agency for future-making can emerge and be developed by engaging with real-life problems through design. Implications for research and practice point towards a more balanced relationship between skill development and ways of engaging with the surrounding world.

Keywords: agency theory, design thinking, futures consciousness, global challenges, multidisciplinary, potential futures

1. Introduction

As the world and its challenges are becoming more complex (or wicked, as per Rittel & Webber, 1973), several higher education institutions (HEIs) have been transforming their curricula in order to prepare their students to live and operate in a world that is constantly in flux (Austen, 2012; García-Morales et al., 2020; Hermann & Bossle, 2020; Tasdemir & Gazo, 2020). For instance, HEIs can sign the SDG Accord (n.d.) to commit to addressing the Sustainable Development Goals, and similarly the RRBM network (n.d.) encourages business schools to support responsible research.

In their editorial, Király and Géring (2019) go even further by advocating for a more holistic transformation of higher education institutions towards more active agency in the surrounding society. Similarly, Rieckmann (2012) calls for a more future-oriented attitude in higher education that provides students with tools and capabilities to tackle wicked problems. Echoing these calls to transform higher education, the undertone seems to be that higher education should prepare students to ask the right questions instead of finding answers to existing questions (see also Björklund, 2013; Liu & Maas, 2021; Osborne et al., 2021); namely, to develop their competency for systemic thinking as well as dealing with complexity (in line with Rieckmann, 2012).

As we are dealing with multiple potential futures with often conflicting interests, students and practitioners alike need to develop a more nuanced understanding of how to identify problems today for a more emancipatory future-making (Garcia & Gaziulusoy, 2021). Against this backdrop, design has been identified as a potential vehicle for equipping the students with a future-making mindset and a shared problem-solving logic. This leverages on design's innate qualities that are human-centred, collaborative, and future-oriented (Lee et al., 2018; Hyvärinen, Lee & Mattelmäki, 2015; Bason, 2010; Junginger & Sangiorgi, 2009). Given that future is not something given but actively created, design's inherent focus on discovering problems and dealing with ambiguity (Dunne & Martin, 2006) has been identified as a potential means for instilling students with an agentic relationship towards their surroundings as focus shifts from following educators' instructions and exploring well-defined problems to creating opportunities (see e.g., Garbuio et al., 2018; Sarooghi et al., 2019). However, whilst design education is gaining currency in higher education institutions as a means to proposing pathways for solving major societal and environmental challenges (Buhl et al., 2019; Kimbell, 2011), we need to develop greater insight on how design

contributes towards individuals developing capacities for envisioning potential futures through problem framing.

To bridge this gap, and in line with Björklund's (2013) concerns regarding students' passiveness, this paper looks at elements that support (or hinder) students developing active agency when it comes to framing and identifying problems. By taking the UN's Sustainable Development Goals as an example of wicked or ill-defined problems in a business school context (in line with Hill, 1998), this paper explores how a multidisciplinary student body utilized design-driven methodologies to frame complex problems and offer initial pathways forward during a three-week intensive course (c.f. Sarooghi et al., 2019). Therefore, we ask the following research questions:

How do students draw on design to frame problems in today's society?

How does problem framing contribute to students' agency in envisioning desirable futures?

With this study, we contribute to a crucial body of knowledge that weaves together design and futures studies (e.g., Ceschin & Gaziulusoy, 2016; Garcia & Gaziulusoy, 2021) by focusing on the problem-finding and concept development phases of a design process (e.g., Dorst & Cross, 2001). More specifically, findings from this study provide a complementary standpoint to futures consciousness (e.g., Ahvenharju et al., 2018, 2021) by looking at how designerly ways of exploring problems here-now can help in transitioning from linear problem-solving to navigating ambiguous, ill-defined problems and solutions that bridge the present and the future. We investigate how a multidisciplinary student body utilizes design to frame problems in the surrounding society and proposes future-oriented solutions to them. To

this end, we draw on agency theory (Bandura, 2006; Emirbayer & Mische, 1998; Meyer & Jepperson, 2000) to theorize how agency to envision futures develops through engaging in problem framing. The purpose in this paper is not to evaluate the outcomes of problem framing *per se*, but instead to understand how students explore and frame problems with future implications in mind.

The rest of this paper is structured as follows: we will review relevant literature on agency and futures and design education, after which we introduce the methodology devised for this paper. Findings will be presented and discussed afterwards, and we conclude by summarising the findings, discussing the limitations, as well as offering avenues for future research.

2. Literature review: design agency and competencies

Drawing on agency theory (Bandura, 2006; Emirbayer & Mische, 1998; Meyer & Jepperson, 2000), our aim in this paper is to contribute to discussions on how design is being utilized to frame problems with future implications (e.g., Björklund, 2013; Dorst & Cross, 2001; Kim & Strimel, 2020). Acknowledging that there are numerous branches and sub-disciplines of design (e.g., Buchanan, 1992), in this paper we loosely follow Dunne and Raby's (2013) speculative design that emphasizes design as offering alternative viewpoints to and pathways from the *status quo*. To situate our study with regards to extant research, in this section we will review relevant literature on design as future-making and problem framing processes.

Over the last two decades, design has witnessed a broadening of scope from products towards services and systems (Ceschin & Gaziulusoy, 2016; Findeli, 2001; Stegall, 2006). Similarly, Kimbell (2011, 2012) observed how design has permeated new fields such as public services

(Seravalli et al., 2017), meaning making (Verganti, 2009), and user involvement and open innovation (von Hippel, 1986). For instance, understanding how designers frame problems from the end-user's point of view (Dorst & Cross, 2001) or utilize visuals and artefacts in communicating ideas (Comi et al., 2019) have been adopted in other disciplines (e.g., Dym et al., 2005; Garbuio et al., 2018), and similarly, designers have borrowed concepts from social sciences when engaging in service design (e.g., Bowen et al., 2013). Furthermore, as traditional design education predominantly focused on the craft aspect of design (Buchanan, 1992), recent trends that have gained currency include focusing on design as bringing about social or organizational change (Elsbach & Stigliani, 2018) and how design serves as a catalyst for societal and environmental transitions (Ceschin & Gaziulusoy, 2016; Garcia & Gaziulusoy, 2021).

From an educational point of view, expanding design to the systemic level implies a departure from linear and well-defined problems towards multiple, often conflicting, viewpoints to framing problems (e.g., Kim & Strimel, 2020). On a more commercial side, Garbuio et al. (2018) discussed how design thinking can be taught in a business school to foster innovations and entrepreneurship, thus further highlighting increasing demand in educating students with designerly ways of approaching problems and challenges. Similarly, Walsh and Powell (2020) write about how reimagining the MBA curriculum by using an arts-based approach will broaden students' problem-solving skill sets. Chen et al. (2020) highlighted how engineering students ought to broaden their scope in design projects to include societal considerations. By designing technical solutions for homeless people, students in Chen et al.'s (2020) study came to the realization that technology in itself did not solve problems unless it addressed contextual matters.

There is growing interest towards the notion that teaching students how to deal with wicked problems often requires the course space to expose the student body to the particularities and complexities of the outside world (Nowell et al., 2020). For instance, studies on design pedagogies have highlighted the importance of connecting design knowledge with design practice (e.g., Chandler & Ward, 2018; Garbuio et al., 2018; Hill, 1998) as well as interaction with the surrounding world (Ejsing-Duun & Skovbjerg, 2018; Lee et al., 2019). While extant studies have increased our body of knowledge on how design students develop their design competencies, little is said about how they develop their agency towards designing as future-making and how course structures enable or hinder this (Matthews [2019] being one of the few exceptions).

To bridge this gap, in this paper, we utilise agency theory (Emirbayer & Mische, 1998) as our vantage point to theorize how students become active agents in framing wicked problems. Here, we adopt Emirbayer and Mische's (1998, p. 963) conceptualization of agency:

“a temporally embedded process of social engagement, informed by the past (in its habitual aspect), but also oriented toward the future (as a capacity to imagine alternative possibilities) and toward the present (as a capacity to contextualize past habits and future projects within the contingencies of the moment)”.

According to the definition above and agency theories in general, individuals develop their sense of agency through interacting with the surrounding societal structures (e.g., Bandura, 2006; Emirbayer & Mische, 1998; Lasky, 2005; Meyer & Jepperson, 2000). Considering that teachers are often perceived as the change agents within educational institutions (Villegas-Reimers, 2003), agency theories seem to hold significant potential in explaining how teachers

enact change or reforms within the existing social structures. However, in this context, social structures are not seen as rigid or imposed from above; instead, as Wallen & Tormey (2019) emphasise, agency defines structures and vice versa.

Prior research has made tremendous advances in terms of how teachers across disciplines develop their agency (Matthews, 2019; Tao & Gao, 2017; Vähäsantanen, 2015; Wallen & Tormey, 2019), and here we extend agency theories to cover students' point of view within the context of design. In her study on school food gardens, Green (2014) argued that design served as a catalyst in helping children become active place-makers. Similarly, Oxman (2004) explored how students learn about design through a specific pedagogical framework with emphasis on active exploration.

Building on the above, if we understand design as conscious efforts towards creating potential futures (e.g., Garcia & Gaziulusoy, 2021; Kemp, 2017), the intersection between agency and design education becomes fruitful in the context of futures education. As Rieckmann (2012, p. 128) writes, it is imperative for educational institutions to adopt “a new learning culture which does not confirm academic tradition but examines its potential for a sustainable future, in an open-minded, reflexive and participative process”. Similarly, Amsler and Facer (2017) elucidate how neoliberalism has infused discourses on education with profitability, and how a more diverse dealing of potential and imaginable futures could enable us to transcend futures dictated by the current *status quo* of neoliberal and colonial capitalism. Here, (higher) education institutions can operate as laboratories for imagining potential futures whilst also provoking thinking about alternatives to capitalism and ubiquitous commodification (Király & Géring, 2019).

There is a growing body of literature looking at how individuals develop capacities and competencies for imagining alternative futures. On a broader level, Király and Géring's (2019, p. 123) editorial draws attention to higher education's potential to help students envision possible futures when we only seem to have a partial understanding of what can be imagined. They (ibid., p. 128-129) continue by questioning the current emphasis on 'world-class' or 'entrepreneurial universities': such narrow focus "constrains thinking about what HE is for and what it should become in local and global contexts". In this context, focus has been paid especially to cognitive and psychological factors that influence how well individuals can imagine possible futures (Ahvenharju et al., 2018, 2021). Extending this, Pouru-Mikkola and Wilenius (2021) emphasize the transformative role education can play in developing sensitivity towards multiple futures, and Finn and Wylie (2021) draw attention to collaborative imagination. In essence, futures education seems to have focused on the psychological dimensions, and recently Pouru-Mikkola and Wilenius (2021) speculated on the potential that futures education and design might have. Indeed, due to design's focus on visibility and materiality – interacting with objects – imagining futures can become an active process that extends individual's psychological capabilities.

Through active participation in learning processes (thinking and doing echoing Dewey [1930, 1938] and Schön [1983]) - design students enact and develop their agency by interacting with the surrounding world. Literature on design education in and outside the design discipline has implicitly discussed the importance of agency in connection to developing design competencies (Dell'Era et al., 2020; Garbuio et al., 2018; Johansson-Sköldberg et al., 2013). Thus, as higher education institutions more broadly are increasingly integrating design (thinking) into their curricula (Çeviker-Çınar et al., 2017; Coleman et al., 2020; Dong et al., 2016; Gaiardo, 2019; van der Westhuizen et al., 2020), students across many disciplines are

introduced to design's duality where they are expected to know how and why design methods can be used, as well as the possible consequences that may surface. In other words, while design itself has been understood as having transformative potential, how do we ensure students do not remain passive in framing problems but actively engage in framing problems in the surrounding society (Björklund, 2013)? Moreover, while design is understood as a future-making practice (Yelavich, 2014), we still need more research on what factors influence students navigating problems for envisioning desirable futures.

3. Methodology and context: visual research in a multidisciplinary setting

3.1 Research context

IDBM Challenge was a three-week intensive course offered at Aalto University's multidisciplinary International Design Business Management graduate program. Bringing together graduate students from design, business, technology, and humanities; learning outcomes for this course were two-fold: first, to help the students understand how to work in interdisciplinary teams, and second, to provide the students with a basic understanding on how design can act as a catalyst for social change. Each team was formed so that they contained five to six participants and so that more than two disciplines were present. At the same time, we also paid close attention to ensuring diversity (e.g., gender, nationality) in teams.

During the course, the students worked on assignments on three levels (Thamrin et al., 2019): individually, they crafted their learning diary to reflect on their learning experiences; in teams, using the United Nations' SDGs as a lens, they identified a problem (e.g. lack of social

interaction, inadequate support for employing refugees, and well-being and public transportation) in the city where the course was taught and ultimately presented a solution concept to the problem (Cunliffe, 2004; Schön, 1984); and as a cohort, they organised a public event showcasing all the identified problems and solutions. Moreover, the course was designed so that the first week focused on problem framing, the second on exploring the solution space, and the final week on concept development. Whilst the overall structure was somewhat linear to help the teams advance their project with weekly milestones, the focus within each week was on iteratively developing the project. As the course instructors, the first and third author invited a couple of domain experts (e.g., municipal employees and social entrepreneurs) to the course to provide the students with inspiration for their project, and similarly we provided mentors for each team. Apart from that, the students were encouraged to interact with other parties external to the course either through research or concept development.

3.2 Research design

Data for this study was gathered through visual learning diaries that the students submitted at the end of the course (Jay & Brooks, 2003; Porto, 2007). Consent was sought by asking each participant to sign a consent form created by the university. In addition, each participant was reassured that whether they participated in the study or not would not impact their final grade in any way. Crafted individually and submitted digitally, these visual learning diaries were not graded for style or content - to enable the students to focus on reflecting on their own learning journey instead of aiming for the top grade, full points for the assignment were obtained by using our model of issues to be covered as the baseline as well as submitting the assignment on time (see Figure 1 below).

30% VISUAL LEARNING DIARY
Usually learning diaries are expected to be handed in in written format, but here at NR we are trying out something completely different.

Being visual can take many different formats, such as sketching, mind-mapping, photograph, and collages. Feel free to experiment and find your element to capture your personal point of view of the upcoming three weeks! Please note, the visual learning diary does not restrict you to share some key messages in a few concise sentences.

Your personal learning diary will not be shared with others. Main objective of the diary is that you reflect on the happenings and insights of the course, documenting your personal learnings and feedback.

In case you are a paper addict, there is nothing wrong with good old pen and paper. In case you are on the tech side of life or would like to explore the technological possibilities out there, feel free to establish your diary digitally!

TOPICS TO BE COVERED WEEKLY

READINGS EPISODES SESSIONS TEAMWORK BLENDING

TOPICS TO BE COVERED AT THE END

DIARY FORMAT Please reflect on the choice of your diary format, discussing the reasons and insights of its usage.

WISHLIST What would you have wished to include to enhance the communication during the hybrid (online + offline) learning environment?

- The diary needs to be uploaded to Microsoft Teams by **12 October 2018 (Friday)**.
- 2- 3 pgs per week + 1pg for the topics covered in the end • Submission as PDF (in case you used paper, please scan the pages).
- In order to get the maximum points for this assignment, you are expected to cover all the aforementioned topics. The less topics you cover, the less points you will receive for your assignment.

However, please keep in mind that we have first and foremost designed this task to support your learning experience, and as such the more you reflect on your experience, the more you will get out of this exercise!

Figure 1. Instructions for compiling the Visual Learning Diary.

Students were encouraged to utilise visual means of communication in their learning diaries as they are well suited for expressing and reflecting on emotions and insights that are otherwise difficult to articulate (Bryans & Mavin, 2006; Lehtonen, 2020; Zaltman, 2003). As Renaud et al. (2021, p. 234) discussed, visual methods have been gaining momentum and participatory visual methods were particularly well suited for “fulfilling the need for more nuanced and sensitive investigations”. In essence, the diaries were multimodal documents combining both written and visual communication. The learning diary assignment was designed so that it would assist the students to reflect on the course as an unfolding process. Whilst we did not control when the students worked on their learning diary (e.g., during or at the end of the course), the main focus was on exploring what transpired during the course and why. In addition, as design as a practice is inherently visual and material, not limiting the learning diaries to the textual domain enabled us to analyse the students’ agency and its

emergence in more depth. We approached the visual learning diaries as multimodal texts (Höllerer et al., 2018) so that both narrative and visual aspects of learning reflections could be considered.

Our data set consisted of sixty-seven visual learning diaries that varied in length (between ten and fifty pages), and their structure temporally followed the course thus enabling us to analyse how the students perceived their agency to develop over time. Of the sixty-seven participants, roughly one third had a background in design, with the remaining students coming from backgrounds such as technology, business, or humanities. Approximately half of our students had prior work experience (not necessarily in the field of design) whilst the other half joined the program immediately after their undergraduate studies. Also, with nearly twenty different nationalities represented, the cohort studied was diverse both in terms of disciplines and cultural backgrounds.

3.3 Data analysis

To analyse our data, we adopted the Gioia methodology (Gioia et al., 2012; Gioia & Pitre, 1990) that is well suited for exploring emergent phenomena as well as providing structure to qualitative analysis without imposing too narrowly predefined categories to the data. In line with the Gioia methodology (Gioia et al., 2012, p. 19), the first and third author were engaged in teaching the course whilst the second author brought in ‘an outsider perspective’ to ensure we did not stay too close to the data. To begin our data analysis, we went through each visual learning diary separately, taking notes along the way and identifying patterns and codes (see 1st order concepts in Table 1 below) focusing on agency and what kind of elements influenced it (Glaser & Strauss, 1999).

In essence, this methodology is built on three interrelated phases: the first phase focused on words and visuals used by the informants, the second phase involved the researcher generating patterns from the data, and finally in the third phase focus was on aggregate dimensions. Thus, the Gioia methodology gives primacy to the informants whilst at the same time allowing the researcher to raise the abstraction level through theorisation. The table below (Table 1) shows our data analysis process.

Table 1. Analysis process based on the Gioia methodology.

1st order concepts	2nd order themes	Aggregate dimension
Team-building activities generating rapport	Being vulnerable, being closer	
Creating a safe environment		
Give space to others in the team	Respecting others	Reciprocal trust in design teams
Respect differing opinions		
Make the most out of diversity	Trusting and embracing differences	
Strong commitment to teamwork		
Learning to understand others	Being caring towards others in the team	
Learning from others		
Struggling in teaching design methods	Developing design identity	Self-reflection
Dealing with ambiguity		
Being aware of one's own shortcomings	Others as a vantage point to oneself	
Identifying strengths in others		

Developing design leadership	Developing design competencies through the brief	
Design and responsibility		
Stimulating learning methods	Changing one's mindset through the project	Changing perspectives
Interacting with the world		
Learning to be more open-minded	Questioning prevailing forms of value creation in the society	
Broadening notions of value		
Identifying a problem one feels passionate about	Balancing between own and potential users' needs	
Designing with instead of for		
Cross-pollinating ideas within the team	Contextual complexity as a trigger for exploring the problem space	Emotional investment
Being open to ideas from outside the team		
Feelings of accomplishment	Collective commitment	
Instructors' commitment		
Being explicit about the design brief	Applicability of methods	
Balancing conceptual and practical knowledge		
Design methods and brief complexity	Applying methods in real-life settings	Combining theory and practice
Project management skills		
Developing narrative skills	Novel sense-making ways	
Developing visual skills		
Going on a student exchange	Design brief as making one aware of their blind spots	
Becoming more self-aware		
New type of design brief	Exploring problems beyond their surface	Engaging with the world and its complexities
Deeply exploring the topic		
Understand the system	Systemic change through	

Questioning the status quo design

Concepts on the left side are directly taken from the visual learning diaries, and the second order themes represent our categorisations. The first order concepts should be treated as collated groupings; the purpose behind this methodology is to reduce the number of concepts by grouping them under similar categories for discovering deeper structures in the data (Gioia et al., 2012). Concurrently with the previous, we engaged with prior literature on agency theories and design education to move towards second order themes. Here, prior literature helped us “describe and explain the phenomena we are observing” (Gioia et al., 2012, p. 20). Second order themes, then, were used to arrive at the aggregate dimension that forms the foundations for the theoretical insights. In the section below, we will introduce and discuss all six aggregate dimensions that were crafted during the analysis process.

4. Findings: the six aspects of emerging agency

Design is an activity aimed at improving or transmuting the world (Simon, 1969; Dunne & Raby, 2013) and that entails a continuous dialogue between thinking and doing (Schön, 1983). Our findings suggest that future-oriented problem framing is dependent on the following aspects: *combining theory and practice, engaging with the world and its complexities, reciprocal trust in design teams, self-reflection, changing perspectives, and emotional investment*. These aspects form a model where agency, wicked problems, and design thinking contribute towards problem framing. The figure below (Figure 2) theoretically illustrates the emergence of problem framing.

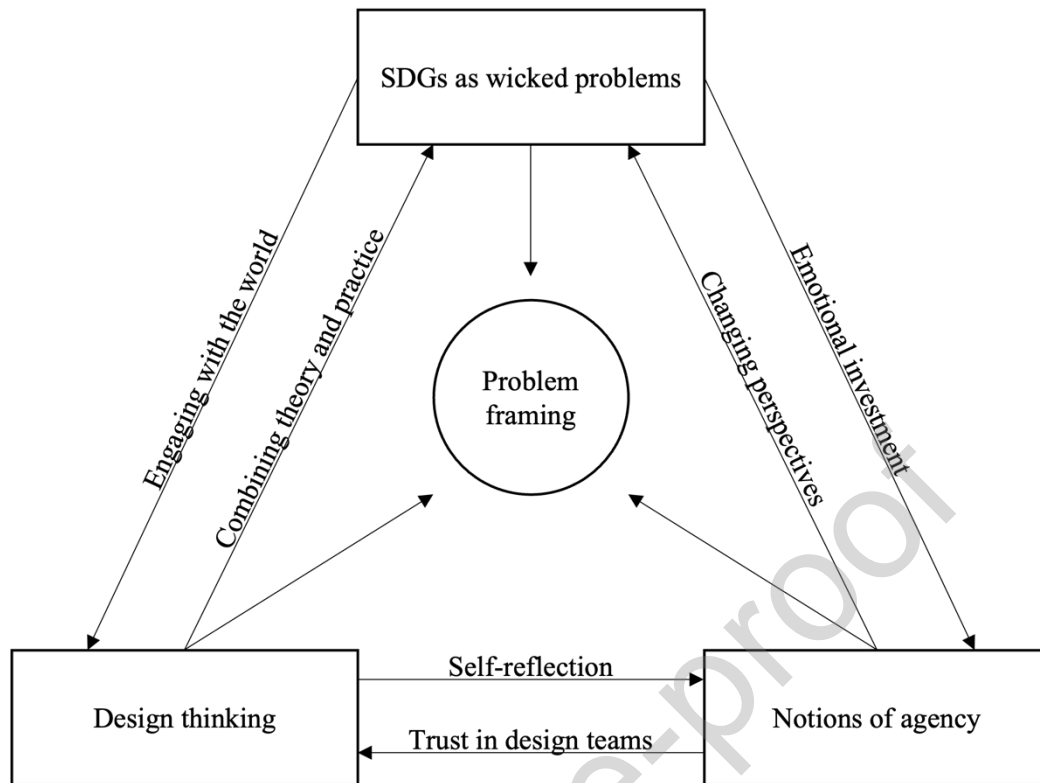


Figure 2. Model illustrating the emergence of problem framing based on the findings.

In the model above, future-oriented problem framing develops through the six aspects, and the three corners of the triangle should be understood as specific anchoring domains for the aspects. More specifically, as futures consciousness is understood as an individual capacity (e.g., Ahvenharju et al., 2018, 2021), our findings shed light on how designerly ways of engaging with the problem at hand support the development of agency. In addition, our study offers student-level insights on how competencies identified by Rieckmann (2012) develop as well as what Király and Géring's (2019) call for institutional transformation implies from the student's perspective. Next, we will separately go through the different components of the model.

4.1 Combining theory and practice

Given that theories concerning design or the world in general are often abstract constructs, translating them into design practice is not a straight-forward process. However, being able to do so is crucial, considering how design focuses on making the abstract tangible. Seen from this point of view, the students described the design brief provided in the course as a conceptual anchor for theoretical explorations (see Figure 3 below). For example, one of the workshops that focused on entrepreneurial principles in the form of a cooking session was perceived as highly engaging and thought-provoking. The experiential learning of cooking with limited resources available was used as an analogy for entrepreneurial endeavours that are also often characterised by limited resources.

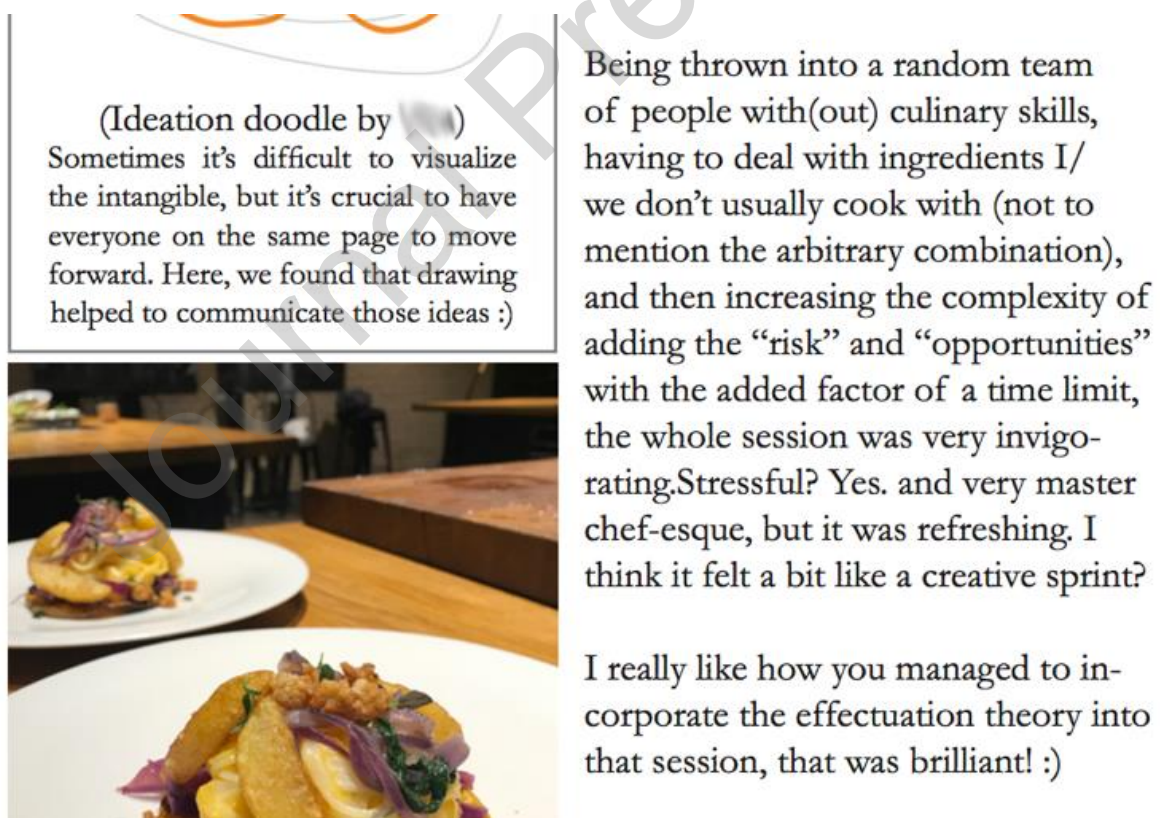


Figure 3. One of the participants reflecting on the cooking session.

As the design brief itself involved the wider society, being able to get instant feedback from external actors was also perceived as effective in validating whether the students were able to translate theories into practice through describing the problem space. Due to the complexity of the SDGs and problems connected to them, communicating disciplinary knowledge was also perceived as a factor influencing how the problems were framed. When design projects are carried out within a course space, students seldom deal with issues related to implementation feasibility. However, in the context of our study, even though the students were not developing prototypes or concrete deliverables to clients, they were nonetheless exposed to financial realities. In this context, they had to balance between artistic expression and economic restrictions, thus further helping in positioning design not only in society but also in terms of other disciplines. In a similar vein, one of the students also reflected on the relationship between freedom and responsibility: on the one hand, creative or artistic expression entails a lot of freedom, while on the other hand, understanding the influence of structural and economic constraints generated reflections on design's responsibility in the world.

4.2 Engaging with the world and its complexities

Building on the above, design management (Dumas & Mintzberg, 1989) was described as a catalyst for navigating between the problem and the solution space (Dorst & Cross, 2001). In essence, given that "design cannot be managed like other activities" (Dumas & Mintzberg, 1989, p. 37), the teams approached the project iteratively rather than in a linear fashion. Consequently, managing design projects also required identifying existing solutions and understanding user needs as well as figuring out how to reach the desired design outcomes from the existing state of things. Recent literature's emphasis on design's role in creating

more sustainable futures (Ceschin & Gaziulusoy, 2016; Coyne, 2005), suggests that identifying design as a catalyst for change is crucial.

Achieving clarity and transformative change was also closely connected to the students' understanding of systems, people, and problems, and how these are interconnected to the proposed pathways. In engaging with the design process, some of the students mentioned how their proposed solution also exposed societal norms related to how students are perceived and what is expected of them (Figure 4).



Figure 4. One of the participants reflecting on design research.

For example, in one team that focused on creating a service for refugees, one student from the team described how some of the existing non-profit organisations refused to meet them as

they felt students would not be able to deal with such issues. This perhaps illustrates the complexity of how design can make issues related to societal norms visible.

4.3 Reciprocal trust in multidisciplinary teams

While trust *per se* does not necessarily guarantee a more nuanced problem framing process, it does nonetheless benefit sharing of experiences and disciplinary knowledge and expertise in the team. This was illustrated in how the students were talking about their team dynamics and how achieving trust was described as pivotal for each team member to utilise their skills and engage openly in design methodology towards solving the challenge.

Words such as ‘care’, ‘responsibility’, and ‘cohesion’ were used by the students to describe their team dynamics. Care in this context referred to team members being genuinely interested in each other’s background stories and perspectives, while responsibility was used to describe the team members relying on each other. In a similar vein, achieving cohesion in a multidisciplinary and multicultural team was seen as providing the team with cognitive space that, in turn, moved attention away from disciplinary conflicts towards collaborative action (see Figure 5 below).

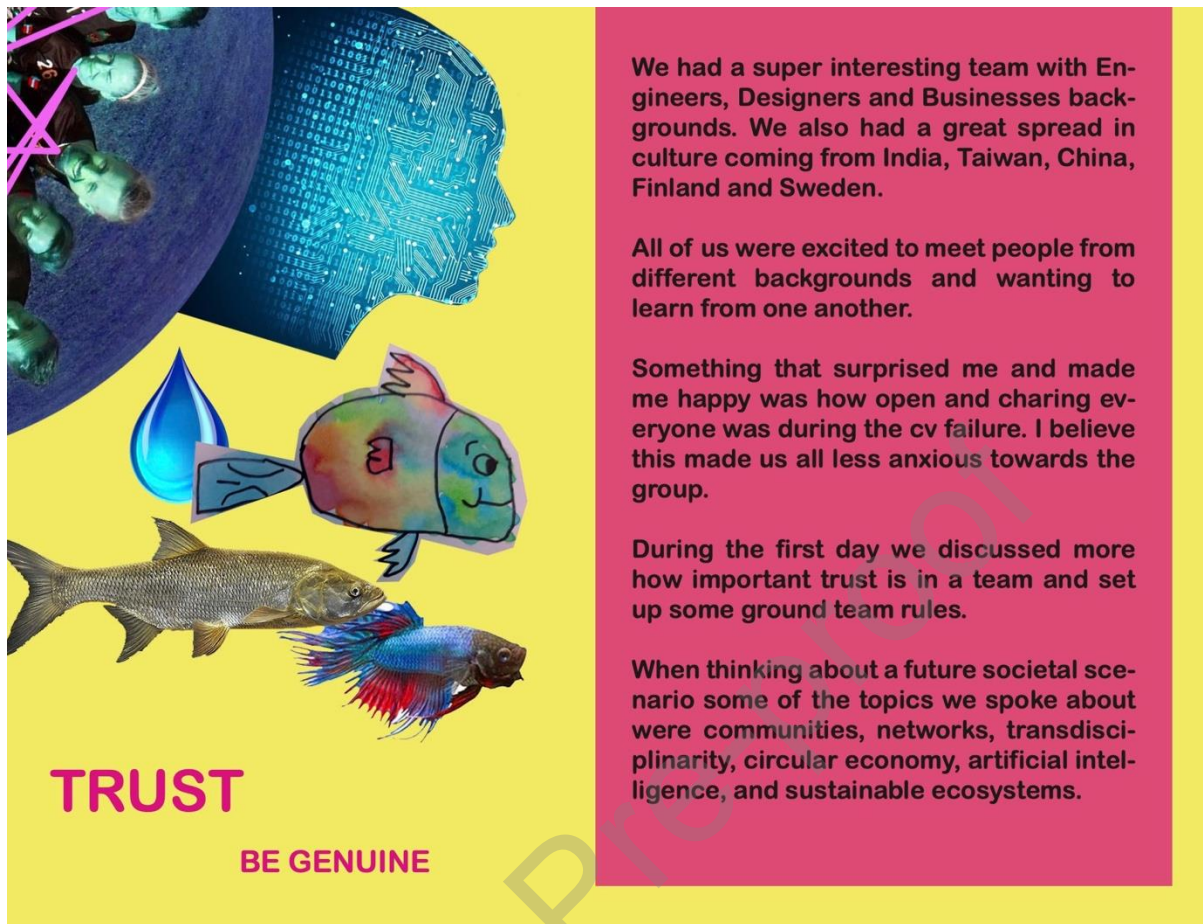


Figure 5. An excerpt from one of the participants' learning diary.

A strong trigger for achieving rapport in the teams came from the failure résumé activity that the students described as creating a safe space for sharing both private and professional failures (in line with Wilhelm et al., 2019). In this exercise, the students would visualize three failures (any combination of professional, private, and academic) and share these in their team along with what they learned from each failure (Seelig, 2016). Intimacy, a word often used by the students to describe the exercise, seemed to serve as a trigger for developing trust in the team: trusting one's team members in not excluding them as well as trusting everyone in the team contributes with their skills and competencies towards the jointly defined problem space. From problem framing's point of view, having the temporal and cognitive harmony that arises from emerging trust refers to what Emirbayer and Mische (1998, p. 971) define as

agency's 'iterational element': in essence, agency develops over time and through stability, and thus without stability problem framing would most likely remain on a rather mechanistic level. This, in turn, enabled the teams to focus their attention on the problem, identifying its stakeholders, and reflecting on diverse future consequences.

4.4 Self-reflection

The act of designing (concepts and artefacts) and utilising design methods often involves others. Many of the participants described this as also triggering self-reflection through learning from and about their team members. While respondents reflected on the ambiguous nature of design, they realized there is no single way to tackle complex problems, thus illustrating sensitivity towards others (peers and external domain experts) and their ideas. As all teams consisted of students from different disciplinary backgrounds, being exposed to different ways of engaging with the world made them more aware of the importance of learning from and about others.

Working with others was also seen as an insightful vantage point into one's shortcomings and conversely into the strengths of others. Perhaps highlighted by the complexity of the design brief's context, several students reflected in their diaries on how they had to rely on their team members both in terms of identifying a problem as well as crafting a solution to it (Figure 6).

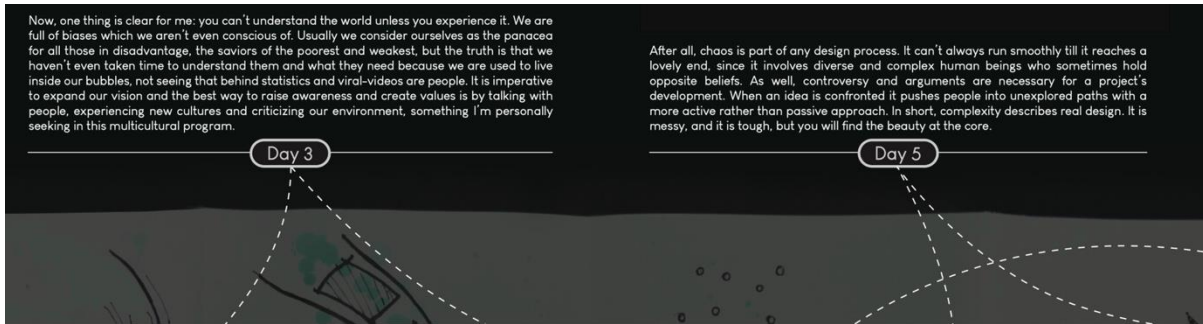


Figure 6. An excerpt from one of the learning diaries reflecting on learning.

On a more strategic level, some of the design students also reflected on their abilities to deal with ambiguity and offer additional help to their non-design team members when it came to understanding design tools and methods utilized throughout the course. Being exposed to such moments were seen by some respondents as relevant for developing their design leadership skills. As the initial design brief nudged the participants to exit the course space, this was seen as positively influencing the emergence of design identity.

4.5 Changing perspectives

The open-ended and complex nature of the design brief triggered reflections on viewpoints in three interrelated aspects: changing one's own mindset, developing design competencies, and questioning prevailing forms of value creation in the society. First, being exposed to the world outside the university and audio-visual content created by the facilitators to support the learning outcomes were perceived as contributing to changing one's mindset throughout the project. This is in line with speculative design's underlying ethos as challenging the status quo (Dunne & Raby, 2013); changing the current state of things can potentially lead to impact not only in the surrounding world but also in the individual themselves and their standpoint to what surrounds them.

Second, and in line with the first aspect, the respondents focused especially on design leadership and design's responsibility when reflecting on and crafting the problem space. Understanding what it takes to manage similar design project and how the design team is responsible for the outcomes and their potential impact were seen as contributing to seeing design as a strategic asset. Moreover, the process of framing the problem was not seen as a straight-forward, but an iterative, process that unfolded as the team further conducted research on their topic and based on this started to develop the solution (Figure 7 below).

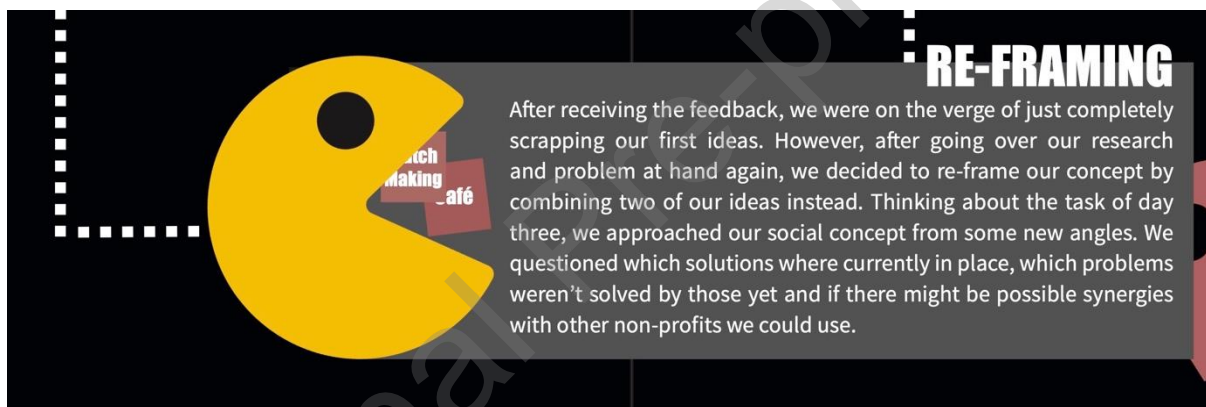


Figure 7. One of the participants discussing iterative development.

Thirdly, as the brief was not focused on one single organization with a clear commercial agenda, this enabled students to explore how and for whom their final solution concept would create value. More specifically, approaching problems and their solutions from the user's point of view helped the teams understand design's human-centric ethos. Whereas most design thinking discourse has focused on single (commercial) organizations, in this context the students were provided with a relatively high level of freedom to investigate problems,

solutions, and potential impact that go beyond purely commercial gains¹. Seen from this perspective, the participants could reflect on their stance towards design as a value-adding activity.

4.6 Emotional investment

With design briefs that breach the boundary between course spaces and the surrounding society, the instructor partly gives up their control in terms of what kind of interaction the students might experience. Such unpredictability implies that students could face, for example, positive (i.e., supporting the project) or negative (e.g., questioning the project's relevance or novelty) reactions and emotions. To counter this, the positive atmosphere during the course space and the language the students used to describe their experiences during the course meant that the students could reflect on what they had learned in a safe and supporting setting. Just like professional designers can sometimes experience empathising with the users as cognitively demanding, similarly the students' descriptions regarding emotions highlighted similar sentiments. As they were exposed to emotionally taxing challenges, they needed a counterforce to the plethora of emotions experienced in the field, and here the positive emotions experienced within the course space were critical. With this, we wish to highlight the importance of emotion work in design projects: to empathise with someone involves emotions, and students working with design need a similar counterforce to not feel emotionally drained. Seen from this light, the role emotions play in developing agency is critical: to develop agency through design is not devoid of emotions, both positive and negative (Figure 8).

¹ As Dunne and Raby (2013, p. 2) write, “alternatives [to capitalism] are exactly what we need. We need to dream new dreams for the twenty-first century as those of the twentieth century rapidly fade. But what role can design play?”.

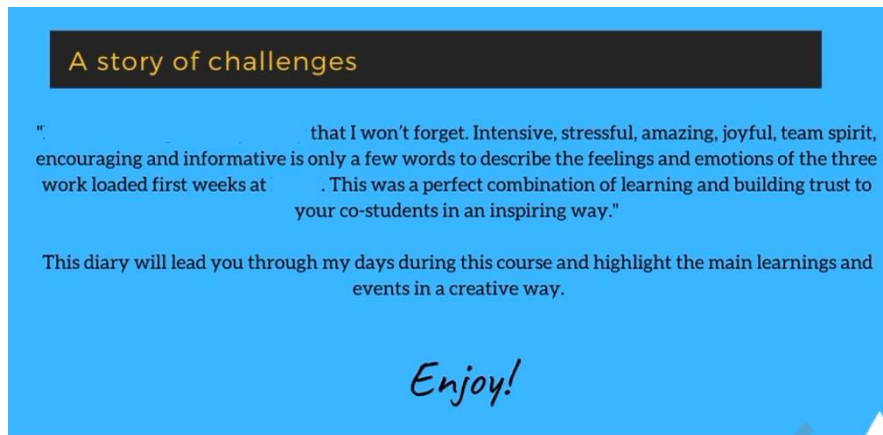


Figure 8. An excerpt from one of the learning diaries focusing on emotional aspects.

While notions of emotional atmosphere were more concerned about the internal course context, navigating the problem space in connection with the surrounding society was often regarded as an emotional journey that surfaces notions of how the students approached the problem through design. For example, dealing with complex problem contexts such as refugees, low-income families and their children, and emotional deprivation in public transportation triggered emotional reactions on how design could be harnessed to solve deep, often complex, societal issues. Some examples include students understanding the differences between designing *for* and *with* end-users by interacting with practitioners who worked with refugees; while other teams empathised with a child who had no friends because their parents did not have enough money to organise birthday parties. These were moments in the design process that triggered strong emotional reactions as the teams learned more about the end-users' challenges. While such moments are often difficult to face, they nonetheless give rise to irreplaceable learning experiences as the students were developing their design capabilities through understanding how they can, in a respectful fashion, work with others through design interventions. In some cases, with such empathy and understanding, relevant solutions can also be designed or created.

4.7 Ethics in action

In line with Gayá and Brydon-Miller (2017), we believe higher education plays a critical role in addressing social and environmental issues in the surrounding society. Having said that, moving away from the ‘business as usual’ paradigm towards more participatory approaches comes with ethical considerations that deal with educators, students, and external stakeholders. Here, covenantal ethics – defined as “the unconditional responsibility and the ethical demand to act in the best interest of our fellow human beings” (Hilsen, 2006, p. 27) – provides a fertile vantage point as a “stance enacted through relationship and commitment to working for the good of others” (Brydon-Miller, 2009, p. 243).

In more concrete terms, ethical considerations that were most critically introduced in the course focus on three dimensions: 1) context awareness through interaction between the students and domain experts, 2) openness through course design, and 3) mindfulness in problem identification within community. First, as Reitsma et al. (2019, p. 1567) elucidate, “ownership is at the centre of the evaluation in order to understand the success of the co-creative design participation”. We involved external stakeholders in designing the briefs for the student teams and similarly they hosted introductory sessions for the students on issues relevant to the brief. Second, the course was designed so that the students would have room to suggest changes in the course content to better cater to the needs of the projects. Instead of imposing a rigid structure on the students and the social issues they were addressing, we focused on collectively negotiating the course space (as per Brydon-Miller, 1997, 2003). Finally, given that social design has shifted its focus “from individual users towards communities with the aim to generate collective value, fulfil social needs while also triggering new social relationships” (Rodgers et al., 2020, p. 510), attention was paid to

instilling a sense of care and dialogue in the community, consisting of educators, students, and external stakeholders (Freire, 2014).

Given that participatory approaches are not the *de facto* of engaging in learning in higher education institutions, our collective efforts during the course were not always ‘successful’, but nonetheless our aim was to engage in and stimulate dialogue with and between different actors. As Freire (2014, p. 90) writes, “the encounter of those addressed to the common task of learning and acting, is broken if the parties (or one of them) lack humility”. Thus, the ethos of the course rested on dialogue: negotiating the course contents with the students, designing the project briefs with external stakeholders, and creating a course space in which the students could learn about the importance of designing for and with people from diverse backgrounds.

5. Synthesising the aspects: design and agency intertwined

During the course of this paper, we have explored how a multidisciplinary student body frames societal and environmental problems through design and with a focus on future implications. Through the model and its six aspects discussed above, the findings reported in this study contribute to discussions on how design can serve as a catalyst in promoting students’ development of agency in envisioning desirable futures (see also Kemp, 2017). As Kemp (2017, p. 59) posits, design can be understood as “the act of intentionally creating change”, and we see this as aligning well with Pouru-Mikkola and Wilenius’s (2021) call for integrating design with futures education. Findings presented in this paper illustrate how design can develop students’ agency for envisioning futures.

Often mentioned in agency theories, structure and agency are almost inseparable (Bandura, 2006; Emirbayer & Mische, 1998; Matthews, 2019; Meyer & Jepperson, 2000), implying that course designs can create structures (e.g., through pedagogical methods, external collaborators, and design briefs) for agency to emerge. As Emirbayer and Mische (1998, p. 974) wrote, agency is grounded “in the structures and processes of the human self, conceived of as an internal conversation possessing analytic autonomy vis-à-vis transpersonal interactions”. Although notions of structure have received less attention in this paper, it is worth noting that curriculum design has the potential to create scaffolds for understanding, and here our role as educators is significant: although it is our students who ultimately come to realise their potential during and after their studies, we can identify and create structures that are aimed at supporting problem framing as well as providing vantage points for rethinking structures as the students exercise and reflect on their agency as practitioners of design (Cunliffe, 2004). Structures themselves do not contain any meaning, and as such it is the interplay between the instructors, students, and the structures that matters (as per Lizzio et al., 2002). In a similar vein, Singh and Segatto (2020) argue for the importance of partnerships as facilitating the dissemination of sustainability agenda in higher education institutions. While their study focused on the institutional level, findings from our study support this claim since becoming an active agent in the society requires collaboration with external partners as they act as a sounding board for students’ projects.

We often come across notions of paradoxes when it comes to framing problems through design: the more a designer can articulate their agency, the more they are also giving it away as they understand design in the social sphere being to a large extent about leaving one’s ego behind. This is something our data also suggests as students described experiences where they had to step back in order to push their solution forward. For instance, developing a

service for refugees required the team to change their mindset from designing *to* towards designing *with*, and through this withdrawal of the ego, they were able to reflect on the emergence of their own agency. The development of identifying and framing problems seems to be quite paradoxical from agency's point of view: the more one develops and refines the problem space, the more they understand how agency needs to be in the background as the problem in question more often than not involves not the person engaged in design activities but other stakeholders.

Furthermore, while our findings focus on the student perspective, models such as the one presented above also have implications for teachers and higher education institutions more broadly. In their study focusing on student-teachers, Nousheen et al. (2020) and Bradfield (2009) found that being exposed to sustainability matters during their studies had a positive impact on these teachers eventually integrating sustainability into their curricula. The model presented above further granulates Nousheen et al.'s (2020) argument whereby blending the boundary between the university and the surrounding society potentially increases student engagement but also provides external feedback to the teacher (in line with Cox et al., 1995; Montiel et al., 2020; Singh & Segatto, 2020). Arguably, the most important contribution of the model is to highlight the importance of agency in exploring and framing problems that enables students to critically reflect on what it means to be an active member of any given society as well as what design's role could be as a societal and environmental catalyst (e.g., Filho et al., 2018; Király & Géring, 2019).

Prior literature on student engagement (e.g., Kahu, 2013; Kahu & Nelson, 2018; Zepke, 2014) has predominantly understood agency to be an antecedent of engagement, and our findings granulate the picture by showing them as intertwined concepts. This might be

explained by design's role as combining cognitive and embodied practices (Schön 1983). As the students were conducting field research to identify their initial problem space (Dorst & Cross, 2001), they were able to generate insights that formed the basis for ideating potential final concepts. These ideas were categorized based on the *sanpo-yoshi* method originally devised by merchants in the Edo era Japan (1603-1867) (see e.g., Kunitoshi, 2019) that focuses on value creation from three perspectives: team, society, and end-user. For example, the student teams came up with concepts that would create value for the society and the end-user, and since these ideas would not create value to the team, they were often discarded. As design can be understood as an activity aimed at improving (Simon, 1969) or questioning (Dunne & Raby, 2013) the *status quo*, utilising design methods to solve problems in the society can help the students strengthen their sense of engagement. This combination of conceptualizing and crafting has the potential to increase perceptions of agency as well as generate innovative solutions to pressing societal challenges.

6. Conclusion: developing future-oriented design pedagogies for the new world

Our point of departure in this paper has been how a multidisciplinary student body moves from replicating design towards autonomously applying it to frame societal and environmental problems with future implications in mind. This framing is in line with Jonassen et al. (2006) and Björklund (2013) who call for changes in design (engineering) education to better prepare the students to enter working life, and with Alexiou and Zamenopoulos (2008) and Celaschi and Celi (2015) who have explored design from a future-making perspective. More specifically, while prior research has advocated design's role in creating futures (Amsler & Facer, 2017; Garcia & Gaziulusoy, 2021), this paper explored

how students develop the competencies to frame future-oriented societal and environmental problems through design.

As university graduates are increasingly expecting their future employers to have high ethical standards, it is crucial that we, as educators, create learning structures and opportunities where our students can develop and explore their agency through action (Baker, 2014).

Supporting the notion of structures interacting with emerging or developing agency amongst students, Vars and Lowe (1963) argued social forces are required to influence what is being taught and for what purposes. As such, course designs indirectly influence and are influenced by forces and phenomena outside the university borders (Roberts, 2015).

As agency and structures are inherently intertwined, aspects found to be influencing problem framing processes can be supported through course design. For example, trust in design teams can be developed through methods aimed at constructively enabling the students to be vulnerable with each other (e.g., failure résumé in this context) and crafting a course assignment that gently nudges the students to interact with the world outside the university illustrates the depth and complexity of design problems and solutions. Building on this, as students interact with wider society, they become more aware of design's limitations and possibilities and at the same time develop a more nuanced understanding of how design relates to their own discipline. As Barnett (2012, p. 76) puts it, education should focus not on knowledge and skills but *being* (emphasis original). At the institutional level, addressing students' problem framing processes can indirectly contribute to universities making surrounding societies more resilient (as per Király & Géring, 2019) as well as more open to alternative futures (Rieckmann, 2012). In their study on top ranking business schools Christensen et al. (2007) found that sustainability matters are gaining traction in curricula,

thus highlighting a broader trend dealing with transformation in universities to better respond to the challenges and opportunities of the 21st century (Matten & Moon, 2004; Parker, 2018).

As in every research, this study has its limitations that, however, can also be regarded as avenues for further studies. First, as one of our students pointed out, studying perceptions of learning changes over time, meaning that the way the students perceived their learnings from the course might have changed over time. Second, even though the visual learning diaries were rich both in terms of documenting the journey and reflections, they nonetheless offer a singular vantage point to our students' learning experiences. Complementing the diaries with post-course interviews or asking the students to talk about their diaries, for example, would most likely generate additional fruitful insights. Third, since the study in question focused on the concept development phase of the design process, further studies are needed on the delivery phase of the design process (e.g., concept testing and prototype development).

In terms of future research, comparative studies on students and practitioners as well as disciplines not addressed in this paper would further granulate the insights of this paper. Similarly, as problem framing is a context-dependent process and always being negotiated and shaped in connection to the surrounding structures, future studies could also adopt a longitudinal approach to explore how students frame problems throughout their studies in diverse disciplines and over time. In this paper we have focused on agency emerging in processual fashion, but further inquiries are needed on a method level. For example, are there certain methods that enable or hinder the development of agency, and under what contextual circumstances? In addition, we also need more in-depth understanding of whether – and if so, how – agency develops within those with whom the students collaborate².

² This was brought to our attention by one of the anonymous reviewers.

Furthermore, more inquiries are also needed in terms of how psychological traits influence the emergence of agency. Given that conduciveness to design and attitudes towards the future vary not only between individuals but also over time, a more nuanced understanding of individual characteristics and their connection to agency is needed. In addition, more studies are also needed in terms of what extent agency is something that develops in a distributed or networked fashion between individuals. Can agency develop through the interactions between individuals, futures, and materiality especially in the context of futures education and design³?

To conclude, we hope that the findings reported in this study inspire further inquiries at the intersection of futures studies and design. As Yelavich (2014, p. 17) wrote, design plays a critical role “in developing active capabilities to negotiate our material, natural, political, and social entanglements”. Combining futures consciousness’s cognitive capacities with design’s inquiry through making seems to hold great potential.

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³ We thank the anonymous reviewers for highlighting this issue.

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Highlights

- Due to increasing complexity, students need to develop a more nuanced approach for navigating desirable futures
- Design has been perceived as a means to drive societal and environmental change
- Yet we know little about how students learn to autonomously apply design
- Visual learning diaries were analyzed on how students engage in future-oriented problem framing
- A framework that illustrates how agency emerges through the intersection of design and futures studies is presented