2014

Assessing Design Thinking through the Activation of A Social Challenge in Higher Education: An Academic Inquiry

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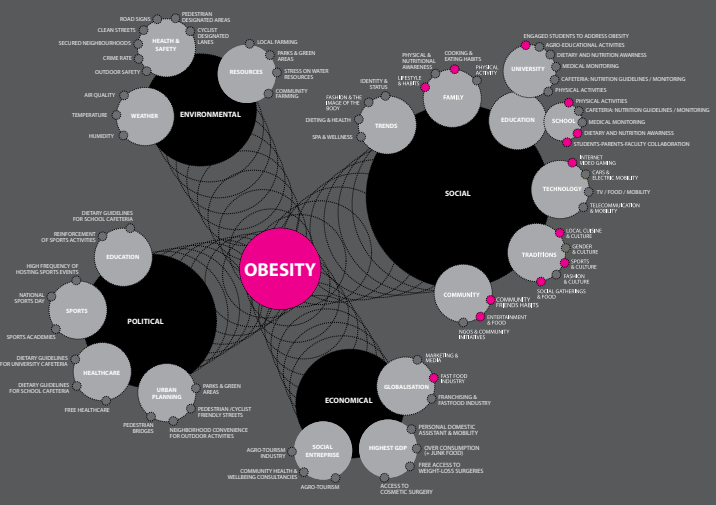
Virginia Commonwealth University

DESIGN
THINKING.
REFLECTING.
KNOWING.
REFRAMING.
FORMULATING.
CREATING.
DOING.
CONNECTING.
IMPACTING.
BRIDGING.



FOOD PREPARATION FOR SCHOOL CHILDREN

INTERACTIVE PLATFORM FOR PARENTS AND SCHOOLS ADMNI.

EAT AND PLAY AT SCHOOL

EATING EXPERIENCE AT SCHOOLS

DIMINISH CARBOHYDRATE INTAKE

FOOD DESIGN AND HEALTHY SNACKS

THE EATING EXPERIENCE

DESIGN WORKSHOP

BUSINESS ADMIN. WORKSHOP

ENGINEERING WORKSHOP

MULTI-DISCIPLINARY WORKSHOP

ASSESSING DESIGN THINKING THROUGH THE ACTIVATION OF A SOCIAL CHALLENGE IN HIGHER EDUCATION: AN ACADEMIC INQUIRY

AMIN MATNI | THESIS PROJECT | VIRGINIA COMMONWEALTH UNIVERSITY IN QATAR | MAY 2014

ASSESSING DESIGN THINKING THROUGH THE ACTIVATION OF A SOCIAL CHALLENGE IN HIGHER EDUCATION: AN ACADEMIC INQUIRY

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Approval certificate for **Amin Matni** for the thesis project entitled **Assessing Design Thinking through the Activation of A Social Challenge in Higher Education: An Academic Inquiry**. Submitted to the faculty of the Master of Fine Arts in Design of Virginia Commonwealth University in Qatar in partial fulfillment for the degree, Master of Fine Arts in Design.
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ABSTRACT

This thesis is an inquiry that documents, identifies and assesses the effectiveness, circumstances, and potential resources related to addressing the gap between social needs and higher education as stated in the National Development Strategy 2011-2016. The aim of the thesis is to evaluate the response of the students on the collaborative, human-centered, result-oriented aspects of design thinking while addressing the eating experience topic, an articulated theme from the wicked problem of obesity. The eating experience theme provided students from design, business and engineering majors a contextualized topic to test design thinking in a series of workshops conducted in three different universities.

Quantitative research methods were used to test the students' feedback on design thinking, map their reactions during the process and rate the workshops. The later served as a recruitment channel to bring interested students from design, business and engineering majors in a last workshop. Participants develop one of the previously generated seed concepts and reflect on the multi-disciplinary experience.

Results have shown that students successfully articulated the method, focused on the user-needs, collaborated with each other and generated tangible seed concepts to address the social topic. The interior design students assessed the method with an average rating. They were the least confortable with the ambiguity level of the topic and with the user-centered approach of design thinking. Whereas the engineering and business students rated the method with high scores and were confortable in the workshops. Furthermore, 22% of the students involved in the study were interested to enroll in the last multi-disciplinary workshop yet 5% participated due to their workload and the lack of incentives.

In conclusion, the inquiry engaged students in a transformative academic experience that impacted their cognitive and ethical capacity. It also revealed new opportunities that can bridge the gap between higher education and social needs.

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Above all, the thesis is dedicated to my family who continuously inspires me to pursue meaning.

INTRODUCTION

PROBLEM STATEMENT

The thesis is activated through an academic inquiry that articulates the complex social challenge of obesity in higher education. It integrates the redesign of the eating experience, a reframed **problem** statement of the multifaceted obesity challenge, using design thinking as a **process** to explore the reactions of undergraduate students in a unique geo-educational **platform**. To present the situation of the study, the following questions pose a hierarchical narrative from the national agenda to the thesis' area of focus:

How can Qatar achieve sustainable development to meet the Qatar National Vision 2030 (QNV 2030)?

How do we respond to the social pillar in the National Development Strategy (NDS) 2011-2016-a milestone to meet QNV 2030-and address the gap between social needs and higher education?

How can an inquiry in higher education take on the complex social challenge of obesity (social need) and explore the gap stated in the NDS 2011-2016?

How can design thinking, as a process of this educational inquiry, facilitate the interaction with a uniquely established geo-educational landscape at Qatar Foundation and engage undergraduate students on the redesign of the eating experience, as a reframed topic from the obesity challenge?

How will students from various disciplines and universities assess the overall inquiry and the collaborative, user-centered and result-oriented principles of design thinking as they address the redesign of the eating experience?

Within these convergent questions, the core of the thesis resides in the last question. Yet it cannot be separated from the inquiry, as it is the journey that enabled the **problem** (redesign of the eating experience) to be integrated with the **process** (design thinking) in the **platform** (higher education).

Consequently, the inquiry is the framework and the vehicle of the thesis as it holds three core elements:
Problem, Process and Platform.

Hence the thesis aims to test the reactions of undergraduate students (users) on design thinking (process) while addressing the redesign of the eating experience topic (problem).

Figure 1 illustrates the hierarchical arguments articulated in the previously mentioned questions, the core elements of the inquiry and the thesis positions.

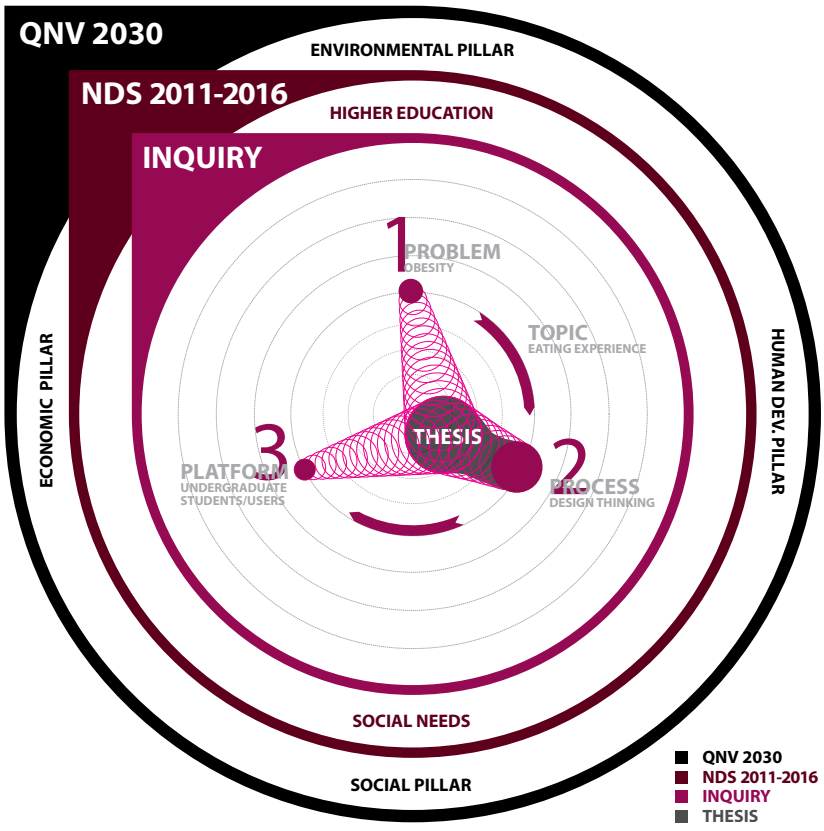


Figure 1- Positioning the thesis within the inquiry framework.

SCOPE OF THE THESIS

The scope of the thesis is to evaluate the collaborative, user-centered and result-oriented principles of design thinking through a design-led educational inquiry for undergraduate students, while they address the redesign of the eating experience; an articulated sub-topic of the wicked problem of obesity.

MIND THE GAP

Education and the Industrial Revolution

Higher education, as we know it today, is structured to meet the needs of the Industrial Revolution (Tuomi and Miller 2011). The industrial revolution disrupted the feudal model and created a complicated division of labor. The development of factory-based production led to a major shift in educational opportunities. As competition built-up in the 19th century, the requirement for improved efficiency in the production line resulted in an increase of specializations. Education responded by supplying greater amounts of explicit and formalized knowledge in various areas of study. The chasm between disciplines grew further as each one adopted its own school of thought and methods of inquiry. The amount of information grew considerably in each discipline to provide a space to create sub-disciplines and programs. Liberal arts and science became the common denominator of all majors in higher education curricula. During the second half of the 20th century, "the educational system was already quite well aligned with the requirements of the Industrial Age. Now this equilibrium is changing, as we are moving toward a disruptive period similar to the one of the Industrial Age" (Tuomi and Miller 2011).

Industrial Revolution and the Emergence of Systems

The invention of the machine crowned the Industrial Age and unfolded the creation of new hard or physical systems to deliver these innovations. For example, the creation of the automobile required a transportation system, the train and subways to name a few. In addition, other soft systems or processes were required to deliver services for users and customers, whether the service providers were from the public or private sector. To illustrate a few examples, the healthcare, welfare and air transport systems are complicated processes that deliver services to users or customers. In fact, transportation systems, energy and water systems, telecommunication systems, social welfare systems, financial systems, political systems and many others triggered the reconfiguration of a lifestyle that previously depended on agriculture and elementary craftsmanship. On a smaller scale, institutions such as hospitals, schools, universities, car manufacturers and other establishments created their own systems to operate and interact with their employees and customers.

The emerging institutional and business problems from these systems became the task of both the management and the employees to address and increase the users and customers satisfaction. As professionals, we managed to master these man-made sub-systems, such as the creation of paved streets with traffic signals, design functional and appealing habitats to face the housing challenge, install piping to deliver clean water, so on and so forth. The emerging problems from these sub-systems were to a great

extent well defined and they were consequently addressed with the available professional capacity. Higher education responded to the market needs and provided the required human capacity to manage the emerging well or relatively defined challenges in various created systems.

The Emergence of Systemic Challenges and "Wicked Problems"

As decision makers managed to deal with the relatively easy problems stated above, new challenges emerged that were more tenacious and beyond our existing human capacity to address (Rittel and Webber 1971). What was unforeseeable is how the established systems that served the Industrial Revolution well, will interact with each other and what will be the consequences on our quality of life. John Thackara, in his book *In the Bubble* pointed out to the fact that "we're filling up the world with amazing devices and systems—on top of the natural and human ones that were already here—only to discover that these complex systems seem to be out of control: too complex to understand, let alone to shape, or redirect" (Thackara 2005). These new challenges were to a great extent ill-defined and the available human resources were not able to frame these problems. Rittel and Webber concluded that "the available professionalized cognitive and occupational styles are not ready to suit contemporary conceptions of interacting with open systems and contemporary concerns with equity" (Rittel and Webber 1971). Rittel and Webber coined the term wicked problems in reference to ill-defined ones and noted that "this definition was originally used in social planning to describe a problem that is difficult or impossible to solve because of incomplete, contradictory, and changing requirements that are often difficult to recognize. The term 'wicked' is used, not in the sense of evil, but rather its resistance to resolution" (Rittel and Webber 1973). In addition, Thackara expanded on *wicked problems* as "challenges that touch upon ethical questions, and require a complete reframing with the collaboration of multiple actors for innovative and ethical solutions to be developed" (Thackara 2005). Jeremy Rifkin stretched his argument to point out that "this global civilization is threatened to fundamentally alter the relationship between the human being and the world" (Rifkin 1987).

In summary, systemic challenges emerged from the defaults and discrepancies between human-made systems. When these emerging requirements are compared with the historical requirements that shaped the current Industrial Revolution-based educational system, it becomes clear that the educational system needs to change. Further academic development is required to develop responsive programs that look into how to address ill-defined and complex challenges in higher education.

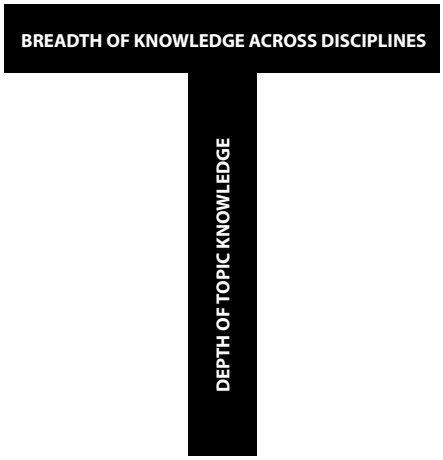


Figure 2: Adaptation on David Guest, T-Shaped people, *The Independent*. London 1991.

Reactions of academia to "wicked" and systemic problems

William Newell, a faculty at Western College Program (WCP) before transitioning to become a permanent member of Miami University in 1977, acknowledged the "frequent criticism of over-specialization in modern industrial societies. Social commentators asserted that our reliance on narrowly-trained experts to solve the complex problems our societies confront yields only partial solutions, many of which produce negative externalities that exacerbate the rest of the problem and create new problems" (Newell 2008). As an interested scholar in integrative education, he accepted this criticism and analysis while disagreeing on the solution of training more generalists. Newell thought that there is a need for holistic and not general thinkers. He noted that holistic thinkers have this type of capacity that "can understand both where the disciplinary experts are coming from and how their proposed solutions fit into the larger problems confronting society" (Newell 2008). Whereas McKinsey & Company illustrated the generalist type of capacity in 1971 as the "T-shaped" professional. As late as 1967, Gil Clee has bragged about McKinsey's partners as being "generalists who will take on any problem and rely on logic and intelligence to solve it" (McDonald, 2013). They identified the need for consultants specialized in a discipline, but also to have a broad knowledge across other disciplines. It was an important attribute to help build a culture of collaboration and understanding amongst other team members in the company. In the London newspaper *The Independent,* David Guest revived in 1991 the term 'T-shaped people' as per figure 2 and explained that "this type of rounded personality…. equally comfortable with information systems, modern management techniques …" (Guest 1991). During the same period, Marco Iansiti in Harvard Business Review noted that the "I-shaped professionals of earlier times, for whom everything revolved around vertical, profound specialization, proved insufficiently resilient in the face of change. T-shaped professionals combine in-depth knowledge of one field with a good understanding of others, and are much more stable as a result" (Iansiti 1993).

Later, Tim Brown wrote an article published in Fast Company that IDEO is looking for "T-shaped people" as "they have a principal skill that describes the vertical leg of the T – they are mechanical engineers or industrial designers. But they are so empathetic that they can branch out into other skills, such as anthropology. They are able to explore insights from many different perspectives and recognize patterns of behavior that point to a universal human need" (Brown 2005).

In order to address complex societal problems and to develop the required "T-shaped" capacity to navi-

gate its transient challenges, **holistic thinking** and **systems thinking** emerged to formulate an attempt "to reclaim the sense of connection to the world that utilitarian manipulation and advanced technology have steadily eroded," according to Ron Miller. During the 1970s, an emerging body of literature in science, philosophy and cultural history provided an overarching concept to describe this way of understanding education-a perspective known as *holism*. A holistic way of thinking seeks to encompass and integrate multiple layers of meaning and experience rather than define human possibilities narrowly (Miller 2005).

One of the foundational theorists on holism in education is the revolutionary John Dewey who argued that the pursuit of knowledge should go beyond "the fusion of facts, inquiring and thinking" and consequently attain what he calls "moral knowledge" (Dewey 1985). He notes that "moral knowledge" captures an understanding of justice, freedom and virtue bound up in academic material or else our "knowledge in academic subjects and skills remains technical and mechanistic unless funded by an enduring sense of the consequences of human life" (Dewey 1989). He adds that if students learn under conditions where "their social significance is realized" or brought to life, then "they feed moral interest and develop moral insight" (Dewey 1985).

Ron Miller summarizes the core qualities of holistic education in four elements:
1- It relies on experiential learning enabled through the organic exchange with the context through discussions, hands-on tacit experiences and an active engagement with the environment.
2- Personal relationships rise as an important factor to build a rapport with the community, the sense of respect, care and belonging.
3- Interplay and exchange between the inner and the outer world provides a rich environment of growth and self-actualization. Our inner world is alive through our feelings, aspirations, ideas and queries that nurture the learning process.
4- Holistic education expresses an ecological consciousness in relationship to inclusive communities. Respect for nature and a worldview that embraces diversity both natural and cultural (Miller 2005).

Yet the roots of holistic education go back well before the 1960s as they are grounded in a synthesis of several well-established philosophical and pedagogical perspectives. Holistic thinkers often draw from the work of theorists from the early and mid twentieth century including Alfred North Whitehead ("process" philosophy), Carl Jung (archetypal psychology), Sri Aurobindo (integral philosophy), Gregory Bateson (cybernetics), and Ludwig von Bertalanffy (systems theory) among others (Miller 2005).

An emerging model from the design discipline called design thinking corresponds to some of the above-mentioned pedagogical perspectives. The term design thinking is used to refer to the study of the practices of working designers (Cross 2006), and, to the application of the human-centered 'open' problem solving process to real world 'wicked' problems in other areas (Rittel and Weber 1973). This transfer from design to non-design domains is possible, it is argued, as design possesses a distinct logic of practice (Bourdieu 1990) capable of application to a range of real world problems. Thus Buchanan suggests in 1992 that design thinking, as consistent with Dewey's pragmatism, has logic (technologia) with potential applications to different fields (Melles 2010). Along the same line of thoughts, design thinking often refers to the pragmatist notion of experiential knowledge making (Chiasson 2001).

As design thinking has migrated from the design discipline, it is understood as "a way of thinking which leads to transformation, evolution and innovation, to new forms of living and to new ways of managing business" (Tschimmel 2012). It provides the ability to articulate systemic problems, identify and visualize key issues, ideate, solve and implement value propositions in a creative way.

Design thinking nurtures multi-disciplinary interactions to ultimately achieve a *mindshift* in the students' cognitive capacity, as per a study conducted at Stanford University. Furthermore, multi-disciplinary team-based learning provides a peer-to-peer transfer of knowledge and skills. This exchange occurs in de-centralized structures of authority as it stretches away from the facilitator or faculty's influence circle (Goldman and Caroll 2012).

Hence the thesis identifies the relevance and benefits of implementing design thinking on real world problems in higher education and looks into formulating a contextual inquiry to test this method on a social topic.

MIND THE CONTEXTUAL GAP

COMPLICATIONS ASSOCIATED WITH OBESITY

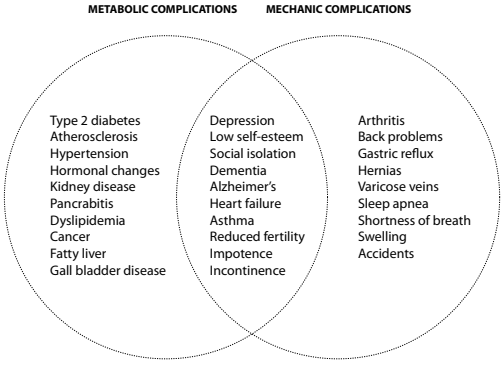


Figure 3- Rössner S., Karolinska University Hospital Huddinge, Stockholm, Sweden, IASO report, 2010.

Higher education and social needs

The National Development Strategy (NDS) 2011-2016[1] thoroughly states the social, economic, environmental and human development challenges facing Qatar, documents through statistical data the current issues, and sets targets to meet by 2016. The strategy is a framework that invites ministries to formulate accordingly their responsive strategies to meet the projected targets. These grand challenges touch upon the topics of road safety, obesity, migrant labor and domestic workers, water, food security, energy consumption and education, to name a few.

Hence, the thesis *identifies* the NDS call for the higher education institutions to go beyond capacity development through teaching and research. "These institutions must *identify social needs* [italics added] that could be met through education, and research programs that support government agencies, civil society and industry" (*NDS* 2011). The directive points out to a new type of learning that is linked to social needs and requires a collaborative framework with key stakeholders from the public, private and civil society.

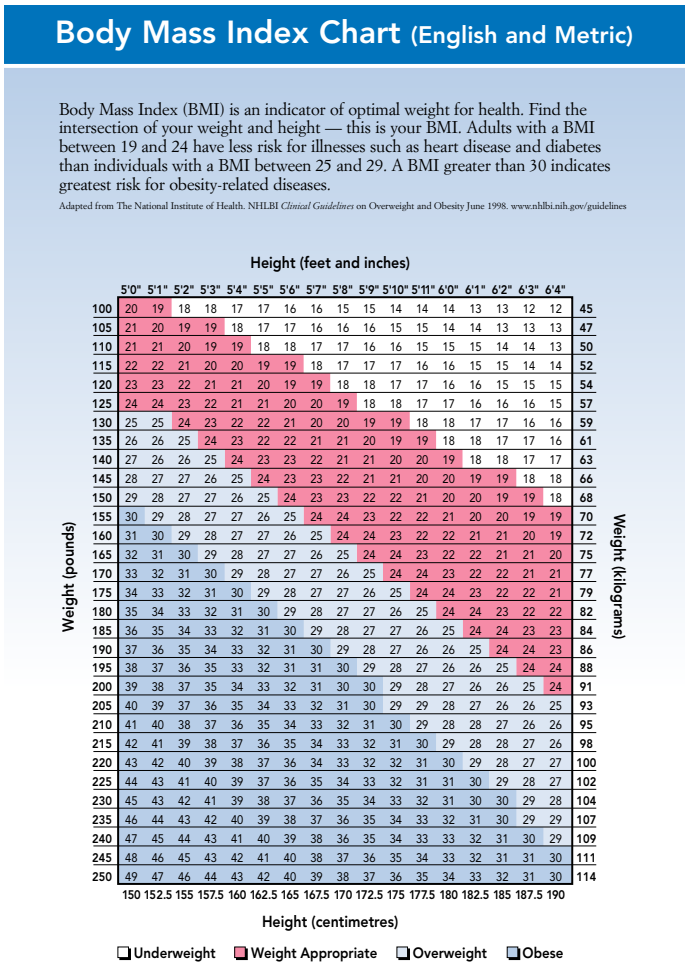
Consequently, the thesis identifies the gap between social needs and higher education and engages on the topic of obesity.

1- The National development Strategy 2011-2016 is a directive publication issued by the General Secretariat of Development and Planning of Qatar. It acts as a milestone to meet Qatar Natioanl Vision 2030.

1. Obesity: A "wicked" social challenge both global and local

The World Health Organization (WHO) defined overweight and obesity as abnormal or excessive fat accumulation that present a risk to health. Obesity is one of todays most neglected public health problems and has replaced the specter of starvation in many developing nations (WHO 2011). Described as a "wicked problem" by the UN general assembly, obesity is a precursor state to several devastating non-communicable diseases (NCDs): diabetes, cardiovascular disease and certain types of cancer (Gortmaker 2011). Figure 3 maps out the complications associated with obesity, a study conducted in Karolinska University Hospital Huddinge in Sweden and it was showcased in the overview report by the International Association for the Study of Obesity (IASO) (IASO 2010).

Hence, "65% of the world's population lives in countries where overweight and obesity kills more people than underweight" (WHO 2011). Overweight and obesity are the fifth leading risk for global deaths and at least 2.8 million adults die each year as a result of being overweight or obese. In addition, 44% of the diabetes burden, 23% of the ischemic heart disease burden and certain type of cancer are attributable to overweight and obesity (WHO 2011).



Body Mass Index Chart (English and Metric)

Body Mass Index (BMI) is an indicator of optimal weight for health. Find the intersection of your weight and height — this is your BMI. Adults with a BMI between 19 and 24 have less risk for illnesses such as heart disease and diabetes than individuals with a BMI between 25 and 29. A BMI greater than 30 indicates greatest risk for obesity-related diseases.

Adapted from The National Institute of Health. NHLBI *Clinical Guidelines* on Overweight and Obesity June 1998. www.nhlbi.nih.gov/guidelines

Height (feet and inches)

Weight (pounds)	5'0"	5'1"	5'2"	5'3"	5'4"	5'5"	5'6"	5'7"	5'8"	5'9"	5'10"	5'11"	6'0"	6'1"	6'2"	6'3"	6'4"	Weight (kilograms)
100	20	19	18	18	17	17	16	16	15	15	14	14	14	13	13	12	12	45
105	21	20	19	19	18	17	17	16	16	16	15	15	14	14	13	13	13	47
110	21	21	20	19	19	18	18	17	17	16	16	15	15	15	14	14	13	50
115	22	22	21	20	20	19	19	18	17	17	17	16	16	15	15	14	14	52
120	23	23	22	21	21	20	19	19	18	18	17	17	16	16	15	15	15	54
125	24	24	23	22	21	21	20	20	19	18	18	17	17	16	16	16	15	57
130	25	25	24	23	22	22	21	20	20	19	19	18	18	17	17	16	16	59
135	26	26	25	24	23	22	22	21	21	20	19	19	18	18	17	17	16	61
140	27	26	26	25	24	23	23	22	21	21	20	20	19	18	18	17	17	63
145	28	27	27	26	25	24	23	23	22	21	21	20	20	19	19	18	18	66
150	29	28	27	27	26	25	24	23	23	22	22	21	20	20	19	19	18	68
155	30	29	28	27	27	26	25	24	24	23	22	22	21	20	20	19	19	70
160	31	30	29	28	27	27	26	25	24	24	23	22	22	21	21	20	19	72
165	32	31	30	29	28	27	27	26	25	24	24	23	22	22	21	21	20	75
170	33	32	31	30	29	28	27	27	26	25	24	24	23	22	22	21	21	77
175	34	33	32	31	30	29	28	27	27	26	25	24	24	23	22	22	21	79
180	35	34	33	32	31	30	29	28	27	27	26	25	24	24	23	22	22	82
185	36	35	34	33	32	31	30	29	28	27	27	26	25	24	24	23	23	84
190	37	36	35	34	33	32	31	30	29	28	27	26	26	25	24	24	23	86
195	38	37	36	35	33	32	31	31	30	29	28	27	26	26	25	24	24	88
200	39	38	37	35	34	33	32	31	30	30	29	28	27	26	26	25	24	91
205	40	39	37	36	35	34	33	32	31	30	29	29	28	27	26	26	25	93
210	41	40	38	37	36	35	34	33	32	31	30	29	28	28	27	26	26	95
215	42	41	39	38	37	36	35	34	33	32	31	30	29	28	28	27	26	98
220	43	42	40	39	38	37	36	34	33	32	32	31	30	29	28	27	27	100
225	44	43	41	40	39	37	36	35	34	33	32	31	31	30	29	28	27	102
230	45	43	42	41	39	38	37	36	35	34	33	32	31	30	30	29	28	104
235	46	44	43	42	40	39	38	37	36	35	34	33	32	31	30	29	29	107
240	47	45	44	43	41	40	39	38	36	35	34	33	33	32	31	30	29	109
245	48	46	45	43	42	41	40	38	37	36	35	34	33	32	31	31	30	111
250	49	47	46	44	43	42	40	39	38	37	36	35	34	33	32	31	30	114
	150	152.5	155	157.5	160	162.5	165	167.5	170	172.5	175	177.5	180	182.5	185	187.5	190	

Height (centimetres)

Underweight | Weight Appropriate | Overweight | Obese

Figure 4- Source: The Body Mass Index chart, http://dentsem.com/assets/docs/Dr_Spensor_Kauai_BMI_Chart.pdf.

Globally, there has been an increased intake of energy-dense foods that are high in fat, salt and sugar but low in vitamins, minerals and other micronutrients, as well as a decrease in physical activity due to the increasingly sedentary nature of many forms of work, changing modes of transportation, and increasing urbanization. Changes in dietary and physical activity patterns are often the result of environmental and societal changes associated with development and lack of supportive policies in sectors such as health, agriculture, transport, urban planning, environment, food processing, distribution, marketing and education (WHO 2011).

Studies on obesity started to look after the World War II into a practical index for measurement and the Belgian mathematician, astronomer and statistician Adolphe Quetelet (1796-1874) concluded that 'the weight increases as the square of the height', known as the *Quetelet Index* that was termed afterwards as the *Body Mass Index* in 1972 by Ancel Keys (1904-2004) (Eknoyan 2007). Hence, the body mass index (BMI) is a person's weight (in kilograms) divided by the square of his or her height (in meters).

$$BMI = \frac{\text{Mass (kg)}}{\text{Height (m}^2\text{)}}$$

A person with a BMI of 30 or more is generally considered obese. A person with a BMI equal to or more

than 25 is considered overweight. By matching the weight and the height of a person, figure 4 points out if the person belongs to the underweight, normal, overweight or obese category.

Once considered a problem only in high-income countries, overweight and obesity are now dramatically on the rise in low and middle-income countries, particularly in urban settings (WHO 2011). In the Eastern Mediterranean Region, prevalence of overweight and obesity remains high, with a few notable exceptions. Iran, Morocco and Tunisia have bigger gender differences, with male obesity below 10% and a female obesity rate of about 20%. In Lebanon, Qatar and Saudi Arabia, more than 30% of adults are classified as obese (IASO 2010).

As for Qatar and according to the WHO, the latest figures point out that 30.8% of males and 39.3% of females are obese. Currently, Qatar ranks sixth globally for prevalence of obesity and has the highest rate of obesity among boys in the region, as per International Association for the Study of Obesity statistics (IASO, 2011). More than 50% of Qatari boys between the age of 8 and 14 years old are severely obese and another 28% of the same ages are overweight. Sever obesity rates are 32% for all residents in Qatar, according to a government study in September 2011 (*The Peninsula* 2011). Surprisingly, Hamad Medical Hospital (HMH) performed bariatric surgeries for teenagers aged 14 to 18 and would start the procedure for children as young as eight. Dr. Gagner from HMH mentioned that there are already 20 teenagers on the waiting list, and that the demand for surgery for obesity in children was rising. There is obviously a problem, he stated (*The Peninsula* 2011).

2- Academic requirements to address "social needs" in higher education

The "social needs" and "collaborative" components formulate new academic principles different than the ones required by the Industrial Revolution. In that model, nature essentially provided the resource to generate value similarly to the current carbon-based economy. Unlike the emerging knowledge-based economy, "value is created by creating value" (Tuomi and Miller 2011). It can be also characterized as moving toward a meaning-based economy, which is an essence of the Knowledge Society (Tuomi and Miller 2011).

From a contextual perspective, "Qatar will continue to invest in its people so that all can participate fully in the country's social, economic and political life and function effectively within a competitive knowledge-based international order" (*NDS* 2011). Consequently, in order to meet the stated requirements for a knowledge-based economy, "as educational

theorists know, [it] requires social support, tools and fundamental cognitive capabilities such as memory, imagination and play. Often, the movement toward value also requires collaboration, communication and mobilization of social resources" (Tuomi and Miller 2011). A Knowledge Society, consequently, could also be called a Learning Intensive Society. Preferences need to be based on coherent value systems that are also aligned with social requirements. "Ethical principles and concepts become important content in education" (Tuomi and Miller 2011). Within the establish parameters, addressing "social needs" requires an innovative, ethical, adaptive and collaborative attributes to scholars. Hence, "the balance shifts from the integrating function of education toward a diversifying function" (Tuomi and Miller 2011) and the *T-shaped* capacity emerges again as a foundational requirement to achieve holistic inquiries and build a sustainable future.

3- The Platform: Understanding the context and the geo-educational landscape

In order to understand the context of the thesis, one must be more familiar with Qatar Foundation and Hamad Bin Khalifa University (HBKU). As of 2013, eight universities established their branch campuses in Doha and deliver the same curricula in the main campuses. In addition, HBKU established two home-grown programs and in the course of establishing a third one. Figure 5 illustrates the established universities and the corresponding programs exclusively delivered by each entity.

HEC, UCL, QFIS and TII are graduate programs. The remaining universities all deliver undergraduate degrees in various disciplines in addition to TAMU and VCU who offer their graduate program.

In regards to inter-disciplinary education, courses and minors degrees offer the opportunity for eligible students to cross-registration between various universities and cross-pollinize their educational experience. CMUQ's biological Sciences and Computational Biology is an example of inter-disciplinary programs. In addition, multi-disciplinary education mostly occurs with the reunion of three or more related disciplines within each university, for example, fashion, interior and graphic design in VCUQ, or electrical, mechanical and petro-chemical engineering in TAMUQ.

The thesis explores the notion of multi-disciplinary education and the encounter of students from various established universities. *Radical collaboration* as defined by the d.school suggests broad multi-disciplinary interactions as it brings students from anthropology, sociology, design, engineering, public policy and business administration together with professionals from various sectors and civil. In that sense,

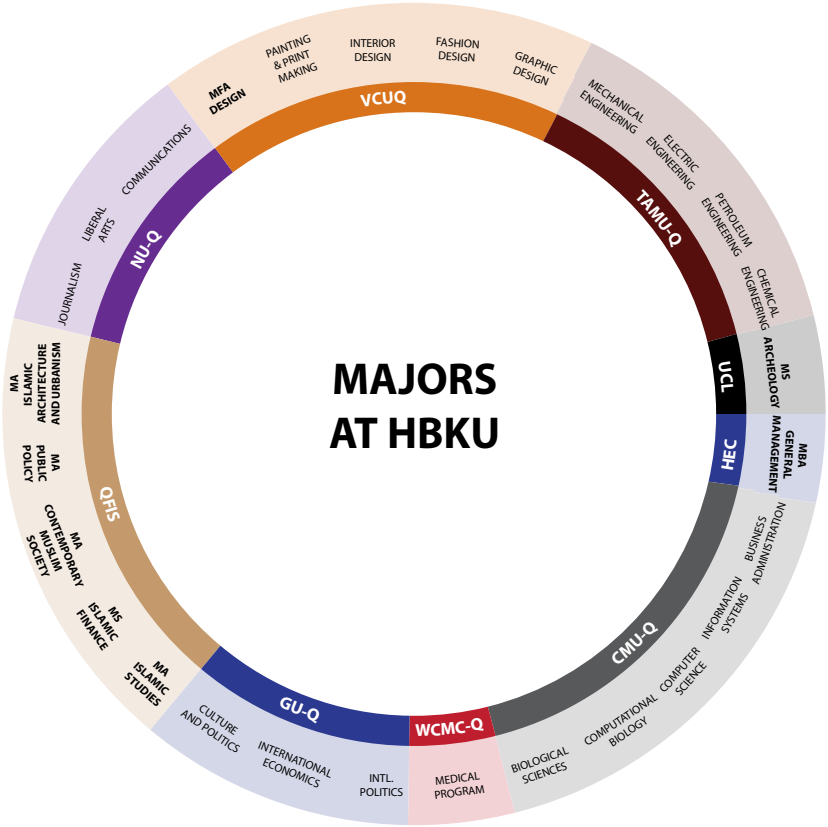


Figure 5- List of the established universities and the delivered programs at HBKU.

students will engage collaboratively on the presented topic and question it from various angles. As stated earlier through the study at Stanford University, the exchange of knowledge and skills between peers facilitated by the design thinking process enriched the academic inquiry and equipped the group of cohorts with a holistic capacity. Unfortunately, such a platform that is able to attract students from all disciplines and address a social topic did not exist during the application of the thesis yet a new initiative has recently emerged at HBKU and it will be discussed in the following chapter.

Within the established conditions, the thesis inquiry will illustrate in the following section how it navigated the geo-educational landscape and interacted with students from various disciplines while testing design thinking as a method of inquiry on a social topic.

REACTING TO THE GAP

The thesis inquiry *reacts* to the call for education on social challenges and picks the obesity theme as a point of departure. The *wicked problem* of obesity will be articulated in an individual capacity through a preliminary divergent study, and it converged in a later stage into the topic of the *redesign of the eating experience*. The later was used as a theme to navigate the educational landscape using *design thinking* as a method of inquiry, to interact in a workshop series with undergraduate students in three different universities. Details on the investigation will be extensively discussed in page 97.

Articulating the "wicked" problem of Obesity

As mentioned earlier, obesity is described as a "wicked problem" by the UN general assembly and is a precursor state of several non-communicable diseases such as diabetes, cardiovascular disease and certain types of cancer (Gortmarker and Swinfburn 2011). Surprising to many, "overweight and obesity are linked to more deaths worldwide than underweight" (WHO 2010).

The challenge was unpacked through the research phase and diverged into six sub-challenges as noted in figure 6. This phase will be presented in details in the investigation chapter. The articulated sub-topics converged into the creation of the *re-design of the eating experience* brief.

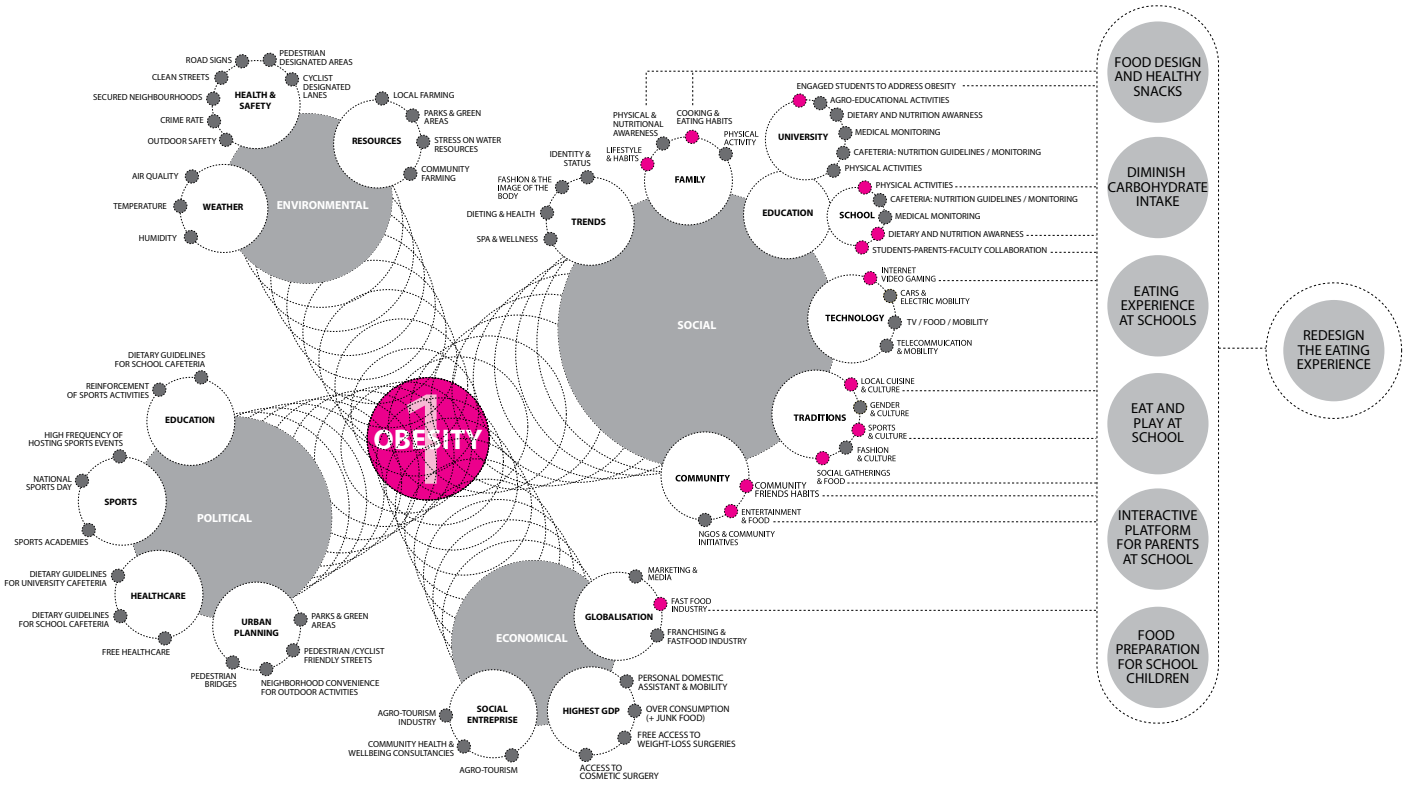


Figure 6– Navigating the obesity topic, articulating six sub-topics and formulating the brief for the thesis.

This foundational exercise familiarized my knowledge on the complexity of obesity and facilitated the generation of actionable topic of the redesign of the eating experience. The later was integrated in an educational program amd delivered to undergraduate students using design thinking as a method of inquiry.

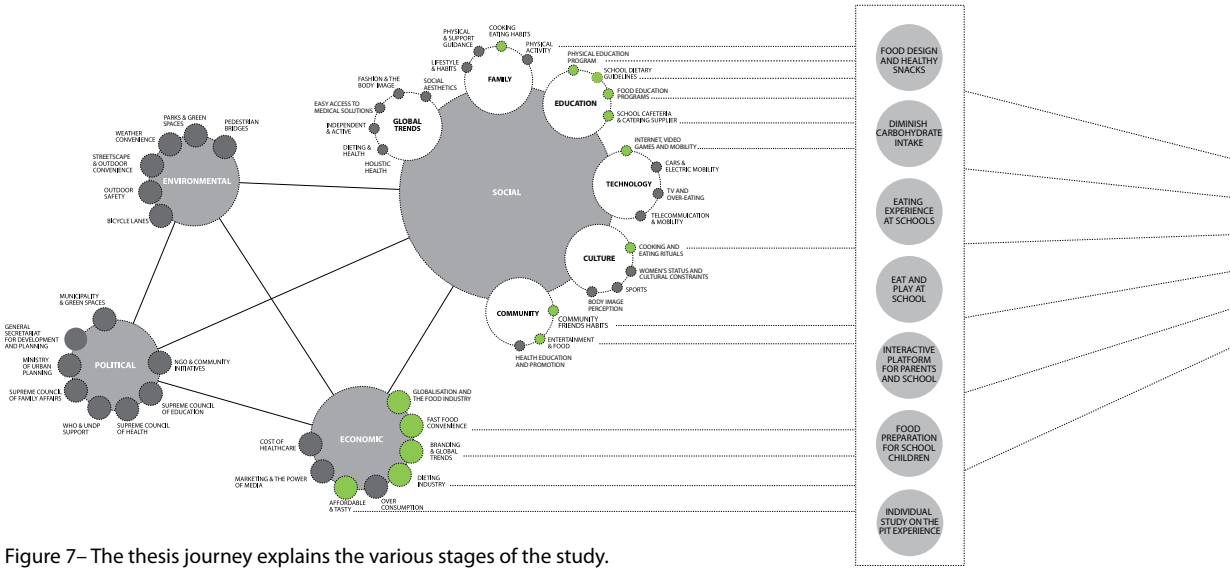


Figure 7– The thesis journey explains the various stages of the study.

Creating an inquiry:
Problem, Process and Platform

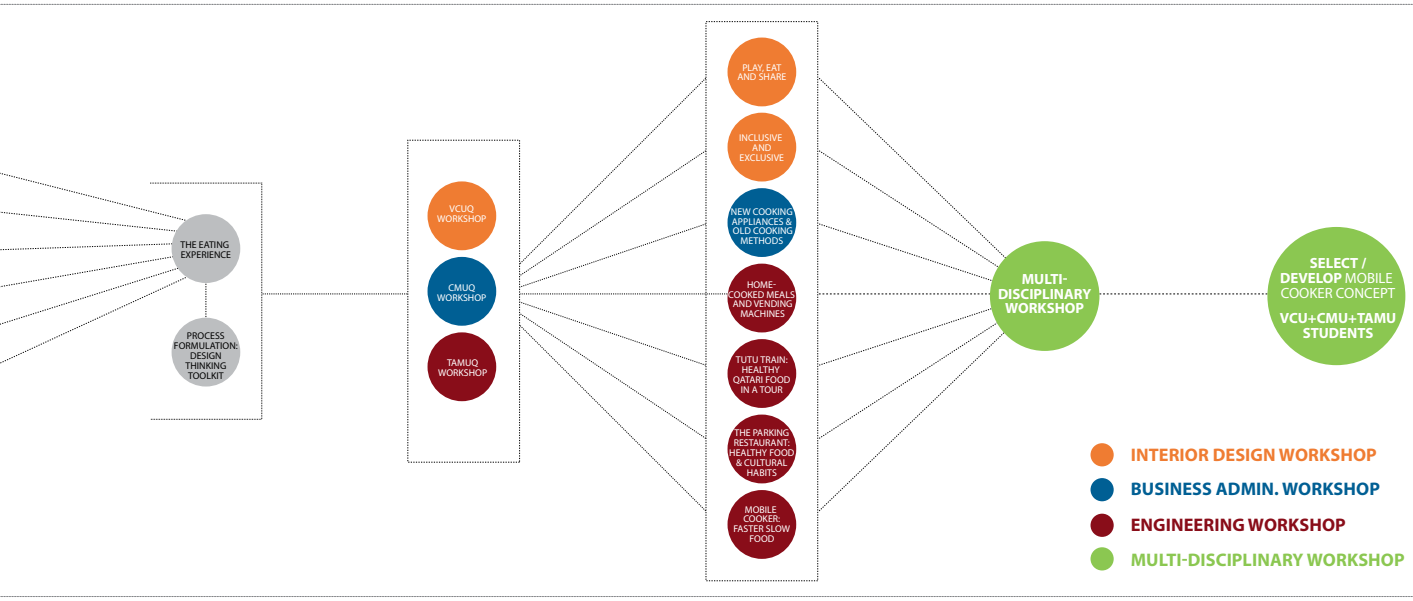
As mentioned earlier, systems thinking and integrative thinking such as design thinking formulate a strategic and relevant approach to address social problems through multi-disciplinary education. After articulating the complex challenges of obesity and generating the eating problem that co-exists in society, an *association* was made between the *redesign of the eating experience* with *design thinking* as a relevant method of inquiry on the social topic. Consequently, a responsive program was formulated, implemented and evaluated the method by the students in the current educational context.

The context imposed the interaction with each discipline separately; hence, three workshops were planned and implemented for students majoring in design, business and engineering. The students address the eating experience topic while using design thinking as a method of inquiry. They prototyped their ideas and assessed the workshop and the method using the evaluation forms. After the completion of the three workshops, the students were invited to enroll in a forth multi-disciplinary workshop where students from the design, business and engineering disciplines come together and refined one of the prototypes generated earlier.

The figure 7 explains the thesis journey starting from a suggestive mapping of obesity, selecting and articulating 6 areas of interest through a divergent and individual hands-on exploration. Later on, the study converged and generated the topic of the *eating experience*, planned, implemented and assessed the workshops and the method. In addition, the last multi-disciplinary workshop harvested the 7 seed concepts generated from the previous workshops and invited interested students to form a multi-disciplinary team and develop one concept. Planning, implementing, assessing the last session provided further insights for the study.

Hence, the eating experience (problem) was integrated in the design thinking (process) to formulate the components of an academic program (inquiry) delivered to undergraduate students from various disciplines (users) residing in the current academic landscape (platform). Within the established parameters, the *problem*, *inquiry* and *platform* are means to test the *process* by the *users*. Consequently, the aim of the thesis is to measure and assess the response of students (users) on design thinking (process).

Finally, as noted in the following diagram, the three components (3Ps) of the thesis inquiry are:
Problem, Process and Platform.



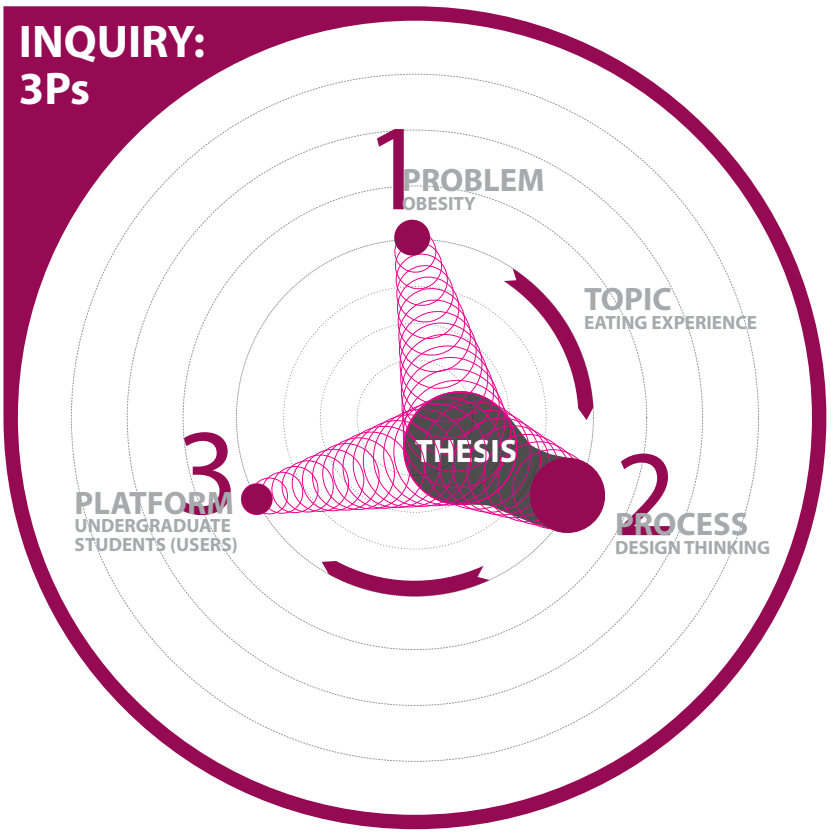


Figure 8 – The 3Ps of the inquiry: Problem, Process and Platform.

EVALUATION FRAMEWORK

The thesis applied design thinking using the topic of the eating experience on design, business and engineering undergraduate students within three different universities in Qatar Foundation. The aim of the thesis is to evaluate the response of the students on the collaborative, human-centered, result-oriented principles of design thinking while addressing a socially connected topic. Each workshop had its own period based on the provided time by the hosting professor. After each workshop, the students assessed the experience by completing the evaluation sheets as per figure 9. One of the questions in the evaluation sheet asked the students if they wish to participate in an upcoming multi-disciplinary workshop. Hence the three workshops acted as a recruitment method to bring interested students in a last multi-disciplinary workshop. At the last workshop, a recorded group discussion documented the reflections of the participants on the overall experience. In addition to the evaluation forms, my observations during the workshops along with the feedback with the hosting faculty professors and students added additional insights to the inquiry.

The evaluation sheets requested additional feedback that goes beyond the thesis goal. For example, further feedback was requested on my responsibilities as the facilitator during the workshops, clarity of the explained material, inspiring, mentoring, and supporting the progress of the students along with the knowledge on the subject matter. Those additions were excluded from the study as they branched out from the main scope of the thesis.

Course name:
Faculty:
Facilitator: amin matni
Date:

feedback

WORKSHOP:
DESIGNING AN EATING EXPERIENCE: SLOW FOOD

	Worst 1	2	3	4	5	6	7	8	9	Best 10
METHOD ASSESSMENT										
Understanding the user's needs										
Generating insights										
Explorations in the ideation process										
Prototyping explorations										
Workshop time structure										
Method facilitated innovation?										
Method facilitated collaboration?										
WORK ASSESSMENT										
Assess your innovation leap										
Assess the desirablility of your solution by user										
MAP YOUR EMOTIONS	STRESSED				NEUTRAL					RELAXED
Beginning of workshop										
Middle of workshop										
End of workshop										
MAP THE COGNITIVE LEVEL	CONFUSION									CLARITY
Beginning of workshop										
Middle of workshop										
End of workshop										
MAP THE FUN LEVEL	LEAST									MOST
Beginning of workshop										
Middle of workshop										
End of workshop										
ASSESS THE OVERALL WORKSHOP										
MODERATOR ASSESSMENT										
Clarity of explaining the workshop										
Facilitating, mentoring and inspiring										
Supporting your progress										
Knowledge on the subject										

IS IT YOUR FIRST WORKSHOP ON SOCIALLY CONNECTED PROBLEMS? YES // NO

ARE YOU INTERESTED IN EXPLORING FURTHER SIMILAR WORKSHOPS? YES // NO

WILL YOU CONSIDER USING AGAIN THIS METHOD IN YOUR PROJECTS? YES // MAYBE // NO

DO YOU WISH TO PARTICIPATE FOR 1 SESSION AT THE END OF NOVEMBER IN THE FIRST CROSS-DISCIPLINARY WORKSHOP WITH CARNEGIE MELLON AND VCUQ STUDENTS ON THE SAME SUBJECT?

YES ///// NO

If Yes, please write your name and contact details to receive an invitation: .....

ADDITIONAL COMMENTS:

Figure 9 – The evaluation sheet for the three workshops.

JUSTIFICATION

WHY "DESIGN THINKING"?

First, as an approach, design thinking has been proven in various educational platforms that it facilitates **collaboration** amongst scholars whether from one or various disciplines. It provides a context for dialogue, respect and progress. In addition, it is a relevant process to address socail topics, whether they are wicked on less complex in nature. The below figure attempts to position various disciplines in the process and clarifies further that design thinking as an integrative process incorporates various tools and methods from different disciplines. It is a method that integrates methods and tools from various capacities and provides a versatile process on inquiry. It is a framework that provides the means for multi-disciplinary education.

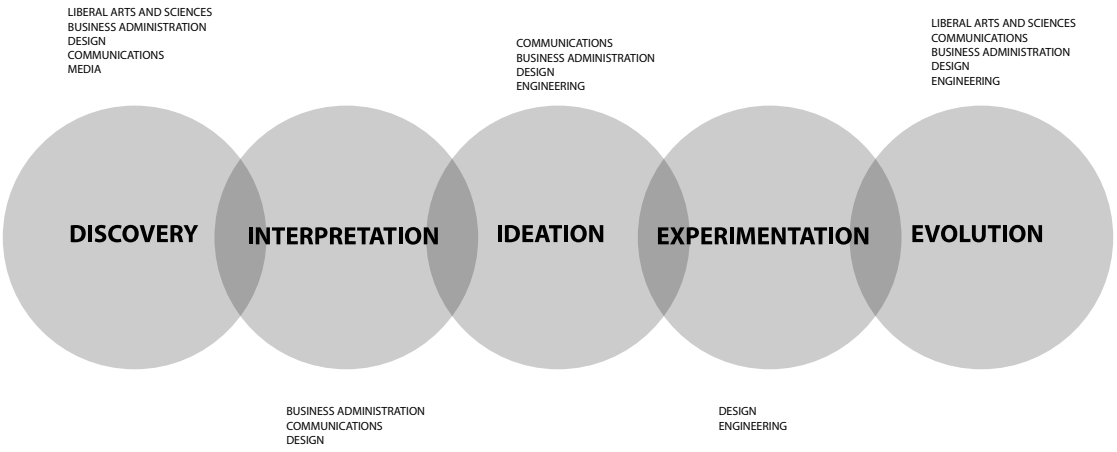


Figure 10- Positioning various disciplines in the design thinking process.

Second, the hybrid exchange of ideas and questioning a topic from various areas provides a **holistic** approach that pushes students to be critical, confident and interconnected. It aims at turning learning into a process of self-improvement that explicitly recognizes the self and the social context of learning, teaching, and recognizing the needs of the individual learner in the interaction. It recognizes the exchanges that take place within this social action are the foundations for developing critical and adaptive learners. In a wider premise, societies continue to exist only because they adapt and change through innovation. Education is therefore also needed to generate and facilitate social innovation and change. Education is then perceived as a source of innovation, empowerment, as in critical pedagogy (Tuomi and Miller 2011).

Third, the **result-oriented** principle of design thinking generates tangible solutions whether they are products, services or even policies. Several case studies on IDEO's website (www.ideo.org) provide proof that the emerging solutions on social challenges are desirable by users, feasible with the available technologies and viable in the market place. It is a generative method applicable on a myriad of problems ranging from simple to complex. Design thinking has been applied and tested at the d.school at Stanford University. It is worthwhile to investigate how the students and faculty will respond to this method within the context of undergraduate education at Qatar Foundation.

Forth, design thinking embodies a **human-centered** experience that empathizes with the user. This approach nurtures the problem-solver with a deep contextual understanding to look at a challenge from multiple perspectives. In this educational experiment, the users and the problem-solvers are the students themselves. During the workshops, groups of students interview each other and alternate roles from a user to problem-solver. Through learning by doing, the students will apply the method, assess it, internalize it and at the same time build their own reality on health and well-being. As they are trying to address the topic of the *eating experience*, the students are *reflecting* and *knowing* about how and what they should eat in order to achieve a healthy lifestyle. Through reflective thinking, the learning experience will potentially nurture intrinsic values for the students and support the development of a higher level of understanding to a healthy diet. It is worthwhile mentioning Donald Schön's theory of *reflective thinking* that explicitly challenged the positivist doctrine under-lying much of the "design science" movement, and offered instead a constructivist paradigm. He criticized Simon Herbert's view of a "science of design" for being based on approaches to solving well-formed problems first used by Buckminster Fuller.

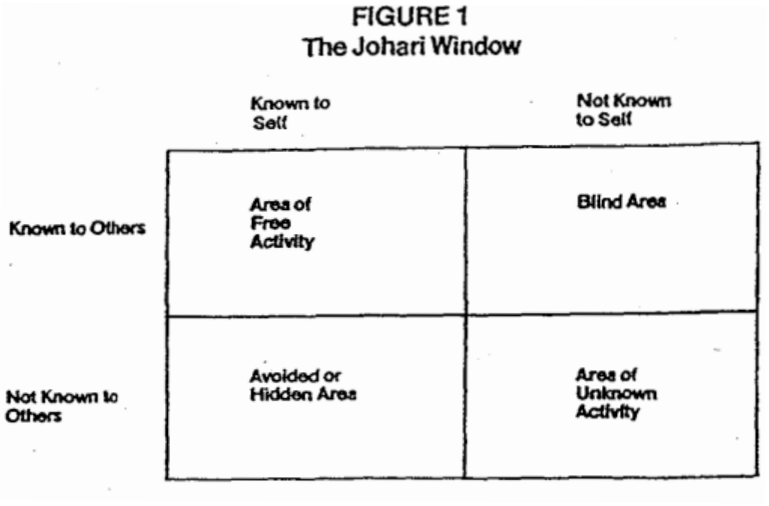


Figure 11- The Johari window
Source: NTL, Reading Book For Human Relations Training, NTL, 1982.

Whereas professional practice throughout design and technology and elsewhere has to face and deal with "messy, problematic situations." Schön proposed, instead, to search for "an epistemology of practice implicit in the artistic, intuitive processes which some practitioners do bring to situations of uncertainty, instability, uniqueness, and value conflict," and which he characterized as "reflective practice" (Cross 2001).

This dual perception provides an opportunity for reflections and potentially nurtures the awareness on the topic, self-awareness and awareness of others. It is worthwhile underlining the Johari model of awareness and interpersonal relations that was first introduced in 1955 at Western Training Laboratories by Josef Luft and Harry Ingham. It provided "a heuristic devise to speculating about human relations" (Luft 1982). The four quadrants of the graph explain the various levels of awareness.

Kurt Goldstein introduced the notion of self-actualization that describes, "at any moment the organism has the fundamental tendency to actualize all its capacities, its whole potential, as it is present in exactly that moment, in exactly that situation in contact with the world under the given circumstances" (Goldstein 1934). Goldstein's reflections provided the foundational theory for Abraham Maslow to develop a decade later his self-actualization theory.

Design thinking provides the methods and tools for reflective thinking, supports the user to achieve awareness (self awareness and the awareness of others) and provides an opportunity for self- actualization.

WHY THE "WICKED PROBLEM" OF OBESITY AS A STARTING POINT?

The NDS 2001-2016 publication provides scholars an opportunity to address social challenges such as obesity, road safety, carbon emissions, water consumption, to name a few. I felt compelled to react to one of these challenges and obesity presented an accessible and relevant topic to articulate. It is worthwhile to look into the average calorie intake in Qatar reach 3000 Kcal / day / capita (Arabianbusiness 2012), or to the fact that children at the age of eight years old are resorting to medical surgery for weight reduction (*The Peninsula* 2011).

My concerns on the obesity challenge do not differ from the ones on road safety or excessive water consumption per capita in Qatar. As an ethical scholar, educator and father, it is my moral duty to respond to these social challenges by creating circumstances for potential behavioral impact. Furthermore, the study will potentially contribute to new knowledge on how to close the gap between social needs and higher eduation and provide a precedent on collaboration and co-creation for undergradaute students.

DELIMITATIONS

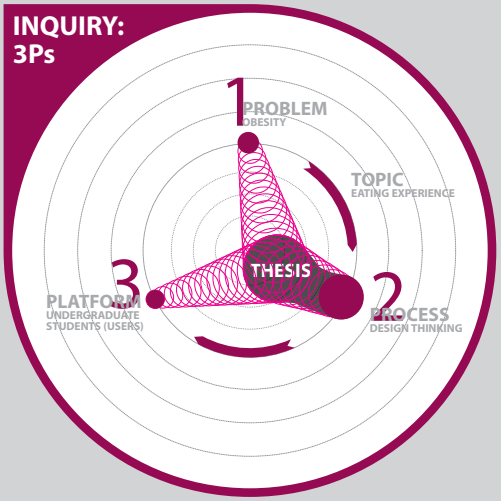


Figure 12- Thesis is positioned closer to the process than to the problem or platform.

The thesis project tackles various topics within the academic exploration, yet the thesis focuses on certain components of the inquiry.

First, the thesis does not aim at building a model on how to address grand challenges within the present educational landscape. Hence, it will not point to a roadmap, nor a step-by-step framework, on how to engage with various stakeholders on grand challenges mentioned in the National Development Strategy 2011-2016. In addition, the goal of this educational exploration is not to solve **the eating experience** as an emerging theme from obesity. Yet, prototyped solutions to address the topic are important indicators to concretize the attained knowledge into tangible outcomes. In parallel, since each discipline is housed in a separate university, the context imposed the application of the workshops with each discipline alone. The separation of disciplines did not facilitate a multidisciplinary interaction. Consequent, the holistic principle of **design thinking** was deactivated in this inquiry and disregarded in the evaluation framework. In addition, the *optimistic* principle was also excluded from the evaluation framework. The goal behind this principle as per IDEO is "the optimism to produce societal change". Hence measuring behavioral and societal change falls out from the scope of the thesis.

In the course of focusing on measuring the reactions of students on design thinking, the inquiry will generate a deeper understanding on the resources needed to address the gap between social needs and higher education, as mentioned in the NDS. As pointed The experiential learning will clarify how to explore future interactions with students on complex social problems. These insights will be point out to opportunities that potentially close the gap.

In conclusion, the objective of the thesis is to test the response of undergraduate students (users) in a unique geo-educational landscape at HBKU (platform) using design thinking (process) on the eating experience (problem). The below figure attempts to position the thesis which resides in the inquiry.

BACKGROUND

The thesis framework (as per figure 12) maps out how the study navigated through the problem space, the process of inquiry and the platform of interaction with the users (students). The study started by exploring the multifaceted problem of obesity, described by the UN general assembly in 2011 as an epidemic and a "wicked problem" (Neel 2011).

ON THE PROBLEM

In the world of design problems, a distinction was made between well-defined problems and the ill-defined ones. In the latter category, further distinctions pointed out to the subclass of *wicked problems* (Churchman 1967). West Churchman raised his concerns in a letter for the *Management Science Journal* in December 1967 after attending a seminar for Professor Horst Rittel on the wicked problem at the University of California, Architecture Department. Churchman commented on the approach that was put forward in the seminar on how to *tame* the problem, since it cannot be solved. He addressed the issue of carving a piece of the problem and addressing it in a rational and feasible approach. Hence leaving the untamed part for someone else to address. Then he pointed out to the reporting process in an organization and underlined the transparency, honesty needed to admit that the problem is still there, yet a small part of it is solved. To him, this approach is deceptive, immoral and the operations and management science profession is indifferent to moral principles. He concluded that the profession has a moral problem and it is worthwhile to start a discussion about it (Churchman 1967).

Afterwards, the term *wicked problem* was further clarified with the seminal contribution of Rittel and Weber in 1972 and Bazjanac in 1974. According to Richard Buchanan, Rittlel borrowed the term wicked problem from the philosopher Karl Popper's book, *Conjunctures and Refutations: The Growth of scientific knowledge* (Buchanan 1992). The term originated from the social planning sector to describe a problem that is difficult or impossible to solve because of incomplete, contradictory, and changing requirements that are often difficult to recognize (Rittel and Weber 1971). They formulated in 1973 the ten characteristics of wicked problems in social policy planning:

1- There is no definitive formulation of a wicked problem (defining wicked problems is itself a wicked problem).
2- The existence of a discrepancy representing a wicked problem can be explained in numerous ways. The choice of explanation determines the nature of the problem's resolution.
3- Solutions to wicked problems are not true-or-false, but better or worse.
4- There is no immediate and no ultimate test of a solution to a wicked problem.
5- Every solution to a wicked problem is a "one-shot operation"; because there is no opportunity to learn by trial and error, every attempt counts significantly.
6- Every wicked problem is essentially unique.
7- Every wicked problem can be considered to be a symptom of another problem.

Figure 13- How to recognize a wicked problem (Rittel and Weber 1973, 1984).

8- The planner has no right to be wrong (planners are liable for the consequences of the actions they generate).
9- Wicked problems have no stopping rule.
10- Wicked problems do not have an enumerable (or an exhaustively describable) set of potential solutions, nor is there a well-described set of permissible operations that may be incorporated into the plan.

Within the presented environment of the problem, rational-technical approaches to decision-making and implementation failed to address wicked problems. They declared that the engineering approach to solving complex problems has ended (Rittel and Weber 1973). In addition, the assumption of having clear goals, adequate information and the appropriate choice of methods, put policy and planning framework under scrutiny during the 1970s and 1980s (Head 2008). As an anecdotal example for that period, the US federal program for social and economic improvement in disadvantaged suburbs required complex coordination that confused the aims and means for any decision-maker and created a discrepancy between the set targets and the actual performance of the program (Pressman and Wildavsky 1973). In the same year, Rittel and Webber noted "the available human capacity based in Newtonian mechanistic physics, is not readily adapted to contemporary conceptions of interacting open systems and to contemporary concerns with equity" (Rittel and Weber, 1973). Similar concerns were raised a decade later about the quality of professional knowledge and practice in human services and argued that technical rationality could not come to grips with the complexity of real world complex problems nor comprehend the experiences of the citizens and clients who are supposed to be helped in these interventions (Schön 1983).

Rittel argues that most of the problems addressed by designers are wicked problems (class of social system problems) and points toward a fundamental issue that lies behind the practice: the relationship between determinacy and indeterminacy in design thinking (Rittel and Weber 1973). Richard Buchanan provides an insight in this respect and points out to the potential universality of design as it is applied to any area of human experience. "But in the process of application, the designer must discover or invent a particular subject out of the problems and issues of specific circumstances which contrasts with the science discipline" (Buchanan 1992).

Rittel provided a projection at that time that "many know of how an idealized planning system would function. It is being seen as an on-going, cybernetic process of governance, incorporating systematic procedures for continuously searching out goals; identi-

fying problems; forecasting uncontrollable contextual changes; inventing alternative strategies, tactics, and time-sequenced actions; stimulating alternative and plausible action sets and their consequences; evaluating alternatively forecasted outcomes; statistically monitoring those conditions of the public and of systems that are judged to be germane; feeding back information to the simulation and decision channels so that errors can be corrected-all in a simultaneously functioning governing process. That set of steps is related to the modern-classical model of planning. Yet such a planning system is unattainable, even as we seek, more closely, to approximate it. It is even questionable whether such a planning system is desirable" (Rittel and Weber 1973). For measurable situations that involve machines in changing conditions, this process was made possible with the help of computers with instant data input where applications interpret and respond to the changing parameters.

To address this discourse on social challenges, a different type of system is required. Integrative or systems thinking provides a process to unpack complex challenges that are persistent, pervasive, and that seem defined as "wicked problems." "These challenges touch upon ethical questions, and require a complete reframing with the collaboration of multiple actors for innovative and ethical solutions to be developed" (Thackara 2005).

"Systems thinking" is an inquiry-based method of learning that uses the technique of perspective-taking, fosters holistic thinking, and engages in belief-testing (Mathews and Joes 2008). As noted early, design thinking provides an application to address real world problems following the statements by Bourdieu 1990, Buchanan 1992, Melles 2010, Chiasson 2001.

The following section will provide a theoretical and historical overview on design thinking.

ON THE PROCESS

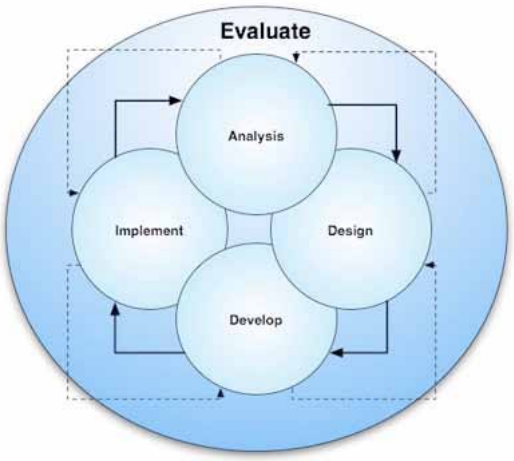


Figure 14- Bertalanffy "General System Theory" model.

Within the evolution of the classical design methodology, the design process was divided into various stages to facilitate planning and implementing activities. The first reference to a multi-phase creative process goes back to 1924 where Poincaré reflected on his own creative thinking process, while solving mathematical problems. That provided a foundation for Wallas, in 1926, to provide the four phases of the creative process: Preparation, Incubation, Illumination and Verification (Tschimmel 2012).

It was the starting point of the research movements into design creativity, which unfolded new models to explain the design process. As per various design researchers, the "classification and respective visualization of the different phases of the design process depend mainly on the methodological paradigm in which the creative process in design is analyzed and described" (Dorst and Dijkhuis 1995; Dorst 1997; Tschimmel 2011). The evolution of the design process witnessed two paradigm shifts. The first one was acknowledged during the Conference on Design Methods, held in London in September 1962 (Jones and Thornley 1963). There was a strong desire to *scientize* the design process by the De Stijl movement during the early 1920s to release it from the "subjective speculation in art, science, technology" and provide an "objective system" as noted by T. Van Doesberg in 1923 (Naylor 1968). Le Corbusier added on his objective approach to design a house as a "machine for living" (Le Corbusier 1929). The design process was based on a rational and analytical approach to problem solving.

Along with the growing demand for the "rationalistic and logical designer" (Bousbaci 2008), the focus on systems thinking emerged with the work of Bertalanffy on the "General System Theory" developed in 1950. It is a general science of wholeness where the constitutive characteristics of a system are not explainable from the characteristics of the isolated parts. The characteristics of the complex, therefore, appear as new or emergent (Bertalanffy 1976). Von Bertalanffy was reacting against both reductionism and attempting to revive the unity of science. Bertalanffy defined a system as "a complex of interacting elements among each other and with their environments. The elements can acquire qualitatively new properties through emergence, thus they are in a continual evolution. When referring to systems, it generally means *self-regulating systems* (they self-correct through feedback)" (Bertalanffy 1976).

The second paradigm shift occurred with the struggle of the scientific mind to address ill-defined or "wicked problems," as previously mentioned by Rittel and Weber in 1971, Peter Rowe in his book *design thinking* and fundamentally, Donald Schön through *The Reflec-*

tive practitioner in 1983. Hence a paradigm shift in the design process occurred in the 1980s that migrated the rational and analytical paradigm to the holistic one of the emergence of design solutions (Cross 2001). "The Problem-Solving paradigm changed to the interpretation of the design process as a Reflective Practice" (Schön 1983) and as a Co-Evolution of the Problem-Solution Space (Dorst and Cross 2001). The problem solving approach remained dominant in the Design Thinking Movement as it evolved into a holistic and non-linear way (Brown 2009; Martin 2009). Instead of process phases or stages, most of these models describe the design thinking process as a "system of overlapping spaces" (Brown and Wyatt 2010) and as an iterative process (Stickdorn and Schneider 2010), and thus we can also assign them to the new design paradigm of emergence (Cross 2001).

In the domain of design thinking, several models have been published and six of them will be presented in the following section:

1- 3"I" by IDEO
2- Human-Centered Design (HCD) by IDEO
3- Double Diamond for 4D by the British Design Council (BDC)
4- Design Thinking Model of the Hasso-Plattner Institute
5- Design Thinking for Educators by IDEO
6- Transformative Desgin by the BDC

1- 3 "I"s: Inspiration, Ideation and Implementation

The first model was developed by IDEO in 2001 in the context of social innovation. As the design agency was increasingly being asked to work on problems far removed from traditional design (health care, learning environments, etc.), they wanted to distinguish this new type of experience-oriented design work from industrial design (Brown and Wyatt 2010).
The first model is based on the three phases: Inspiration, Ideation and Implementation (see figure 15). In a published article in Harvard Business Review, Tim Brown noted that:

> "The design process is best described metaphorically as a system of spaces rather than a predefined series of orderly steps. The spaces demarcate different sorts of related activities that together form the continuum of innovation. Design projects must ultimately pass through three spaces. The inspiration, label is for the circumstances (problem, opportunity, or both) that motivate the search for solutions; ideation, for the process of generating, developing, and testing ideas that may lead to solutions; and implementation, for the charting of a path to market. Projects will loop back through these spaces—particularly the first two— more than once as ideas are refined and new directions taken" (Brown 2008).

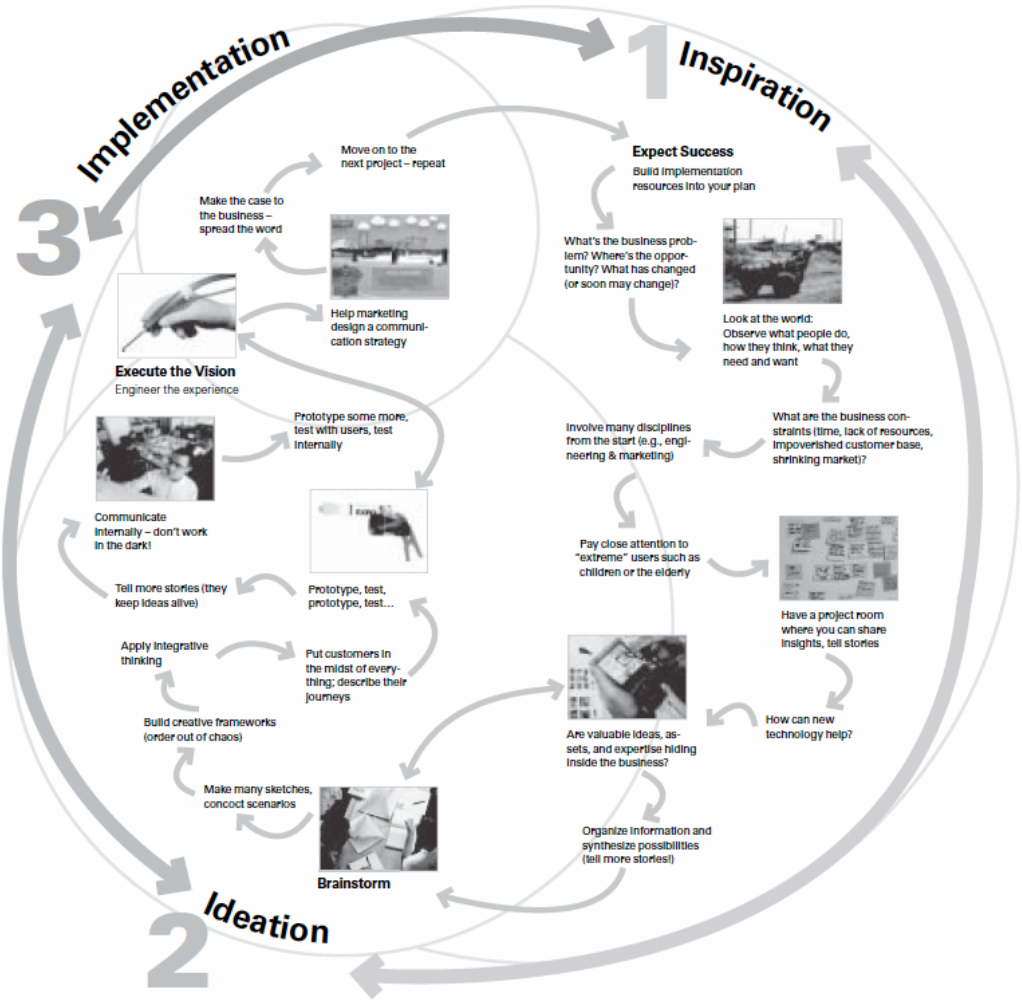


Figure 15- IDEO's process in 2008 published in the Harvard Business Review.

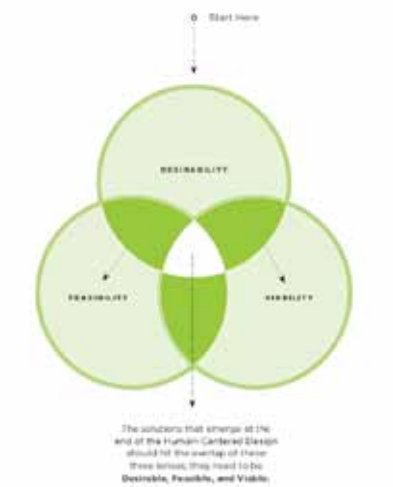


Figure 16 – The three lenses of Human-Centered Design: Desirability, Feasibility and Viability (HCD 2009).

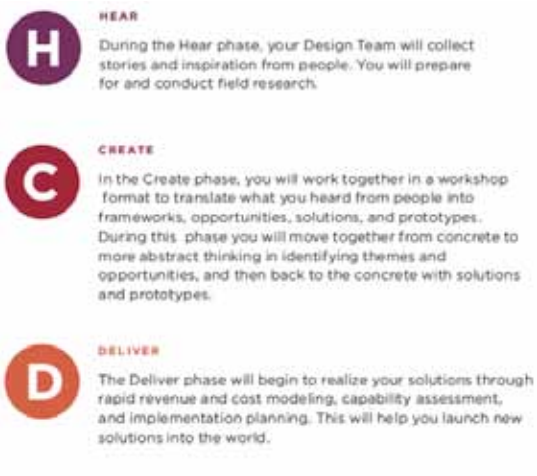


Figure 17 – HCD acronyms explanation (HCD 2009).

2- HCD: Human-Centered Design

The second model was in 2009 when IDEO responded to the Bill & Melinda Gates Foundation's call to developed a toolkit for NGOs and social enterprises that work with disadvantaged communities in the developing world (Brown and Wyatt 2010). Human-Centered Design (HCD) is a process and a set of techniques used to create new solutions for the world. Solutions include products, services, environments, organizations, and modes of interaction. It was named HCD because the process starts with the people that they are designing for. The HCD process, as figure 16 shows, begins with the Desirability phase by examining the needs, dreams, and behaviors of the people to affect with the solutions. Listening and understanding what the people need is the point of departure (HCD 2009).

The Feasibility phase covers the area of producing the idea with the available technology. This phase involves accessibility and availability of soft and hard resources to make the solution.

The Viability phase covers the creation of a viable financial business model to sustain the solution in the market place.

The toolkit is also based on the three spaces of the acronym HCD: Hear, Create and Deliver (see figure 17). In this process, the user is lead through a participatory design process, which is supported by activities such as building listening skills, running workshops, and implementing ideas (Tschimmel 2012).

The process is further explained in the following figure as it brings various components together.

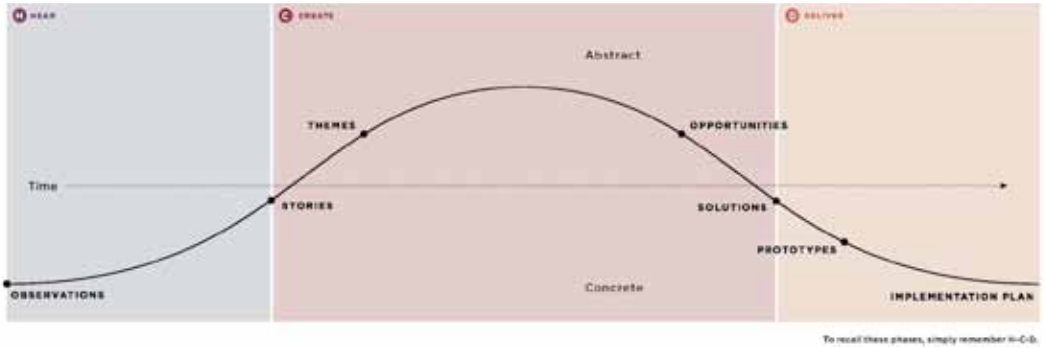


Figure 18 – The lenses and the phases expressed in the abstract or concrete states (HCD 2009).

The HCD is illustrated with real projects examples from Africa and India. HCD toolkit is an effective resource to support working in a collective design process, regardless of the social context of the design project.

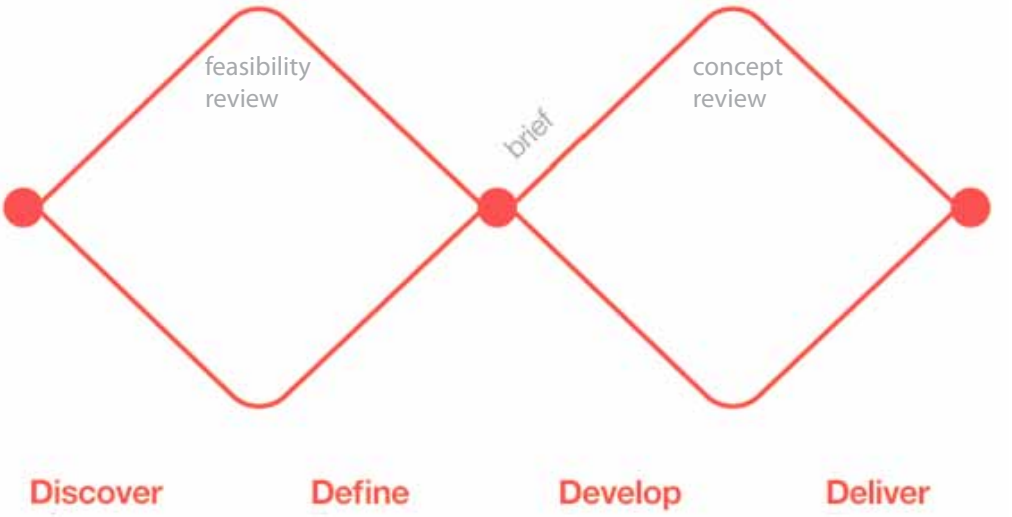


Figure 19 – 4D Design process model or the Double Diamond model.

3- The Double Diamond Model: Design Council

The Design Council is an independent charity founded by Winston Churchill in 1944. It consults the UK government on the design built environment and nurtures design-led innovation. The Design Council studied the design process in eleven leading companies and found striking similarities and shared approaches among the involved designers. Figure 19 maps the design process in four stages.

The double diamond diagram was developed through in-house research at the Design Council in 2005, as a graphical way of describing the design process. The model's name is also 4 D as it is divided into four distinct phases: Discover, Define, Develop and Deliver, it maps the divergent and convergent stages of the design process, showing the different modes of thinking that designers use.

Discover

The first quarter of the double diamond model marks the start of the project. This begins with an initial idea or inspiration, often sourced from a discovery phase in which user needs are identified. These include; market research, user research, managing information and design research groups.

Define

The second quarter of the double diamond model represents the definition stage, in which interpretation and alignment of these needs to business objectives is achieved. Key activities during the Define stage are; project development, project management and project sign-off.

Develop

The third quarter marks a period of development where design-led solutions are developed, iterated and tested within the company. Key activities and objectives during the Develop stage are; multidisciplinary working, visual management, development methods and testing.

Deliver

The final quarter of the double diamond model represents the delivery stage, where the resulting product or service is finalized and launched in the relevant market. The key activities and objectives during this stage are; final testing, approval and launch, targets, evaluation and feedback loops (Design Council 2012).

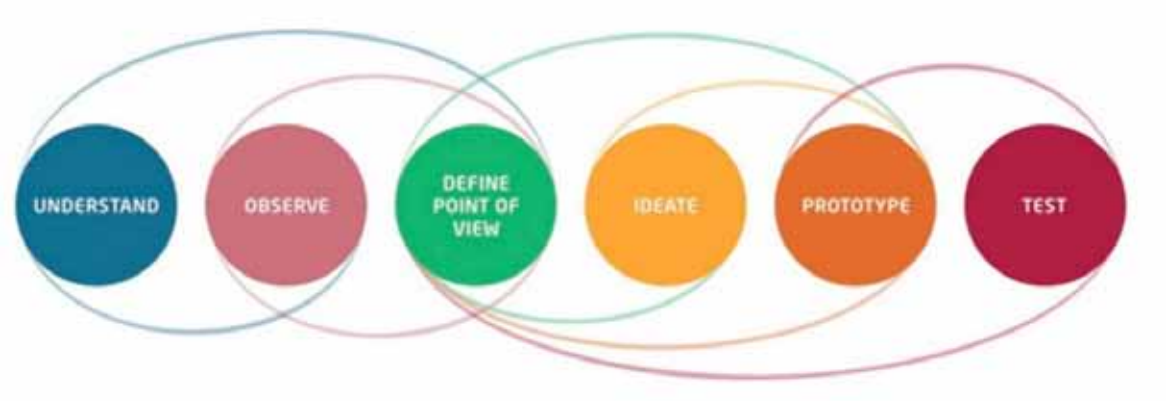


Figure 20 - The Design Thinking Model of the Hasso-Plattner-Institute (http://www.hpi.uni-potsdam.de/d_school/designthinking.html?L=1, accessed April 2013).

4- D.School at Stanford University

The school was founded by, Stanford mechanical engineering professor, David Kelley in 2004. It is a joint project between the university, the Hasso Plattner Institute of University of Potsdam in Germany and IDEO in San Francisco, United States of America.

The design thinking model of the d-school is similar to of IDEO's 3 I, yet this one was developed in an educational context. In this model, the design thinking process is visualized in six steps and connected with curved lines to indicate that each step is performed in iterative loops (see figure 20). In the first step of the model, *Understand*, existing information about the topic is gathered through secondary research. The second stage, *Observe*, is based on a qualitative research approach that includes interviewing and observing techniques, to collect insights about the users' needs.

Through storytelling the insights are then shared among the group and subsequently synthesized into a visual framework called *Point of View*, which reflects the user's perspective. The stage of *Ideation* is similar to the 3I model.

The next two steps *Prototype and Tests* contain the same activities and considerations as the *Implementation* space of the 3 I model (Thoring and Müller 2011).

The process shows that the stages of a design process are not always undertaken sequentially, but that projects may loop back to earlier phases. The d.school is introduced as an innovation hub that builds the next generation of innovators. Students from business, design, engineering, medicine, law, humanities, sciences and education collaborate through transformative learning experiences, while addressing complex challenges. This hybrid environment is also nurtured with professionals from various sectors (see figure 21).

Design thinking is used as a process of engagement as it draws on methods from design, engineering, arts, social sciences and business. Through fieldwork and the user-centered approach, students apply the method and aim to define the problem as they advance in a hands-on iterative journey. Design innovation is attained when a solution is desirable, feasible and viable as shown in figure 22.

Students address *real world problems* and we work on projects that stretch from few hours to few years. The program works with partners to develop these projects. Students work together from the beginning of the project and leverage their "differences as a creative engine" (d.school 2014). As they work in a multidisciplinary environment, they call for *radical collaboration* with various stakeholders.

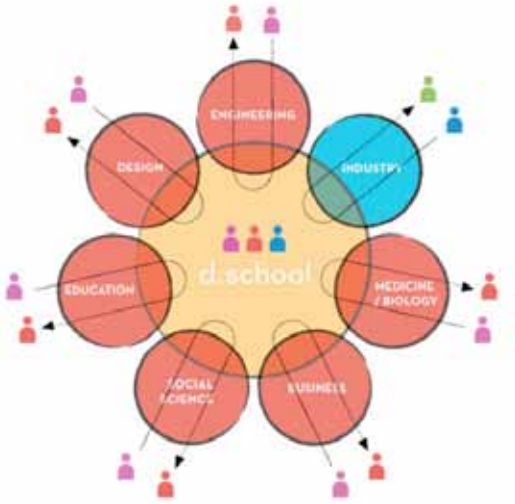


Figure 21- Radical collaboration (http://dschool.stanford.edu/our-point-of-view/) accessed April 2013.

Figure 22- The three lenses of design thinking by the d.school http://dschool.stanford.edu/our-point-of-view.

5- Design thinking for Educators

Design thinking for Educators, published in 2011, provided a descriptive toolkit to navigate the process. It is presented in the following four headlines:

It is Human-Centered

Design thinking begins by understanding the needs and motivations of people—in this case, the students, teachers, parents, staff and administrators who make up your everyday world. Basically it is talking with these people, listening to them, considering how best to help them. Design thinking begins from this place of deep empathy and builds on the power of these empathetic questions and insights.

It is Collaborative

Design thinking requires conversation, critique and all-out teamwork. And that is something that presents a shift, because despite the fact that educators are surrounded by people all day long, teaching remains an often solitary profession. Still, addressing complex or less complex challenges benefits significantly from the views of multiple perspectives, and nurturing the creative process.

It is Experimental

Design thinking creates a real space to try something new. It gives permission to fail and to learn from mistakes, because as new ideas emerge, get feedback new opportunities to iterate new possibilities. Given the range of needs students have, the work will never be finished or "solved." It is always in progress. Yet there is an underlying expectation that educators must strive for perfection, that they may not make mistakes, that they should always be flawless role models. This kind of expectation makes it hard to take risks. It limits the possibilities to create more radical change. But educators need to experiment, too, and design thinking is all about learning by doing.

It is Optimistic

Design thinking is the fundamental belief that we all can create change—no matter how big a problem, how little time or how small a budget. No matter what constraints exist, designing can be an enjoyable process. In short, design thinking is the confidence that new, better things are possible and that change can happen. And that kind of optimism is well-needed in education. Classrooms and schools across the world are facing design challenges every single day, from integrating technology to increasing parent involvement to improving daily schedules. Wherever they fall on the spectrum of scale, the challenges educators are confronted with are real, complex and varied. As such, they require new perspectives, new tools, and new approaches. Design thinking is one of them (Design Thinking for Educators 2011).

The following figure present various phases on the process and the related steps.

Figure 23 – DT phases and steps.

6- TRANSFORMATION DESIGN

In 2004, the Design Council set up RED; a 'do tank' that develops innovative thinking and practice on social and economic problems through design innovation. It is an interdisciplinary team of designers, policy analysts and social scientists who collaborate with a network of world-leading experts to address complex social and economic problems (Design council 2004).

Two years later, they drafted the model Transformation Design that provides an additional resource to reflect upon. The model is build on six principles:

1- Defining and redefining the brief
2- Collaborating between disciplines
3- Employing participatory design techniques
4- Building capacity and not dependency
5- Designing beyond traditional solutions
6- Creating fundamental change

1- Defining and redefining the brief

Complex problems are ambiguous in nature: neither the problem nor its direction or outcome is clear at the outset. Unlike the traditional framework where a designer is called to answer a brief, the transformational design involvement begins before the design brief is formulated, working with user groups and organizations to understand the scope of the issue and define the right problem to tackle. In this way, up to half of a project's timescale may be given over to problem definition and creating the right brief to answer (RED 2011).

2- Collaborating between disciplines

One of transformation design's great strengths is in its ability to mediate diverse points of view and facilitate collaboration. Recognizing that complex problems cannot be addressed from a single point of view and are rarely the sole responsibility of one department, set of expertise or knowledge silo, the design process creates a neutral space in which a range of people, whose expertise may have a bearing on the problem in hand, can work together. Because of this, in transformation design the designers are not always 'designers'. Transformation design is truly interdisciplinary, forming teams in which economists, policy analysts, psychologists and others all take part in the design process itself. Collaborators in transformation design, no matter what their background, are likely to be strong in their core discipline and able to connect to adjacent disciplines (RED 2011).

3- Employing participatory design techniques

Just as transformation design acknowledges that the expertise needed to solve complex problems does not rest solely with design professionals, it also recognizes that expertise does not only reside at the top of the organization. It resides equally with users and front-line workers. A top-down innovation strategy

is no longer appropriate for solving today's complex problems. Solutions must be able to be picked up by those who will deliver them. Groups in the emergent transformation design community have begun to employ participatory design techniques that involve users and front-line workers in the design process – capitalizing on their own ideas, knowledge and expertise, and uncovering some of their latent needs and desires. There are varying degrees of participation and co-design, but co-design workshops and techniques (such as experience prototyping and user-led design reviews) all point to more designers making the design process accessible to 'non-designers' (RED 2011).

4- Building capacity, not dependency
Transformation design acknowledges that 'design is never done'. Because organizations now operate in an environment of constant change, the challenge is not how to design a response to a current issue, but how to design a means of continually responding, adapting and innovating. Transformation design seeks to leave behind not only the shape of a new solution, but the tools, skills and organizational capacity for ongoing change. Transformation design builds on the intuition of 'expert' designers, but with some initial guidance and mentoring it can be practiced by non-designers too (RED 2011).

5- Designing beyond traditional solutions
It is no longer possible to predict from the outset that any particular problem can be solved with a new product or market offer. With industries and institutions looking to reinvent themselves, the right solution may just as easily lie in a new process, service offering, experience, system approach, or indeed a new business altogether. Because transformation design is about applying design skills in non-traditional territories, it results in non-traditional design outputs. Recent transformation design projects have resulted in the creation of new roles, new organizations, new systems and new policies. Transformation designers are just as likely to find themselves shaping a job description as shaping a new product. Transformation design asks designers to shape behavior – of people, systems and organizations – as well as form. Because of this, its practice demands a high level of 'systems thinking': an ability to consider an issue holistically rather than reductively, understand relationships as well as components, and to synthesize complex sets of information and constraints in order to frame the problem (RED 2011).

6- Creating fundamental change
What is noticeable about transformation design projects is that they aim high: to fundamentally transform a national system or a company's culture. In the public sector, RED is applying transformation design

for socially progressive ends. In the private sector, design consultancies are using transformation design to trigger a change in the organizational culture of its clients to one of 'human-centeredness', helping to transform organizations by giving them the capability to design experience from a human perspective (RED 2011).

In conclusion, the various definitions of design thinking vary from one model to another yet they all hold in common the 3"I"s principles of 2001. In addition, Transformative Design can be positioned as design thinking with *Intent*. The *ethical* layer to innovate on social challenges provides a focused application on generating sustainable solutions. Yet, the tools used in all previously mentioned models remain in common. These tools did not all originate from the design discipline alone. Design as a multidisciplinary field that integrated various methods and tools from several knowledge fields. But most of the visually related tools are design specific, such as drawing, sketching, mapping, prototyping to name a few stretch right back to the beginning of design education. The method of Brainstorming and the Brainwriting and Brainsketching variations came from the advertising and marketing fields. Other design thinking tools such as Audience Observation, Ethnography, Personas, Empathy Maps or Focus Group, important tools for the human-centered approach of design are linked to social sciences (Tschimmel 2012).

Below are a few tools used in the design thinking process:

Tools for observing, getting empathy and clarifying the project task

1. Observation and register on place
2. Mind Maps and other kinds of Information Maps
3. Personas and Empathy Map
4. Stakeholder Analysis

Tools for idea generation and experimentation

5. Brainwriting and Brainsketching
6. Sketching
7. Visual and Semantic Confrontations

Tools for elaboration and development

8. Storyboard
9. Rapid Prototyping

Tools for communicating and delivering

10. Storytelling
11. Learning experiences/Test

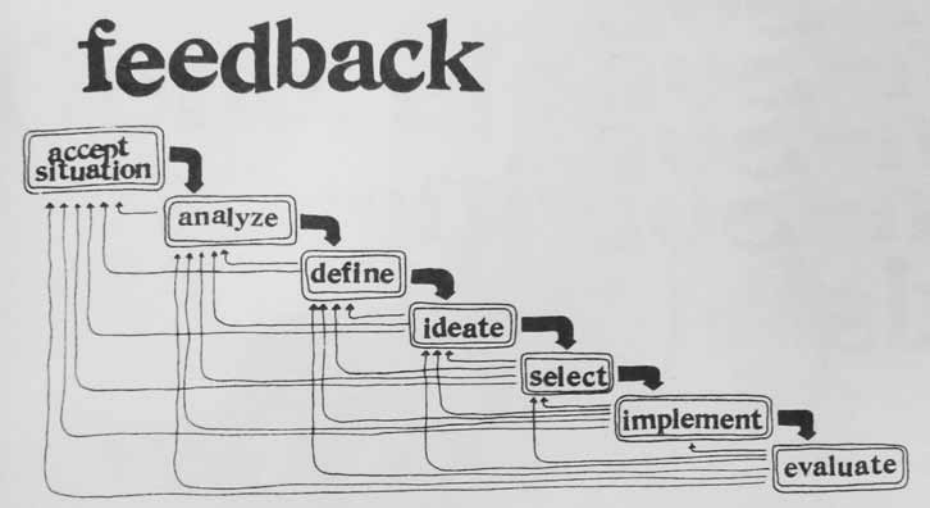


Figure 24- The problem-solving model with iterative feedback loops in *The Universal Traveller* (Koberg and Bagnall 1972).

It is fundamental to link the various methods and tools of design thinking to a previous problem-solving model from 1972. During that period, further work evolved on systems thinking and cybernetics and it is worthwhile to look into *The Universal Traveler* book by Don Koberg and Jim Bagnall. The sub-title of the book stated that it is "a soft-systems guide to creativity, problem solving and the process of reaching goals" (Koberg and Bagnall 1972). They note that the process has a universal relevance and is applicable to simple or complex problems. It is a "systematic process derived from the human-control systems know as Cybernetics forms the basis for modeling most social, industrial and economic problem situations. The user-friendly approach to problem-solving is called soft systems" (Koberg and Bagnall 1972).

The process is presented in three situations, as a linear process with feedback loops (figure 23), as a branching process (diverging and converging) (figure 24) and as a circular process (figure 25).

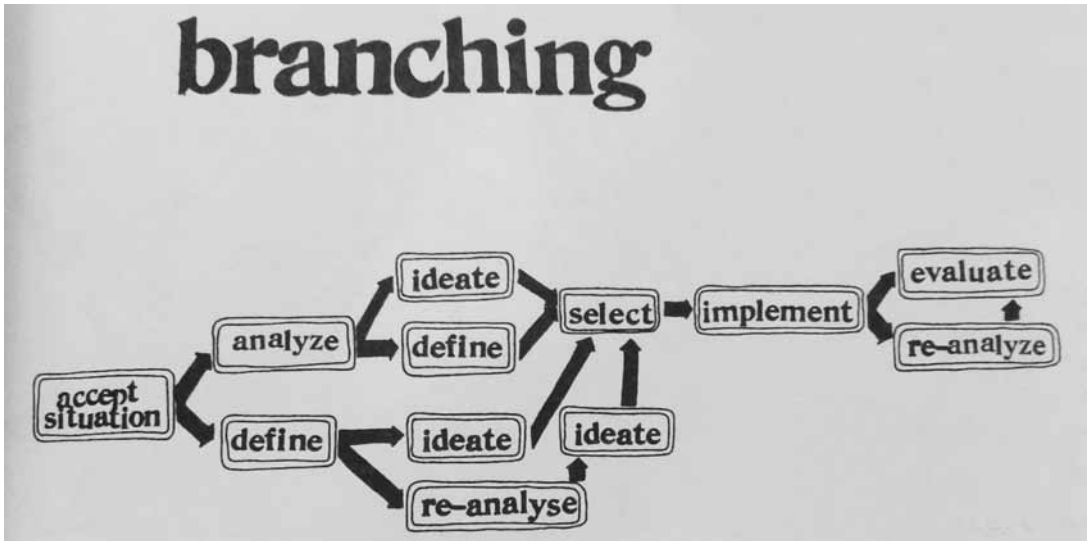


Figure 25 – The branch model in *The Universal Traveller* (Koberg and Bagnall, 1972).

The three discussed models provided a close resemblance to the design thinking model by IDEO. Furthermore, in chapter 6, an interesting step in the evaluation phase suggests to consider human needs (physical and physiological) in order to generate humanistic solutions (Koberg and Bagnall 1972). This step points out that "all problems in some way begin with unsatisfied human needs" and this note comes at the end of the book. Unlike design thinking by IDEO, human needs are the starting point of the Human-Centered Design process. Figure 26 sheds the light on this section in chapter 6 of the book.

To conclude, the tips, road maps and tools provided in the book are similar to the ones found in IDEO's process. David Kelly, the founder of IDEO noted that *The Universal Traveler* "was the blueprint for design thinking years before IDEO practiced it, and is still the best design methodology book I know of" (Kelly n.d.) (http://www.designersandbooks.com/designer/book-list/david-kelley, accessed May 2013).

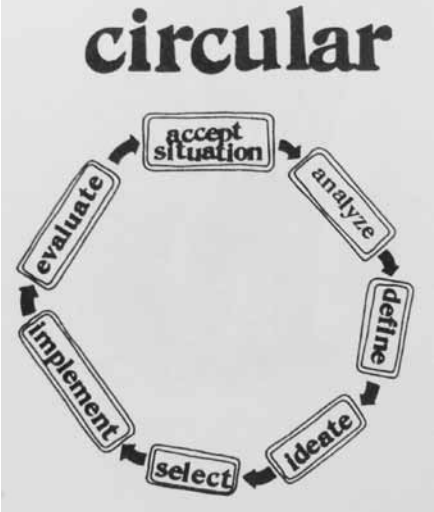
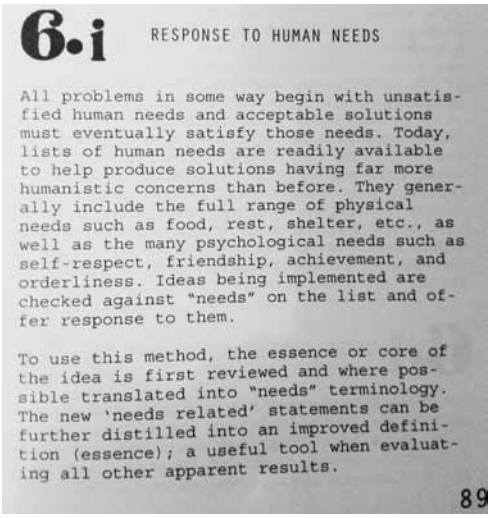


Figure 26 – The circular model in The Universal Traveller (Koberg and Bagnall 1972).


6.i RESPONSE TO HUMAN NEEDS

All problems in some way begin with unsatisfied human needs and acceptable solutions must eventually satisfy those needs. Today, lists of human needs are readily available to help produce solutions having far more humanistic concerns than before. They generally include the full range of physical needs such as food, rest, shelter, etc., as well as the many psychological needs such as self-respect, friendship, achievement, and orderliness. Ideas being implemented are checked against "needs" on the list and offer response to them.

To use this method, the essence or core of the idea is first reviewed and where possible translated into "needs" terminology. The new 'needs related' statements can be further distilled into an improved definition (essence); a useful tool when evaluating all other apparent results.

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Figure 27 – User needs in the designer's handbook section, evaluation phase.

METHODOLOGY

The previous sections established the narrative that the thesis took as a point of departure the "wicked problem" of obesity and articulated the challenge to identify and select various areas of interest. These topics provided validity through an individually led exploratory design journey. These topics converged into the creation of the *eating experience* topic, which served as a theme to navigate the educational landscape and test design thinking through a series of workshops delivered to undergraduate students from design, business and engineering majors. Hence, it is worthwhile expanding on the point of departure and articulating obesity.

PROBLEM COMES FIRST

The fundamental question that was posed at the start of the thesis project was how to unpack a complex challenge, such as obesity, and engage undergraduate students within the academic context using design thinking as a process of inquiry.

There was a need to articulate obesity and identify potential areas of engagement. Going through the literature was an essential phase to understand the various ramifications of a multifaceted challenge. The evolution of the mapping exercise, as illustrated in figure 28, 29 and 30, point out to the accumulation of the acquired knowledge and the reflective effort put into understanding the challenge.

ARTICULATING THE WICKED PROBLEM OF OBESITY

Unpacking the "wicked problem" of obesity initiate an attempt to understand it. This exploration did not aim to define the challenge but to articulate it in a broader interconnected way. The literature review on obesity as a global challenge and as a local one gave further insight on how to develop the mapping exercise beyond the first brainstorm attempt of figure 28.

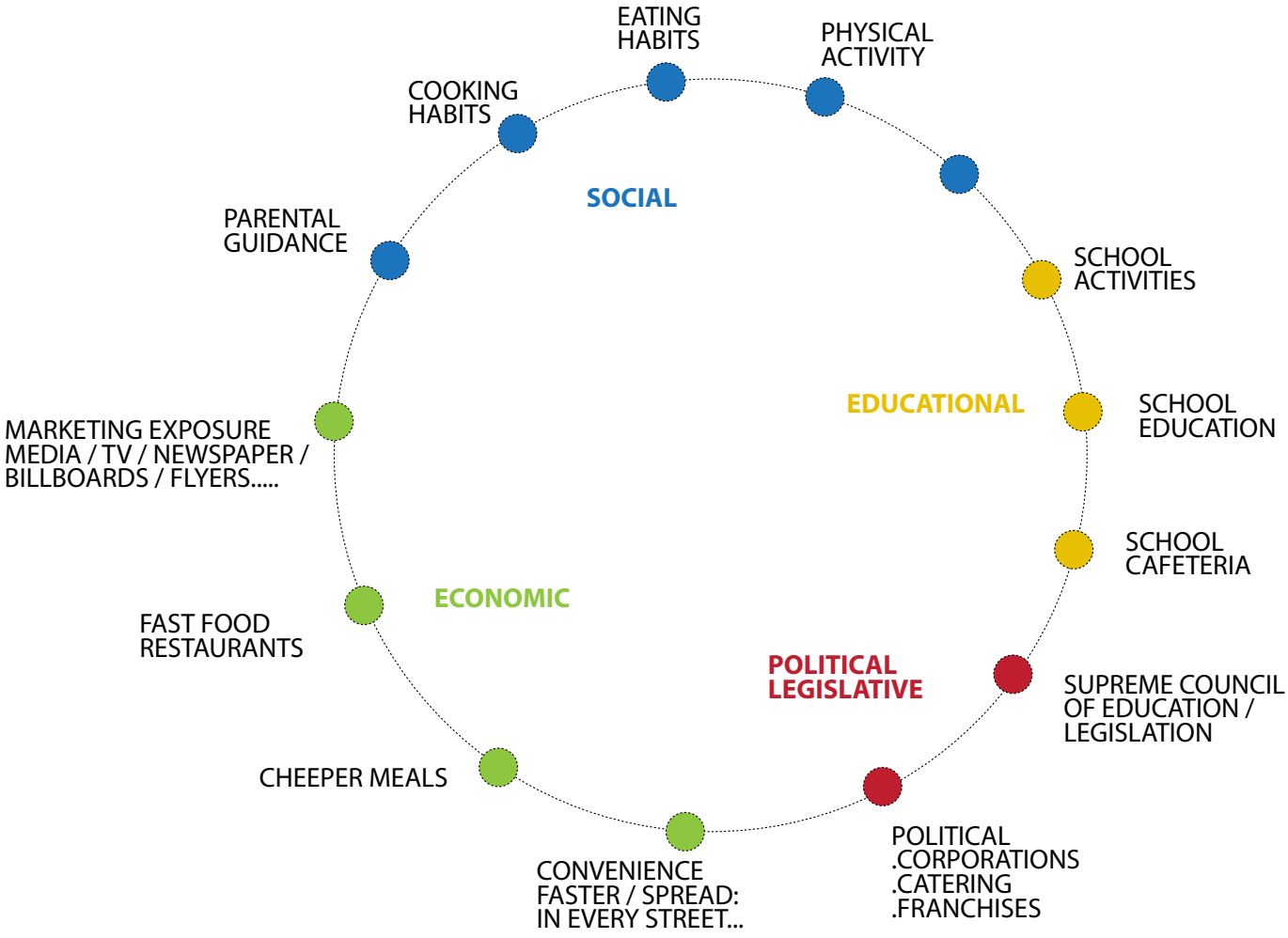


Figure 28 – The first brainstorming attempt to map the obesity challenge.

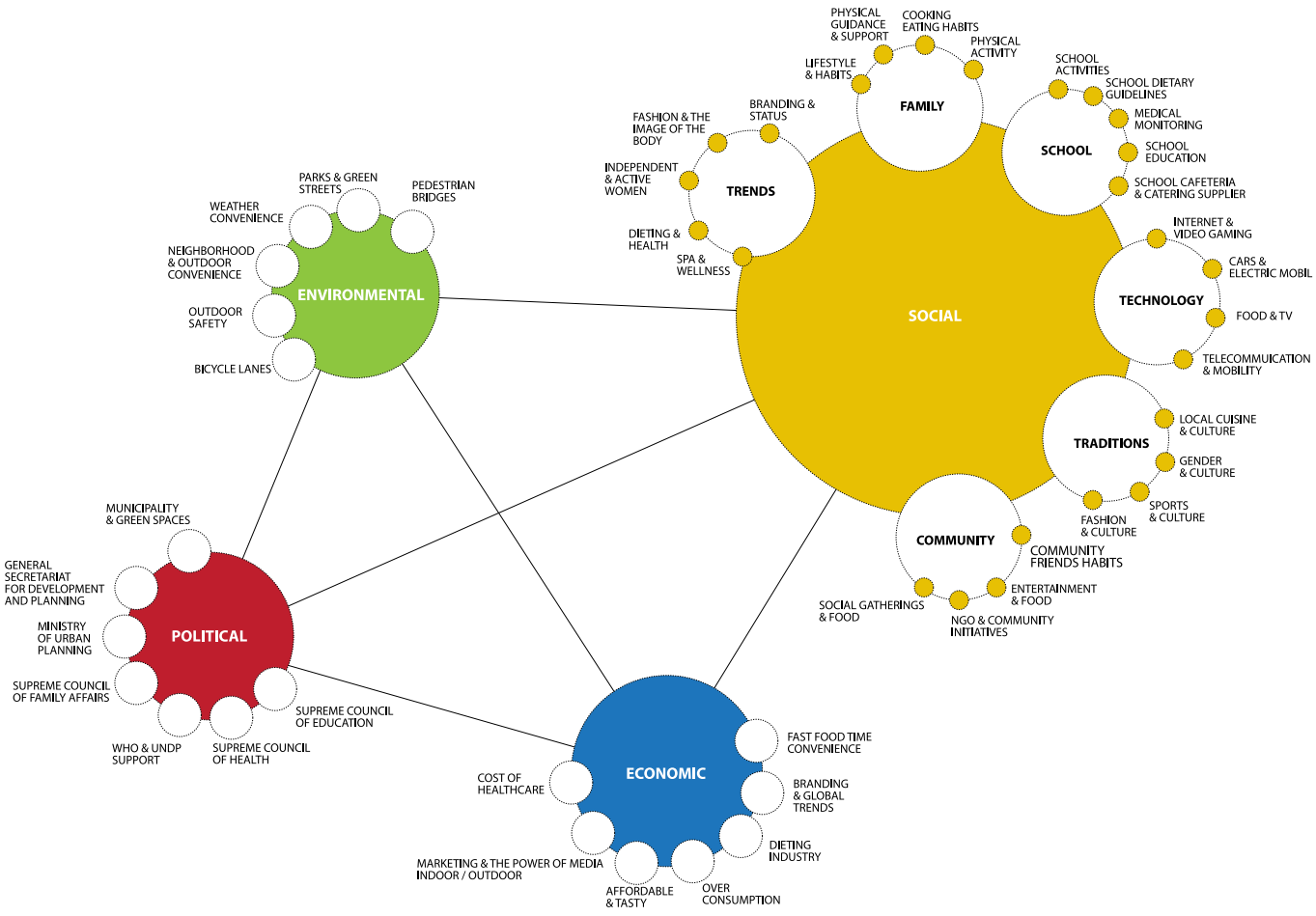


Figure 29 – The second attempt to map the obesity challenge.

After going through the first two mapping exercises, further readings nurtured a broader and deeper understanding on the subject matter. The last mapping version emerged as per figure 30 and the highlighted points rose as interesting area for further investigation.

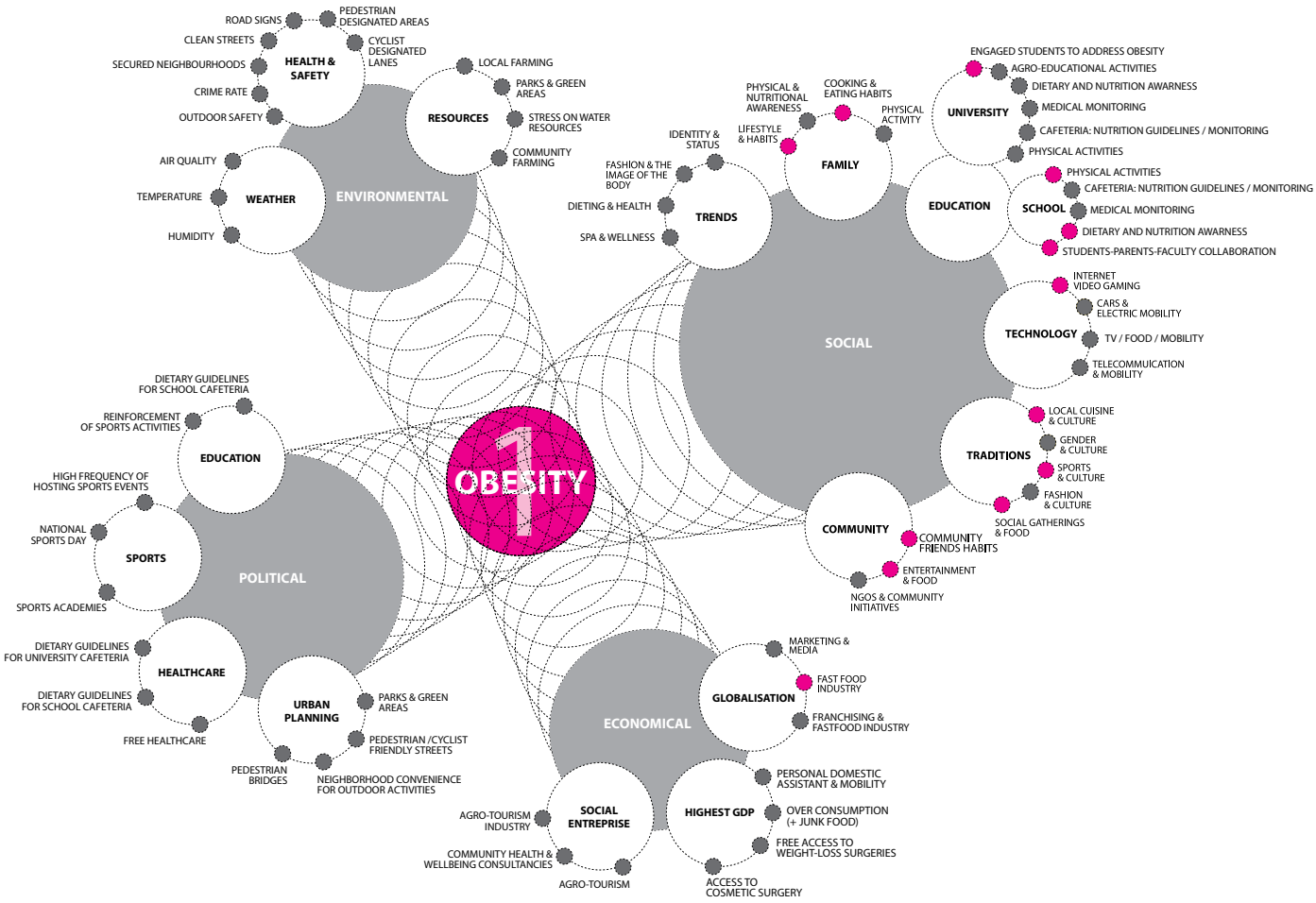


Figure 30 – Mapping obesity and identifying potential areas of engagement.

A reflective exercise shed the light on the interconnectivity of the highlighted topics. Figure 31 is an attempt to highlight the relationship between these points and uncovers a meta-layer beyond the identified four clusters.

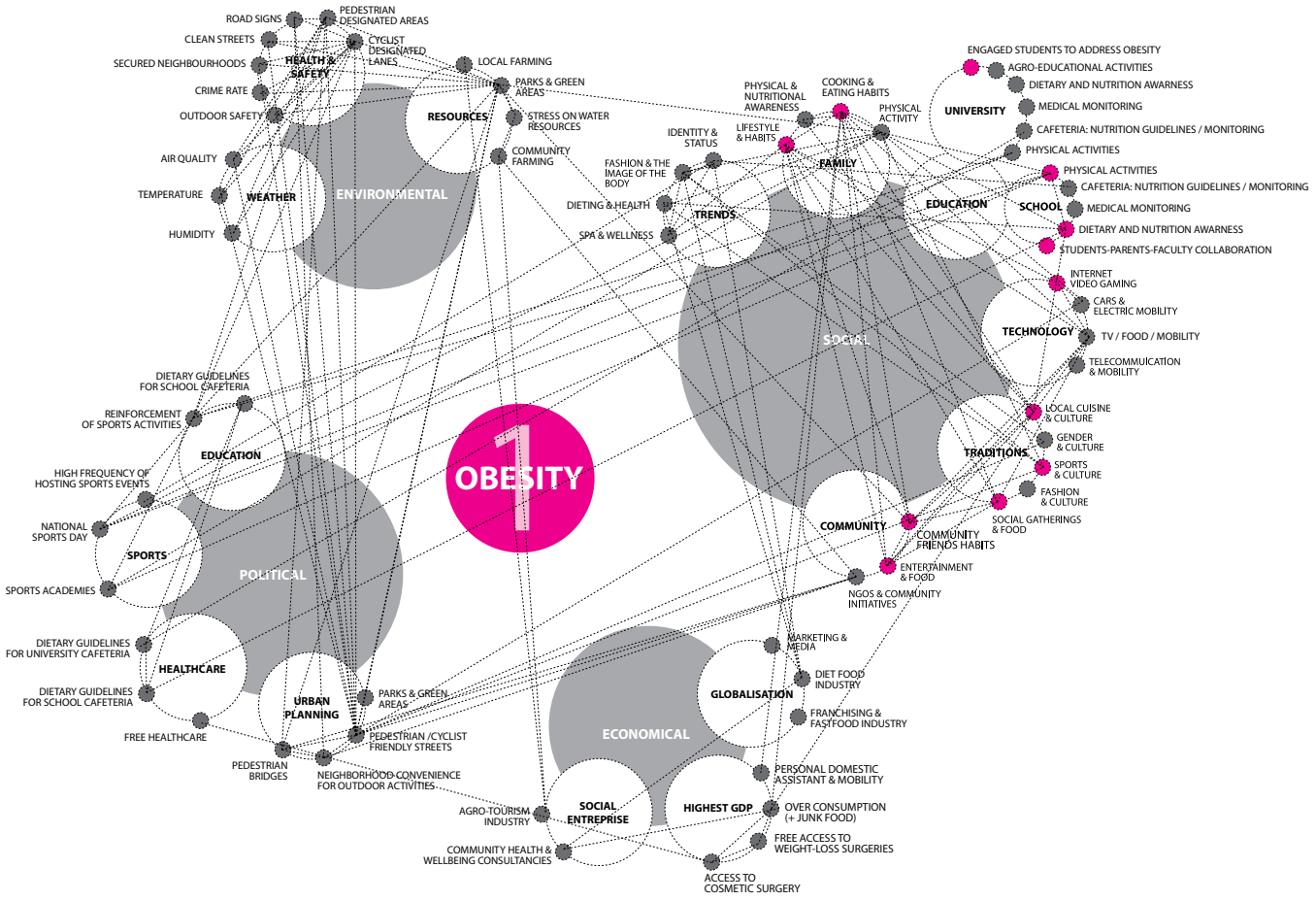


Figure 31 – Interconnectedness of a wicked problem.

Selecting the below six areas was based on the contextual relevance of the topic in addition to the versatility of the theme to be converted into an actionable project.

Afterwards, potential project briefs were formulated around six topics:

1- How can healthy snacks create a counterargument to fast food?
2- How can we diminish the carbohydrate intake?
3- How can we develop the food experience at schools?
4- How can eating and playing intertwine in the school environment?
5- How can we leverage the communication between school administrations and parents?
6- How can slow food from the nomadic times be reintegrated into our fast lifestyle?

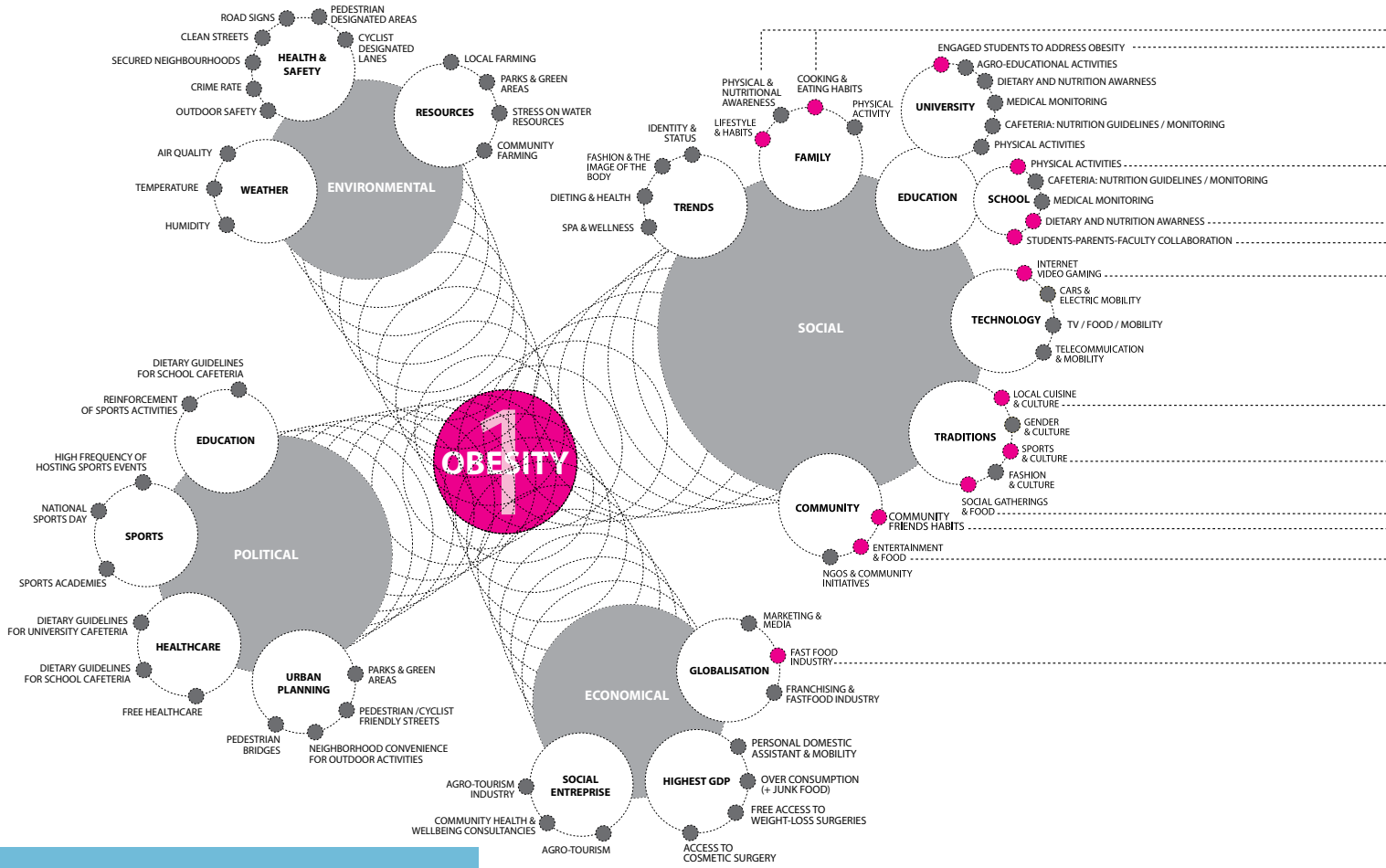
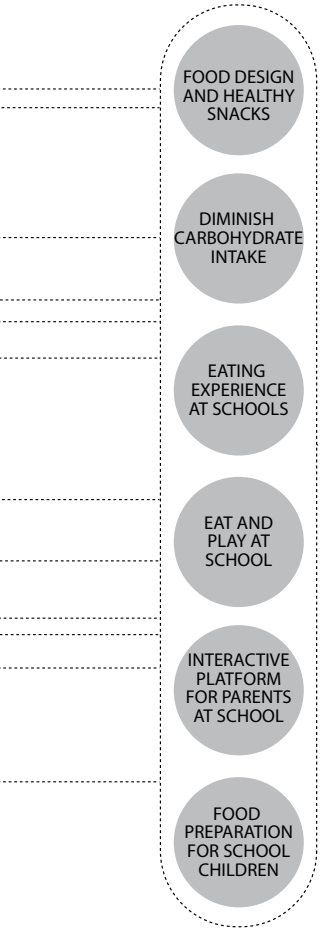


Figure 32 – Articulating potential areas of interest into actionable briefs.



At this point, a personal investigation was set off to explore the potential of each topic. At various points, further literature review was needed to look deeper into different themes and also to generate insights from various interactions.

This individual study included the participation of various faculty from interior and graphic design, mechanical and electrical engineering and social sciences in addition to discussions with a professional chef, architects and other students.

Brief 1: How can healthy snacks create a counterargument to fast food?

The project explored the creation of healthy snacks. Food design provided an experiential opportunity to appeal to the senses with healthy snacks.

Healthy snacks:
Stuffed cherry tomato with finely chopped parsley, mint leaves, olive oil and salt garnished with a leaf of lettuce. The other two cherry tomatos are stuffed with labneh and mint. The salad is presented on a perforated tray in circlar shapes to stabilize the cherry tomatoes.

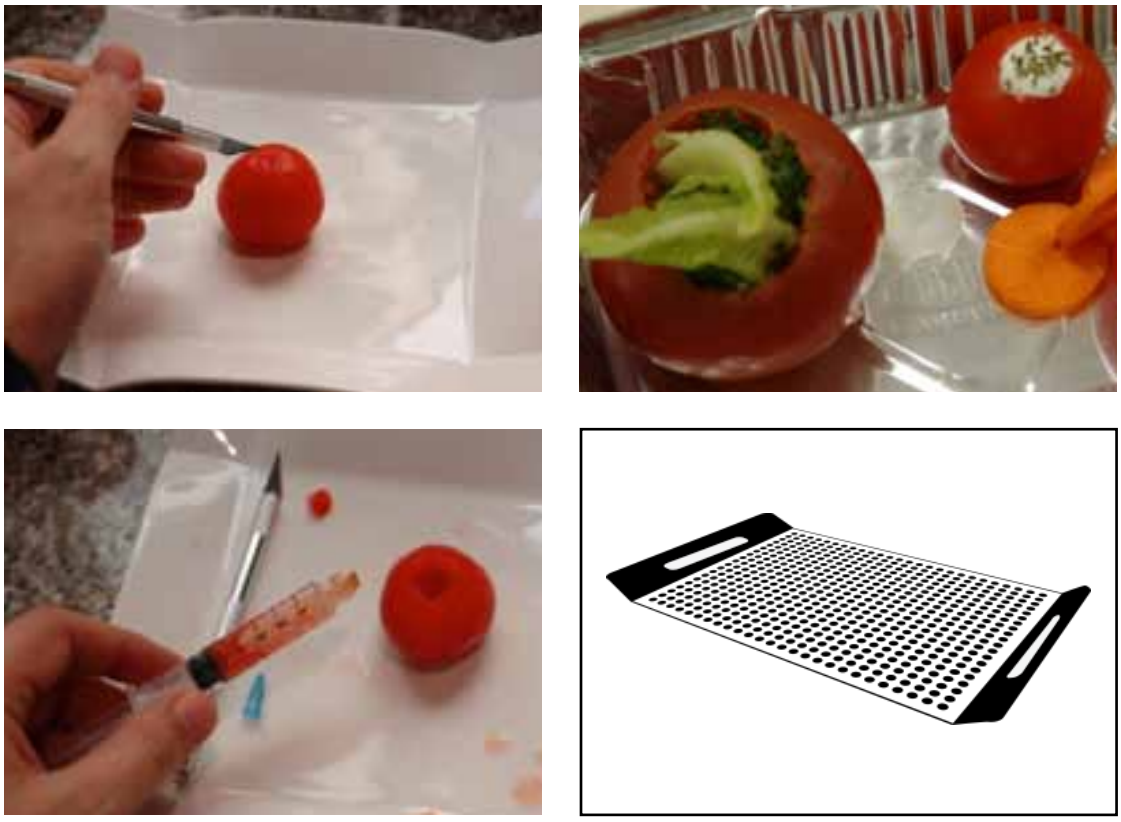


Figure 33- The new Tabouleh salad served on a perforated tray.

Learning from Nutella bread stick and chocolat, what if we can have a healthy snack of minted yogurt with a sesame bread-stick or cucumber?

Literature review:
Jamie Oliver, openideo.org, Food design, Marije Vogelzang, Ann Cooper, Molecular gastronomy, elBulli.

Figure 34- Healthy snack sample with minted yogurt, sesame bread stick, cucumber or carrot wtih packaging design.

Brief 2: How to diminish the carbohydrate intake?

New Cuttlery | Ruling bread out

The aim of this exploration is to diminish the usage of bread as cutlery.
The following exploration looks into the creation of a new reusable cutlery that is as flexible as bread.

The second prototype tested the picture of the bread printed on the pair of gloves.

Literatrue review:
Edible furniture, Low Carbohydrates diets, Industrial kitchen design

Figure 35- Rapid prototyping technique was used to build a quick sample.

Figure 36- Bread version prototype.

Brief 3: How can we develop the food experience at schools?

The lunch box experience

The idea looks into the creation of a system that endorses behavioral shift for preparing healthy meals for school children.

Literature review:
Industrial design, packaging, healthy snacks, behavioral change, transformative design

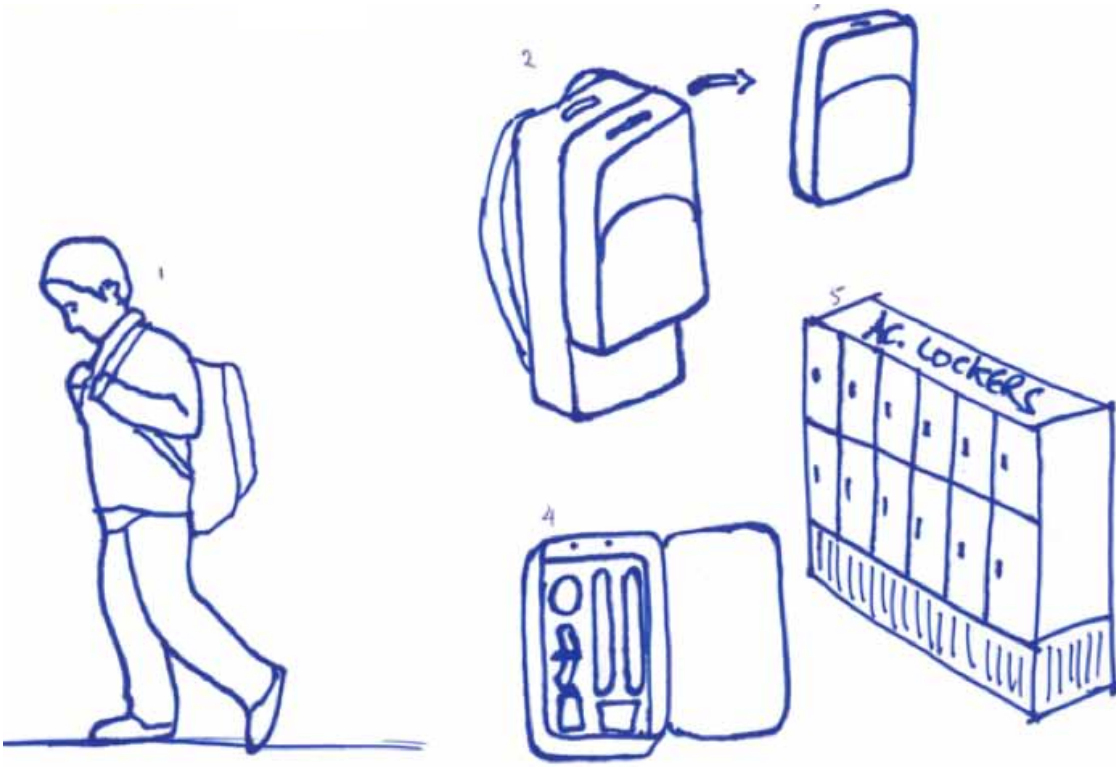


Figure 37- Storage scenario for a lunch box.

Brief 4: How can eating and playing intertwine in the school environment?

PLAY / EAT

What if we bring the video games to the courtyard of the school and place next to them vending machines displaying healthy snacks?

Building upon the previous idea of the healthy snacks and the high interest of young children in video games, an association was built to bring both elelments together to the learning space. The vending machines are free of energy drinks and replaced with fresh unsweetned drink.

A study on developing a childhood obesitiy prevention program, lead by Hamad Medical Corporation in Qatar, revealed that obesity is linked to a "higher reported consumption of sweetened beverages by the obese children compared to non-obese children" (Al-Muraikhi 2010).

Literatrue review:

Childhood obesity in Qatar, physical activity, sedentary lifestyle, role of playing and sugar consumption.

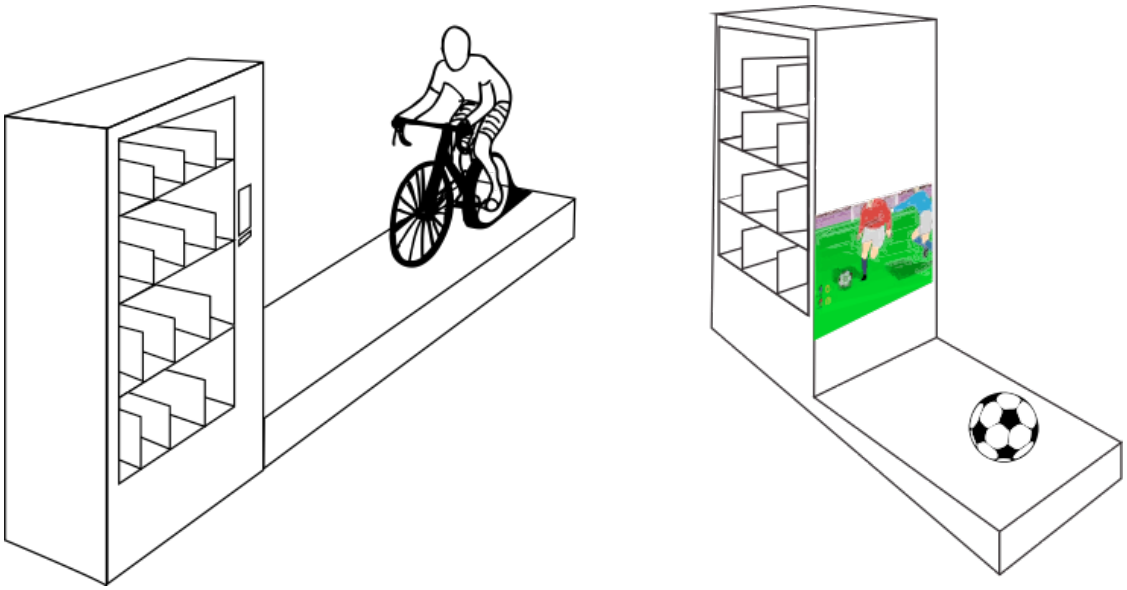


Figure 38- Vending machine displaying fresh and healthy food next to the video games machines.

Brief 5: How can we leverage the communication between school administrators and parents?

TELL ME | STORIES THAT MATTER

TELL ME is a social media platform that brings parents and administrators together to discuss issues and topics that are related to their children's experience at school. Storytelling forms the foundational part of this idea in an oral-based society.

Literature review:
Mobile apps, social media strategy, storytelling, readership in Qatar.

Figure 39- Tell me communication platform for schools.

Brief 6: How can slow food from the nomadic times be reintegrated in our fast lifestyle?

HOT SAND

A contemporary iteration of the nomadic "mendi" sand pit as a slow food experience.

Slow cooking has been a common ritual for nomadic communities including the bedouins. Their lifestyle has drastically changed with the oil and gas discovery. Along with economical prosperity, healthy rituals of the past were overlooked with the influence of a modern lifestyle. This exploration brings the sand-pit back to the dining table.

Literature review:

Rituals of the past, nomads, bedouin, old eating and cooking rituals, thermal conductivity for sand, slow cooking, furniture design, history of cooking.

Figure 40- Desert trip documentation to understand the used material used. The golden piece has an electric heater and it is a new iteration of the coal-fed pit.

Figure 41- Exploring cooking a potato in hot sand.

Figure 42- Cooking wrapped fish filet in hot sand.

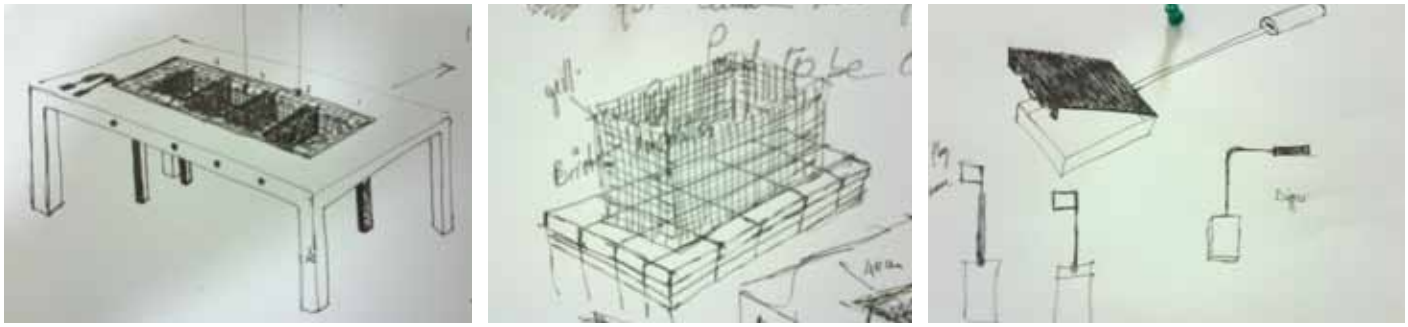


Figure 43- Table with heating system: Sand will be heated, new ustensils and cuttlery will be used for this eating experience.

Figure 44- Various prototypes on the inclusion of a sand-pit in the dining table.

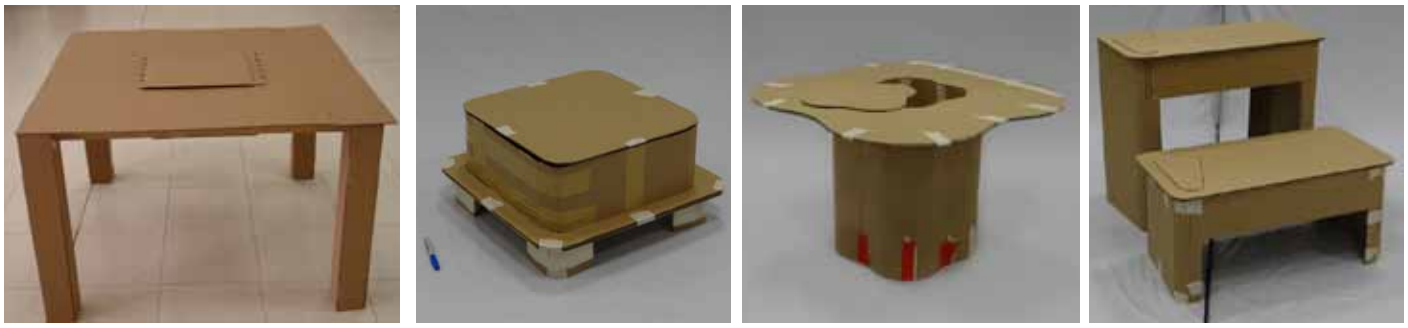


Figure 45- To scale prototype for the sand-pit and the dining tables using corrugated cardboard sheets.

FORMULATING THE TOPIC

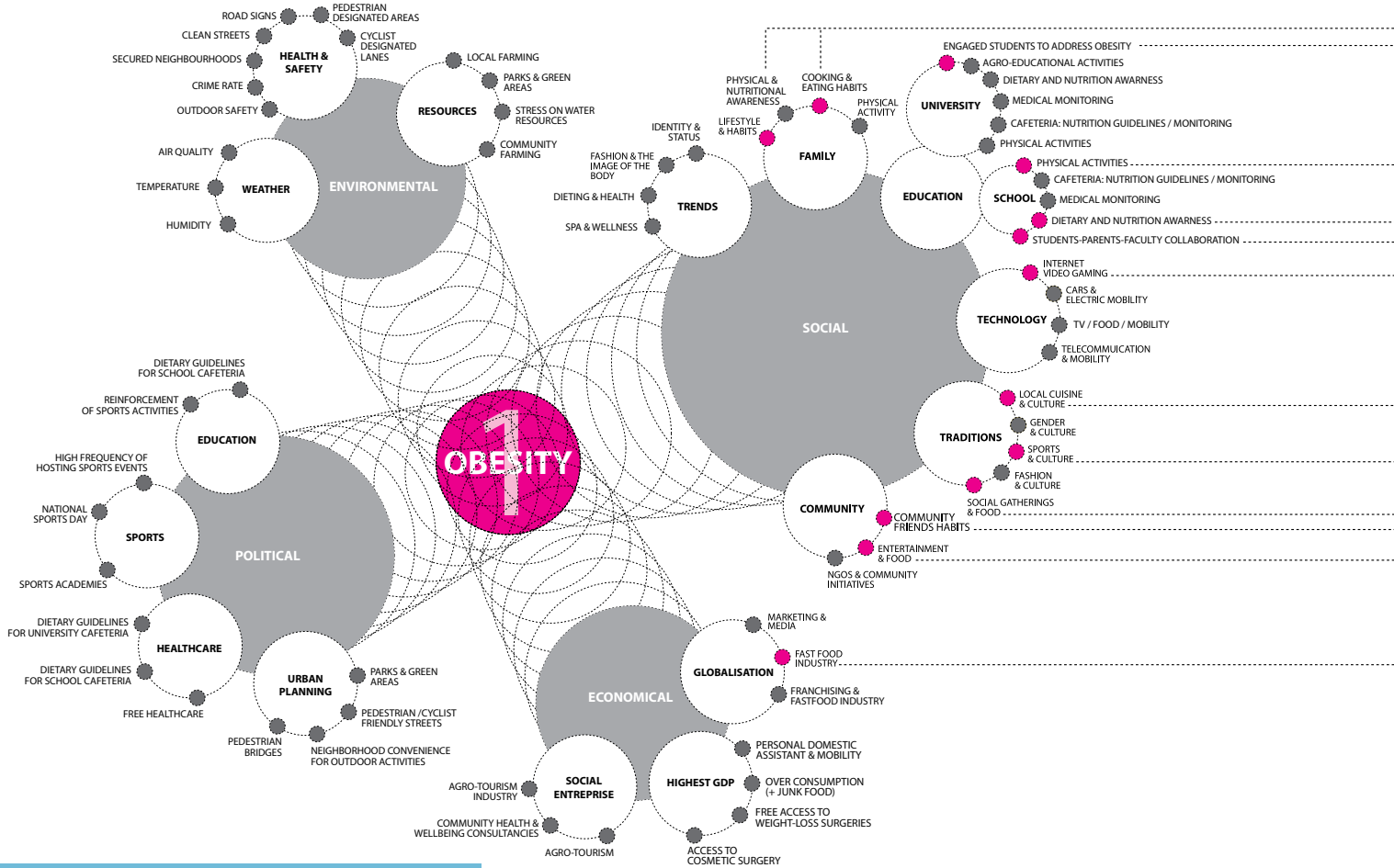
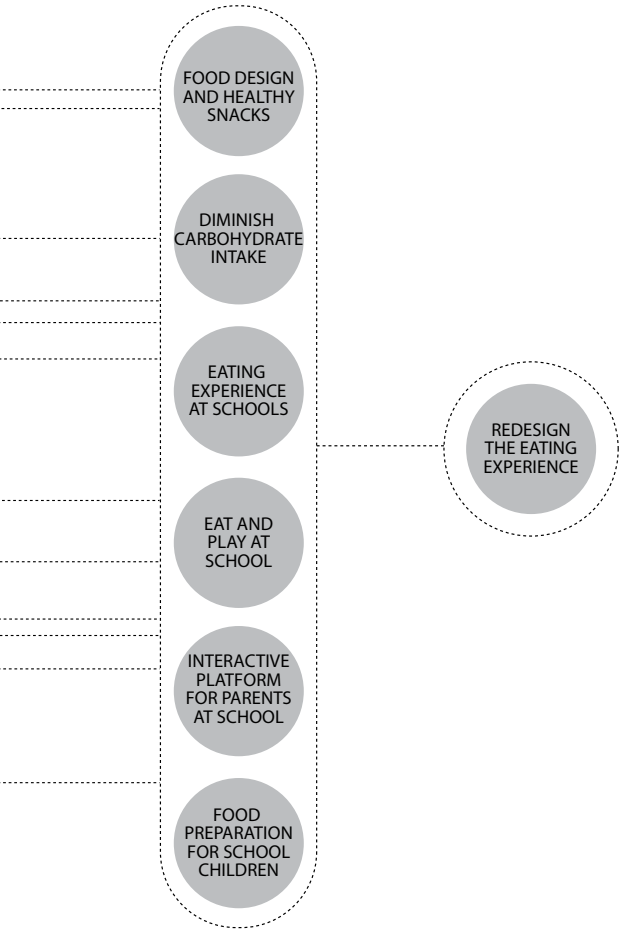


Figure 46 – Migrating from the explored areas of interest and converging into an actionable brief.



After going through an individual design-led exploration and literature review of various themes related to the wicked problem of obesity, the process diverged in the creation of the *redesign of the eating experince* topic as shown in figure 46.

The reframed problem statement remained general, yet actionable. Afterwards, the brief (see figure 47) was pitched to various faculty members requesting to deliver workshops in their courses.

REDESIGN THE EATING EXPERIENCE

Amin Matni | MFA Candidate | VCUQatar

To: Prof. Maja Kinnemark | IDES 201 | Introductory Interior Design Studio
Subject: Request to deliver a workshop
Date: 6 September, 2013

Background information
The project is extended from my MFA thesis and aims to investigate the eating rituals of this region and suggests a new healthy eating experience that embodies the sense of conviviality rooted in Gulf culture.

Learning objectives of the workshop
- Immerse participants in the full cycle of the design thinking process (discover, interpret, ideate, experiment and evolve)1
- Engage in a participatory design experience. It is a user-centered approach as they will design with the user and not for the user.
- Provide another data entry channel for my thesis research through the interviews and Q&A from each group.
- Generate new insights from the prototypes
- Incorporate insights in the second version of my prototypes

The project touches upon the fundamental values of human-centered design, a bias towards action, and a culture of iteration and rapid prototyping.

The topic of "redesign the eating experience" encompasses the emotional and physiological elements of everyday life and encourages experiential prototyping.

Facilitation
To put things in perspective for the students, it will be great to kick-off with an inspirational lecture about the eating experiences/ rituals in parallel to the project briefing.
The workshop requires a lead mentor to concentrate on communicating the instructions (steps of the design process), logistics, and timing and the other person to support regarding the nuances, offering encouragement and providing tips.

Logistics
Each student will be provided with:
- A set of instructions that guide them through each stage of the design process
- Set up the room to facilitate pairing up students
- Corrugated sheets to build the prototypes
- A pan, a stick and a timer to announce when each phase is up

Provisions requested from each student:
- Pens, pencils and markers
- Metal ruler
- Cutter and scissor
- Duct tape and paper glue
- Post-it notes (2 colors: Yellow and Orange)

Brief
The hospitality industry grew considerably in Qatar during the last decade. From fast food to fine dining, the sector has flourished along with the economic growth. International franchises or locally developed concepts mushroomed across the city to cater for their customers from various nationalities.

Within this landscape, our diet relied more on delivered food to our homes and offices or eating in various restaurants. The appeal of the fast food industry has a great impact on our health if we disregard exercising and compensating high calories intake with other balanced and healthy meals at home.

Your task is to create a counter-argument towards the above-mentioned statement. You need to suggest different eating situations that rotate around your user needs.
Your experience can be:
- Contextual and highly vernacular
- A new eating / cooking method
- Emphasis on our relationship with food
- Emphasis on our relationship with objects as we eat, such as chairs, table, floor, cutlery...
- Emphasis on the context and the environment we are eating
- Emphasis on the local rituals and etiquettes

The class will be divided into groups of two students.
Each group will work together in some stages and individually in other

Schedule
Implementing the process is flexible to the provided time for the workshop. If one session is provided, the students will be acquainted to the "Design Thinking" process. If we have more session, then we will have the opportunity to apply the process, attain more reflective prototypes and seed concepts.

1- IDEO. *Design Thinking for Educators,* 2011

Figure 47 – Proposal submitted to VCU faculty to deliver a workshop on the "redesign of the eating experience."

To deliver the inquiry, an educational module was formulated to engage the students from various majors enrolled in different universities with Qatar Foundation. A workshop proposal was prepared and submitted to different faculty members in various branch campuses. Out of the four requests, three faculty members welcomed the workshops in their courses. The first workshop was delivered to sophomore interior design students at Virginia Commonwealth University in Qatar (VCUQ) from the 3rd until the 23rd of October 2012. The second was delivered to sophomore students in the Entrepreneurship course at Carnegie Mellon University in Qatar (CMUQ) on the 12th of November 2012 and the third workshop was delivered to the junior and senior engineering students at Texas A&M University at Qatar (TAMUQ) on the 19th, 20th and 21st of November 2012.

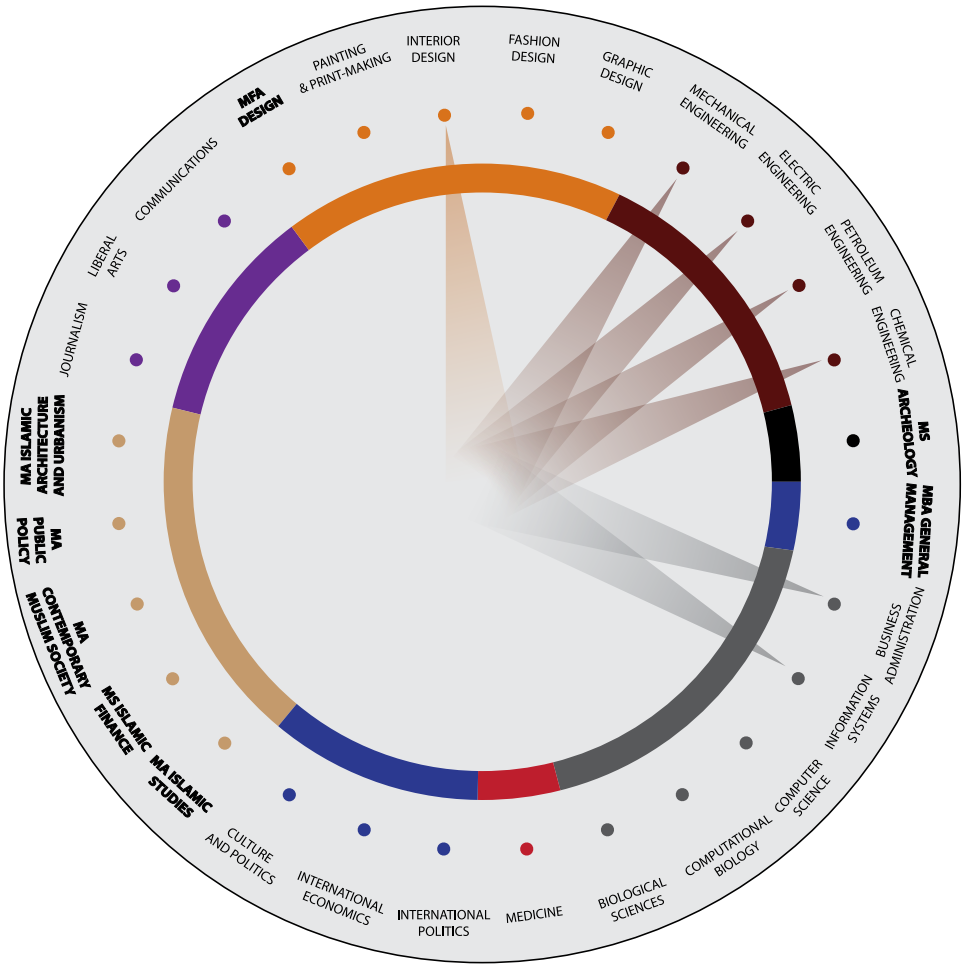


Figure 48- Individual workshops building up toward a multi-disciplinary collaboration for undergraduate students.

The first three workshops were evaluated through an assessment sheet filled by the students at the end of each module. Figure 49 and 50 illustrate the articulation of various topics; the selection of the eating experience topic, the integration of the topic with the process to formulate a toolkit, the implemention of the program with users from various disciplines, the resulting seed output(s) and the evaluated parameters of design thinking.

The three workshops were used as a recruitment channel to enroll interested students for a last multi-disciplinary workshop on the 26th of November 2012. A qualitative evaluation method was used for the last workshop, by means of a recorded conversation with the students as they reflected on the experience. Further details about the evaluation methods will be elaborated on the next chapter.

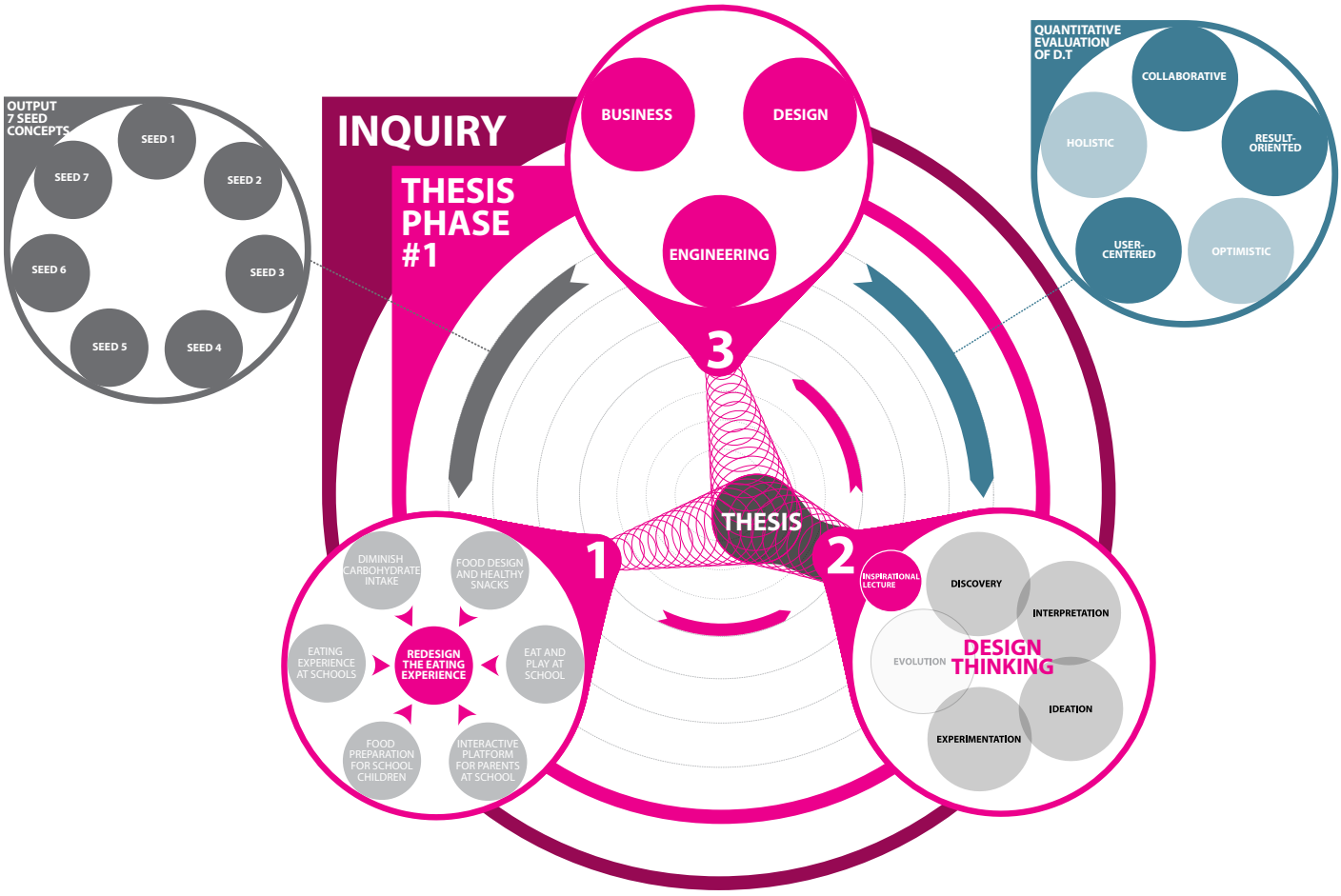


Figure 49 – Mapping phase 1 of the thesis.

The ideal application of this academic inquiry would be to deliver a workshop, or a series of workshops, for a multi-disciplinary audience of undergraduate students. Hybrid teams from various disciplines would collectively discover the sub-challenge with a user-centered approach, interpret their findings, ideate and prototype possible solutions, then evaluate the experience. Unfortunately, there were no accessible educational platforms at Qatar Foundation that could provide these requirements to implement the design thinking method. Needless to say that finding the effective incentives to attract students to attend a new multi-disciplinary off-curriculum educational was a challenging task, considering the available capacity and resources. Consequently, it became more achievable to deliver separate workshops to the design students at VCUQ, the engineering students at TAMUQ and the business students at CMUQ. The first encounter with each discipline provided an opportunity to recruit potential candidates for a final multi-disciplinary workshop.

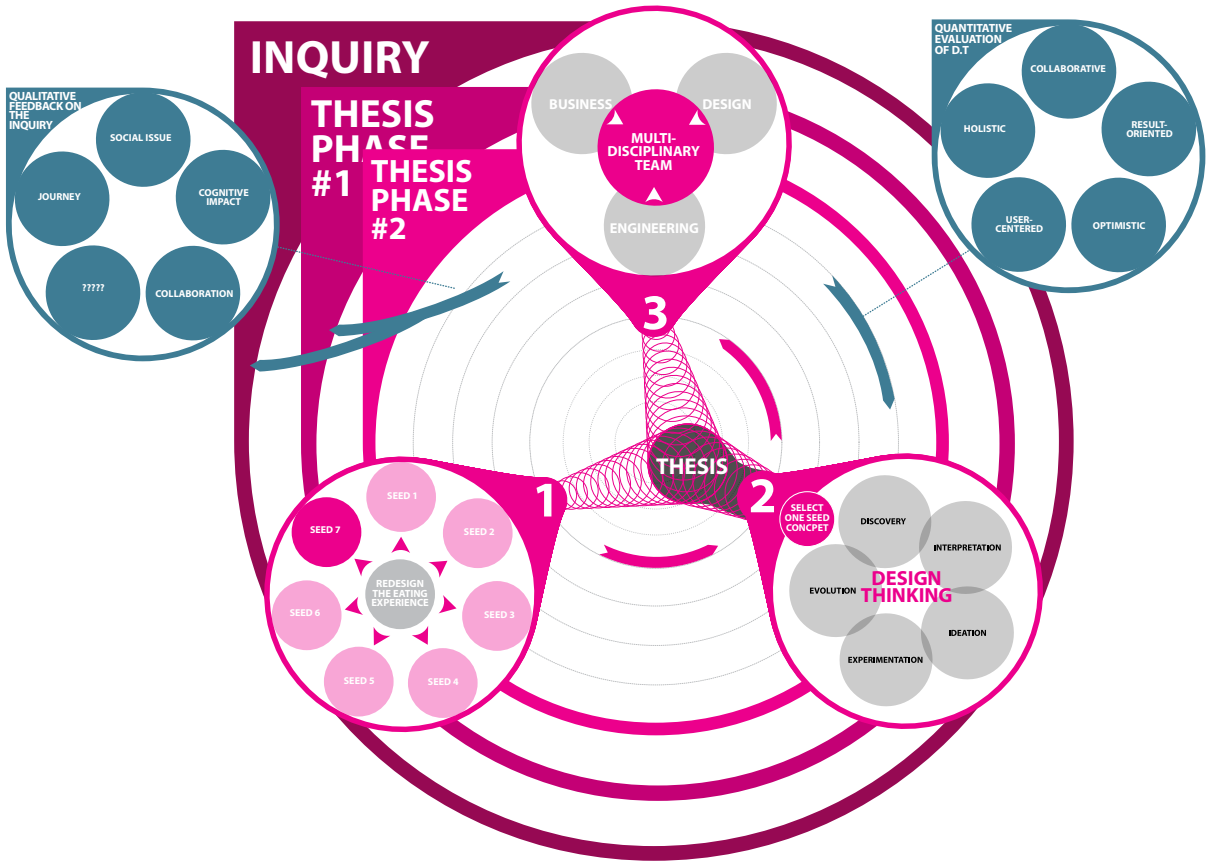


Figure 50 – Mapping phase 2 of the thesis.

FORMULATING THE PROCESS

Formulating the toolkit

Before delivering the workshops as per the provided guidelines from the *Design Thinking for Educators* publication, further development was required to integrate the process (design thinking) with the topic (redesign of the eating experience) to be delivered to the users (undergraduate students from design, engineering and business) in the given time (fall 2012) and space (Qatar Foundation: VCUQ, CMUQ, TAMUQ). *Design Thinking for Educators Toolkit* by IDEO and the *Introduction to Design Thinking* (In one hour) by d.school at Stanford University were used as a reference to recreate a user-friendly toolkit for the students (refer to figure 51). The IDEO toolkit is a diligent method with five phases (discovery, interpretation, ideation, experimentation and evolution). As shown in figure 48, each phase includes a series of steps that were yet to be contextualized on a given challenge in a certain context.

Are you new to Design Thinking? Do you just have a limited period of time for your design project? Or do you want to give someone else a quick overview?

This page is for you.

To get started, use just the highlighted methods. They are the basic set that will lead you through the design process. As you become more familiar with Design Thinking, explore and add more methods to your selection.

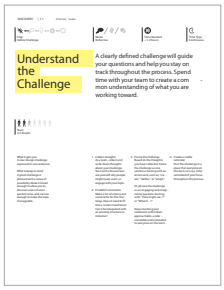
Method Selection

PHASES

DISCOVERY | INTERPRETATION | IDEATION | EXPERIMENTATION | EVOLUTION

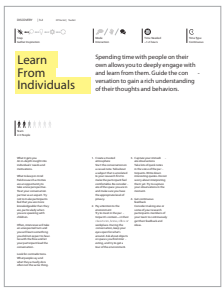
METHODS

1. Define the Challenge



2. Prepare Research

3. Gather Inspiration

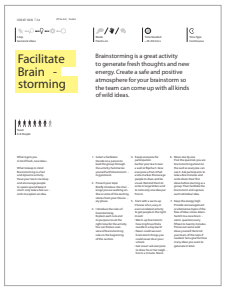


4. Tell Stories

5. Search for Meaning

6. Frame Opportunities

7. Generate Ideas



8. Refine Ideas

9. Make Prototypes

10. Get Feedback

11. Evaluate Learnings

12. Build the Experience

Figure 51 – Design Thinking Method index, Design thinking for Educators 2011.

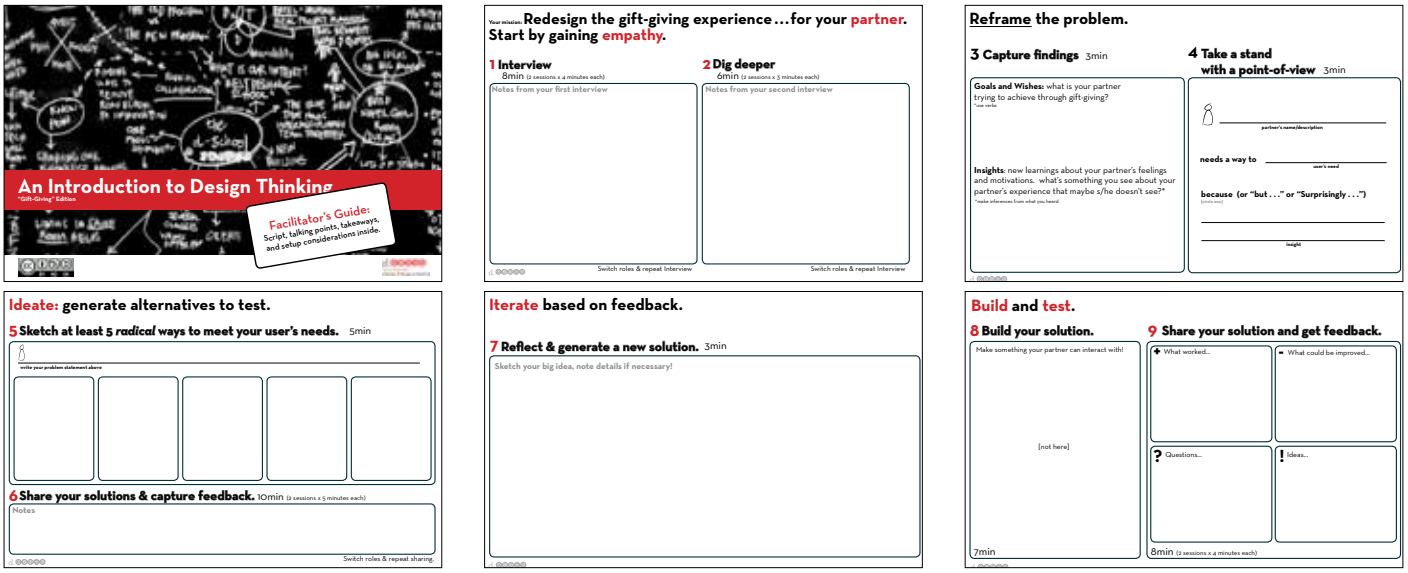


Figure 52- Introduction to Design Thinking in one hour material.
Source: https://dschool.stanford.edu/sandbox/groups/designresources/wiki/ed894/attachments/42143/TheGiftGivingProjectB%26W.pdf?sessionID=279d284171a07bdcd139c9e3dc82a73c8ce0f3aa (accessed on Sept. 2012).

Applying the *Design Thinking for Educators Toolkit* within the given time on the *eating experience* topic would be impossible without a flexible and concise version of the process. The *Introduction to Design Thinking* course from the d.school at Stanford University provided an adequate implementation tool, yet it needed further development and elaboration to fit the topic.

Consequently, both modules were combined to generate a new module formatted in an A3 booklet size. It provided students with a user-friendly toolkit that included the phases and steps of design thinking.

Figure 53- Discovery phase.

Figure 54- Discovery phase.

FORMULATING THE PROCESS
PHASE 1: DISCOVER
STEP A: INTERVIEW 1: FAMILIARIZE

At the start of the workshop, students formed teams of two, three or more depending on the class size. Students interviewed each other. For example, student A interviewed student B for 15 minutes, and would swap roles afterwards for another 15 minutes. The "USEFUL TIPS" paragraph supported the students with directions to be more effective in each step. These tips were from the *Design Thinking for Educators Toolkit*.

The objective of the first interview was to describe what was special about the numerous past eating experiences of their partner and ask what was memorable in them. Inquiring about the sensorial responses was intended to revitalize the memory of the interviewee and bring back the values of those events. Each student wrote their sets of questions and the related replies from their partner. The students were kept informed about the time elapsed, and when it was time to swap roles. After both team members finished the first round of questions, they moved to step B.

STEP B: INTERVIEW 2: DIG DEEPER

Students were asked to review the first interview and circle the replies that were worth learning more about. The main objective of the second interview was to understand the reasons behind the given answers using questions that start with "why."

It was important to understand the reasons behind the behaviors, thoughts and emotions collected in the first interview. Asking multiple questions that start with "why" helped the interviewer to unpack hidden meanings that were hard to remember. They fundamentally empathized toward their interviewee (user). The resulting answers of the second interview unfolded new insights- fundamental new knowledge that shaped the "user-needs" brief. After both team members finished the second round of questions, they moved to Phase 2.

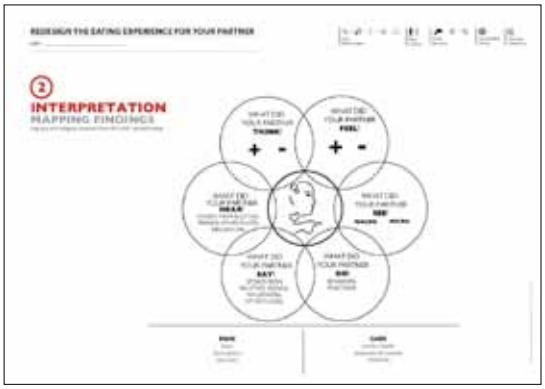


Figure 55- Interpretation phase.

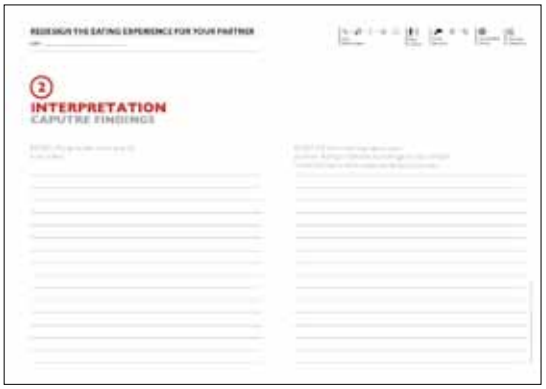


Figure 56- Interpretation phase.

PHASE 2: INTERPRET

STEP 1: EMPATHY MAPPING

Students were provided with an empathy-mapping tool to help them separate various messages from the two interviews. The figure is an adaptation of X-plane's "empathy map." "X-plane is a design consultancy that utilizes visual thinking and people-centered design to clarify complexities and inspire action" (X-plane 2013).

The graph was previously divided into four sections and had the following titles: see, think-feel, hear, say-do. The suggested adaptation splits (think-feel) and (say-do) sections into independent ones.

This graph provided a tool for the students to separate the previously collected information from the interviews and identify key reactions from their users. Making reactions visible was fundamental to identifying key insights.

STEP 2: CAPTURE FINDINGS

After the interviewer digs deeper into interesting areas in the discussion, phase 2 captures those findings into clearly stated sentences. The statements start with "My partner needs a way to" and expresses the needs using verbs, such as "search for comfort, achieve tranquility, eat healthy food, etc.). The aim is to communicate the user-needs with clear, concise and actionable sentences.

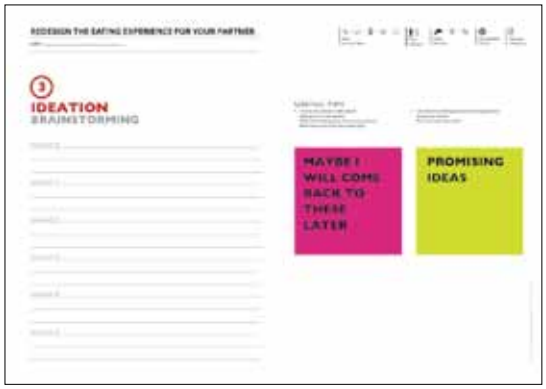


Figure 57- Ideation phase.

Figure 58- Ideation phase.

PHASE 3: IDEATE

STEP 1: BRAINSTORMING

The first step in the ideation phase is to project speculative scenarios and ideas that answer partially or holistically the previously captured insights. The students were encouraged to make real or fictive suggestions without any censorship. Using the post-it notes, they were encouraged to produce a quantity of ideas without self-editing. After producing numerous speculative concepts, the students reflected on them by reviewing the following points:

- Identify the core of the value proposition
- Identify the relevance to the user-needs
- Identify opportunities
- Identify the need for it

In parallel, another analysis will consider the following points:

- The challenges and the obstacles that the ideas face
- Missing points in the premise
- Identification the opponents of the idea

By listing, identifying, evaluating and sorting the ideas, a pool of considerations points out which ideas are worth of further investigation.

STEP 2: SKETCHING

As the students attained, in the first ideation step, a potential written concept that answers the user-needs, they were asked to sketch those ideas. The students were asked to sketch a quantity of ideas, without self-editing, and without being afraid of wrong directions. The ideation process aims at stretching the capacity of students while having the understanding that there are no wrong choices. Being afraid of suggesting a daring possibility will consequently reduce the chances to attain a creative leap.

The tip for students was to consider:

- Sketching the most meaningful and desirable ideas
- Aiming for the quantity of ideas not their quality

The students were asked to share their ideas with their partners and capture the feedback under each sketch. Consequently, the problem-solver (Student A) disregarded undesirable ideas by Student B and vise-versa. The remaining ideas were passed to the next phase for quick prototyping.

PHASE 4: EXPERIMENT

Figure 59- Experimentation phase.

PROTOTYPING

The selected sketches were developed through a quick prototyping exercise. The "build to think" method is a quick iterative tool used to create a visual or 3D representation of an idea to simulate a conversation about it. The provided materials to prototype were corrugated cardboard sheets and building blocks sets. After finalizing the various prototypes, students had to share them with their partners for feedback.

The students were advised to note the following points:
- What worked in the prototypes?
- What can be improved?
- Further questions
- Emerging new ideas

PHASE 5: IMPLEMENT

The last phase in the design thinking process was omitted from the workshop due to time constraints. This step was partially explored in the last multi-disciplinary workshop using Alexander Osterwalder's *Business Model Canvas*. Regarding the three workshops for design, engineering and business administration students, the decision was to focus on need-finding, idea generation and experimentation, without covering the evolution phase.

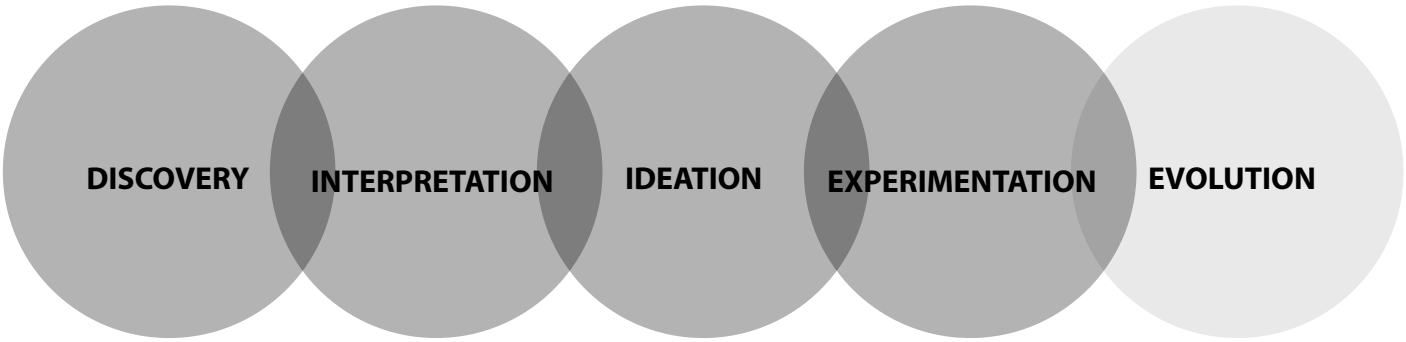


Figure 60- The workshop phases excluding the evolution part.

To summarize the process, the above graph clarifies the various phases covered in the three workshops delivered to VCUQ, CMUQ and TAMUQ students.

My role in all of the delivered workshops is summarized in the following areas:
- Inspire students to convert a social challenge into an innovation opportunity
- Coordinate with faculty on the delivery of the workshops
- Facilitate the workshops
- Request from the students to evaluate the experience

In conclusion, the intergration of the design thinking process and the topic of the *eating experience* provided the resources to create a user-friendly toolkit. The design, business and engineering students used the toolkit during the workshops and addressed the *eating experience* topic. At the end of each session, students assessed the method and the overall experience along with other detailsmentioned in the evaluation sheet.

THESIS APPLICATION

As mentioned earlier, three separate workshops were planned and delivered to design, business and engineering students. Faculty members from three different universities generously provided the time for the workshop to be conducted in their classes. At the end of each workshop, students evaluated the method and the academic experience.

The last multi-disciplinary workshop (MDW) hosted interested students to develop one of the ideas generated from earlier workshops. The following figure provides an overview on the thesis implementation plan.

DESCRIPTION / UNIV./MAJOR	WORKSHOP DATES	CONTACT HOURS	PARTICIPATING STUDENTS	NUMBER OF GROUPS	NUMBER OF STUDENTS PER GROUP	SELECTED SEED CONCEPTS	SIGNED UP FOR MULTI-DISCIPLINARY WORKSHOP	NBR. OF ATTENDED STDS / NBR. OF SIGNED-UP STDS / NBR. OF ALL PARTICIPANTS
VCU/DESIGN	3-23.10.2012	16 hours	21 students	10 groups	2 / 3 students	2 seeds	10 students	
CMU/BUS.	12.11.2012	70 mns	11 students	2 groups	5 / 6 students	1 seed	1 student	
TAMU/ENG.	19-21.11.2012	4 hours	50 students	10 groups	5 students	4 seeds	12 students	
TOTAL			81 students			7 seeds	23 students	
M.D.W	26.11.2012	8 hours	4 students	1 group	4 students	1/7 seeds		4 / 23 / 81 students

Table 1- Descriptive table for each workshop.

WORKSHOP 1: INTERIOR DESIGN MAJOR
VIRGINIA COMMONWEALTH UNIVERSITY QATAR

After preparing the proposal for VCUQ faculty and pitching the idea to Prof. Maja Kinnermark and Prof. Maysaa Al-Mumin to deliver a workshop in the Interior Design class, they agreed to host the workshop for three weeks instead of one session. The workshop was delivered to the sophomore Interior Design students from the 3rd of October until the 7th of November 2012.

Six sessions were delivered to 21 students in the studio course, with approximately 16 contact hours. The class was divided into 9 groups of 2 students, and 1 group of 3 students.

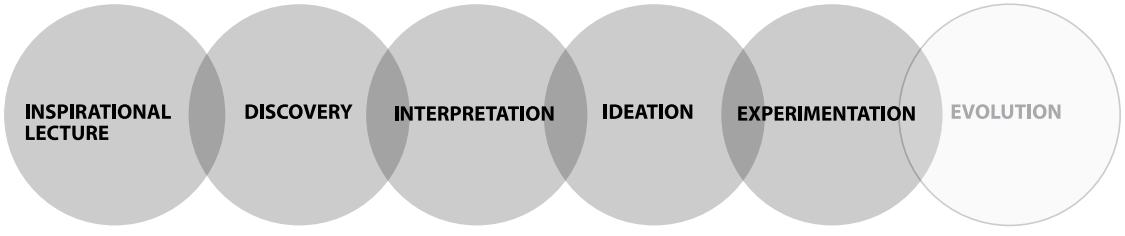
21

16 CONTACT HOURS

02 SEED CONCEPTS

10 SIGNED UP FOR MULTI-DISCIPLINARY WORKSHOP

WORKSHOP STRUCTURE



20 mns lecture on the eating experience, slow food and design thinking

1- Interview (1h)
- Conduct the first interview
- Highlight needs and interests
- Conduct the second interview
- Dig deeper into the needs
- Gain Empathy with the user

2- Reframe the problem (5h)
- Capture insights and needs
- Take a stand: A point of view
- Reframe the problem
- Tell the story

3- Ideate (3h)
- Brainstorm with "what ifs"
- Sketch the ideas
- Share your solution

4- Iterate (1h)
- Reflect and generate a new solution

5- Build and test (5h)
- Build your prototype
- Think small and fast
- Share your solution
- Get feedback

6- Tell your story (1h)

Figure 61- VCUQ workshop factsheet and structure.

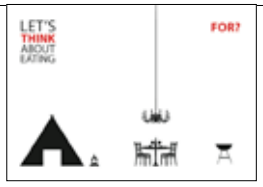
SETTING THE STAGE

The workshop started with an inspirational lecture to build the identity of the workshop and reflect with the students on the topic of the *eating experience* and the *design thinking* process. The students were asked to consider themselves as experiential designers rather than interior designers. The suggestion pointed to an inclusive engagement on the tangible and the intangible elements of the eating experience. In parallel, an introduction was given to the components of a designed experience while reviewing the notion of the platform, front stage, back stage, act or performance that involves actors, a script and a period at a given space.

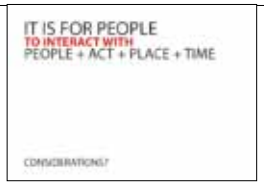
The front stage meant the structure or framework needed to deliver the act for the user by the performers. Whereas the back stage holds the hidden resources needed to facilitate the delivery of the act. Then, trained personnel will perform specific actions in a given timeframe.

The topic of the cooking and eating habits of the nomads, settlers and sea voyagers highlighted the evolution of the eating experience and the cooking methods was discussed in a 30-minute presentation. Below the slides shared with the students.

Slide 1 - A suggestive mindshift for the students.



Slide 2 - Suggesting various eating situations.



Slide 3 - An eating experience is a performance with various elements.

Slide 4 - The eating experience and the relationship between content and context.

Slide 5 - Terminologies, disciplines and the HCD.

Slide 6 - A collaborative process.

Slide 7 - Various eating situations

Slide 8 - "Blind Date", a "designed" eating experience with Marije Vogelzang and MFA students at VCUQ.

Slide 9 - Eating and cooking rituals of nomads and bedouins.

Slide 10 - Various systematic eating experiences.

Slide 11 - "Designed" eating situations by Marije Vogelzang.

Slide 12 - Suggestive and exploratory situations.

Slide 13 - Deep empathy for the user to generate relevant adn meaningful content.

Slide 14 - A result-oriented workshop.

Figure 62- Slides for VCUQ lecture.

At the end of the lecture, the project brief as mentioned below was distributed and reviewed by the students to initiate a comprehensive start.

REDESIGN THE EATING EXPERIENCE

Amin Matni | MFA Candidate | VCUQatar

IDES 201 | Introductory Interior Design Studio | Maja Kinnemark
Duration: 3 weeks | M-W | 1.40 - 5 pm |

Background information
The project is extended from my MFA thesis and aims to investigate the eating rituals of this region and suggests a new healthy eating experience that embodies the sense of convivality rooted in Gulf culture.

Learning objectives of the workshop
- Immerse participants in the full cycle of the design thinking process (discover, interpret, ideate, experiment and evolve)[1]
- Engage in a participatory design experience. It is a user centered approach as they will design with the user and not for the user.
- Provide another data entry channel for my thesis research through the interviews and Q&A from each group.
- Generate new insights from the prototypes
- Incorporate insights in the second version of my prototypes

The project touches upon the fundamental values of human-centered design, a bias towards action, and a culture of iteration and rapid prototyping.

The topic of "redesign the eating experience" encompasses the emotional and physiological elements of everyday life and encourages experiential prototyping.

Facilitation
To put things in perspective for the students, it will be great to kick-off with an inspirational lecture about eating experiences/ rituals in parallel to the project briefing.
The workshop requires a lead mentor to concentrate on communicating the instructions (steps of the design process), logistics, and timing and the other person to support regarding the nuances, offering encouragement, and providing helpful tips.

Logistics
Each student will be provided with:
- A set of instructions that guide them through each stage of the design process
- Set up the room to facilitate pair up students during the project
- Corrugated sheets to build the prototype
- A pan, a stick and a timer to announce when each phase is up

Provisions requested from each student:
- Pens, pencils and markers
- Metal ruler
- Cutter and scissor
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- Post-it notes (2 colors: Yellow and Orange)

Brief
The hospitality industry grew considerably in Qatar during the last decade. From fast food to fine dining, the sector has flourished along with the economic growth. International franchises or locally developed concepts mushroomed across the city to cater for their customers from various nationalities.
Within this landscape, our diet relied more on delivered food to our homes and offices or eating in various restaurants. The appeal of the fast food industry has a great impact on our health if we disregard exercising and compensating high calories intake with other balanced and healthy meals at home.

Your task is to create a counter-argument towards the above mentioned statement. You need to suggest different eating situations that rotate around your user needs.
Your experience can be:
- Highly vernacular, supporting the local culture
- A new eating / cooking method
- Stresses on our relationship with food
- Stresses on our relationship with objects as we eat, such as chairs, table, floor, cutlery...
- Stress on the context and the environment we are eating
- Sress on the local rituals and etiquettes

The class will be divided into groups of two students.
Each group will work together in some stages and individually in other stages of the process.

1- IDEO, *Design Thinking for Educators*, 2011

The project is divided into the following stages:

1- INTERVIEW
Each member of the group will interview the other person twice. You will alternate roles from interviewer to interviewee in order to understand your partner's needs, desires and what they look up to in this eating experience. The key issue to be clarified in this step is that you are designing, you are understanding your user.
It is important to gain empathy with your partner, think and feel as if you are in their shoes. Sitting next to each others, the interface is less formal than an interview and it is more like a conversation. Focus on stories
Hints to ask:
- Your most memorable place / space you enjoyed a meal
- Ask more about that moment, dig deeper
- With whom you were, how did you feel...think, do...say about it?

2- REFRAME THE PROBLEM
- Capture findings: Goals / wishes / insights
- Take a stand with a point of view

3- IDEATE
- Sketch at least 5 ways to meet your partner's needs
- Share your solution and capture findings

4- ITERATE
- Reflect and generate a new solution

5- BUILD AND TEST
- Build your prototype (think small, think fast, do quickly)
- Share your solution
- Get feedback

6- REFLECTIONS AND TAKEAWAYS

Timeline
The project is running for 3 weeks, two sessions / week.

Session 1: Wednesday 3 October, 2012
- Project launch
- Introductory seminar
- Interview 1

Session 2: Monday 8 October, 2012
- Interview 2
- Reframe the problem
- Ideate (homework)

Session 3: Wednesday 10 October, 2012
- Ideate and Iterate
- Build small prototypes

Session 4: Monday 15 Ocotber, 2012
- Build

Session 5: Wednesday 17 Ocotber, 2012
- Build

Session 6: Monday 22 October, 2012
- Build

Session 7: Wednesday 24 October, 2012
- Exhibit and present

Figure 63- Project brief.

Figure 64- Reviewing the A3 booklet and noting that each step starts and ends with a pan/stick bang.

Figure 65-Student A interviewing Student B for 15 minutes before the role swap is done afterwards.

Afterwards, the A3 booklets were distributed to the students and each step was reviewed and explained. The discussion started on the user-centered approach of design thinking and the importance to understand the user-needs. The intereviews provide a point of departure to identify user-needs which will be captured in the problem statement. Students were asked to formulate their own problem based on the interaction with their partner. As explained, once the problem statement is formulated, the student will engage in the *what if* exercise and ideate potential solutions. Later on, these ideas will be sketched and prototyped.

After explaining the process, students started the workshop with the discovery phase and the interviews, as shown in figure 64. Figure 65 and 67 show the interview sequence, the role alternation between an interviewer and an interviewee and the provided time for each activity.

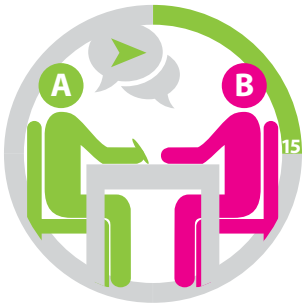


Figure 66- Interview 1: Student A interviewing Student B for 15 minutes.

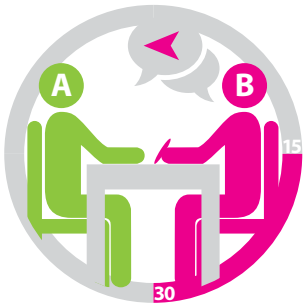


Figure 67- Interview 2: Student B interviewing Student A for 15 minutes.

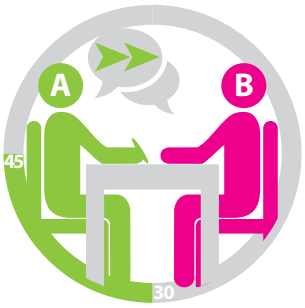


Figure 68- Interview 3: Digging deeper: Student A interviewing Student B for 15 minutes.

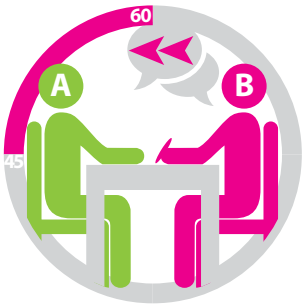
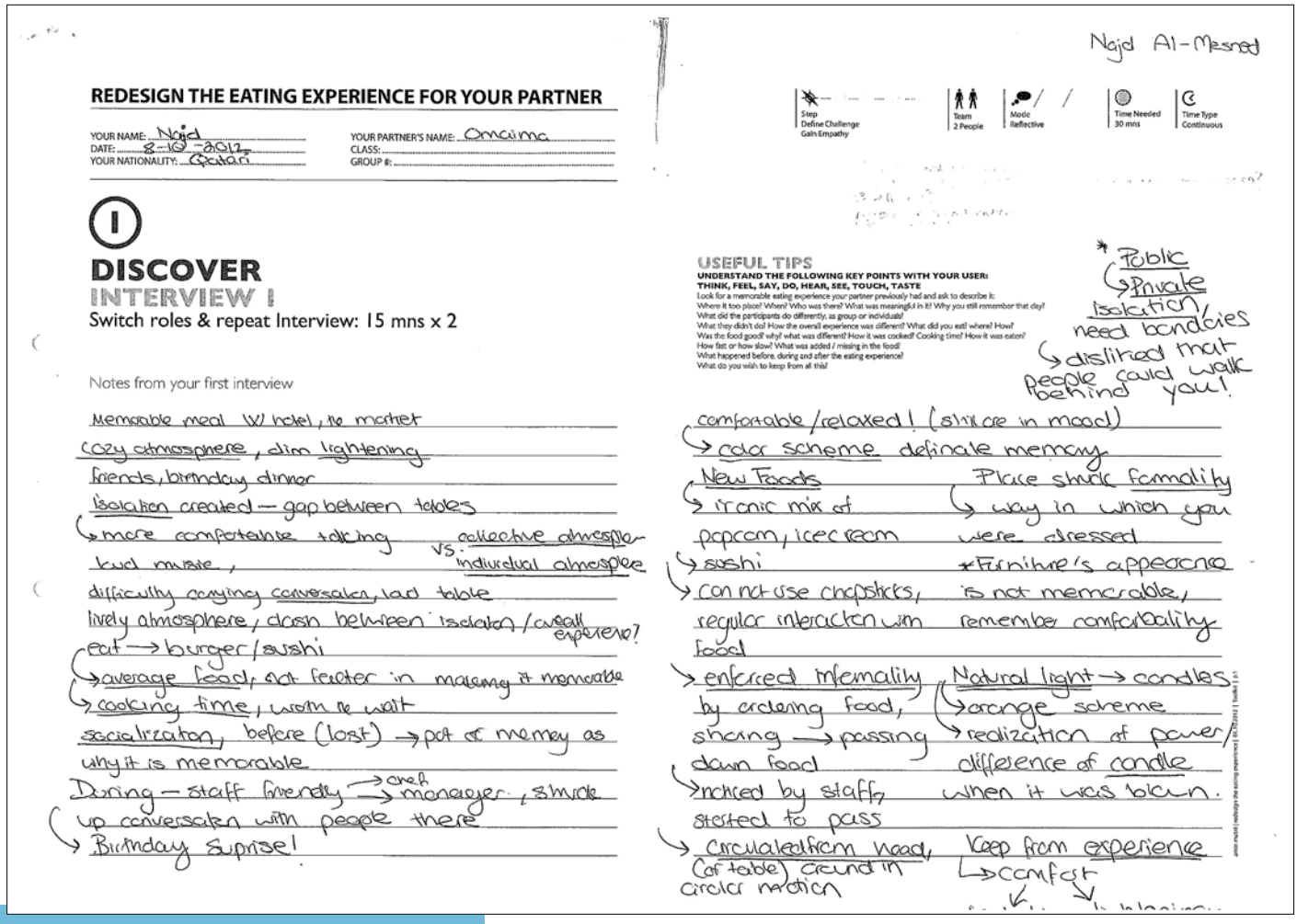


Figure 69- Interview 4: Digging deeper: Student B interviewing Student A for 15 minutes.

Below a sample questionnaire from Najd who had Omaima as her partner.



REDESIGN THE EATING EXPERIENCE FOR YOUR PARTNER

YOUR NAME: Najd
DATE: 8-10-2012
YOUR NATIONALITY: Qatari
YOUR PARTNER'S NAME: Omaima
CLASS:
GROUP #:

1

DISCOVER

INTERVIEW I

Switch roles & repeat Interview: 15 mns x 2

Notes from your first interview

Memorable meal W/ hotel, no market
cozy atmosphere, dim lightening
friends, birthday dinner
Isolation created — gap between tables
↳ more comfortable talking collective atmosphere vs. individual atmosphere
loud music,
difficulty carrying conversation, long table
lively atmosphere, drain between isolation / overall experience?
eat → burger / sushi
↳ average food, not factor in making it memorable
↳ cooking time, worth the wait
socialization, before (lost) → part of memory as why it is memorable
During — staff friendly → chef manager, shook up conversation with people there
↳ Birthday Suprise!

Najd Al-Mesned

Step: Define Challenge, Gain Empathy
Team: 2 People
Mode: Reflective
Time Needed: 30 mns
Time Type: Continuous

USEFUL TIPS

UNDERSTAND THE FOLLOWING KEY POINTS WITH YOUR USER:
THINK, FEEL, SAY, DO, HEAR, SEE, TOUCH, TASTE

Look for a memorable eating experience your partner previously had and ask to describe it:
Where it too place? When? Who was there? What was meaningful in it? Why you still remember that day?
What did the participants do differently, as group or individuals?
What they didn't do? How the overall experience was different? What did you eat? where? How?
Was the food good? why? what was different? How it was cooked? Cooking time? How it was eaten?
How fast or how slow? What was added / missing in the food?
What happened before, during and after the eating experience?
What do you wish to keep from all this?

* Public ↳ Private
Isolation / need borders
↳ distract that people behind could walk you!

comfortable / relaxed! (similar in mood)
↳ color scheme definate memory
New Foods
↳ ironic mix of popcorn, ice cream
↳ sushi
↳ can not use chopsticks, regular interaction with food
↳ enforced informality by ordering food, sharing → passing down food
↳ noticed by staff, started to pass
↳ Circulated from head, (of table) around in circle motion

Place shock formality
↳ way in which you were dressed
*Furniture's appearance is not memorable, remember comfortability
Natural light → candles
↳ orange scheme
↳ realization of power difference of candle when it was blown.
Keep from experience
↳ comfort

Figure 70- Sample page of the discovery phase.

During the interviews, almost half of the class targeted their questions toward the user-needs and the other half drifted their attention to the user-wants. I provided an example where a user-needs to experience the sense of family during the eating experience and wants to eat with different family members.

Students were advised to focus on the needs and dig deeper in the second interview by asking questions that start with *why*. This approach will help revealing the reasons behind the user-wants, in case they emerge in the first interview.

Once this step was over, students reflected on their findings from the Q&As and highlighted potential themes to formulate the ingredients of a user-centered problem statement.

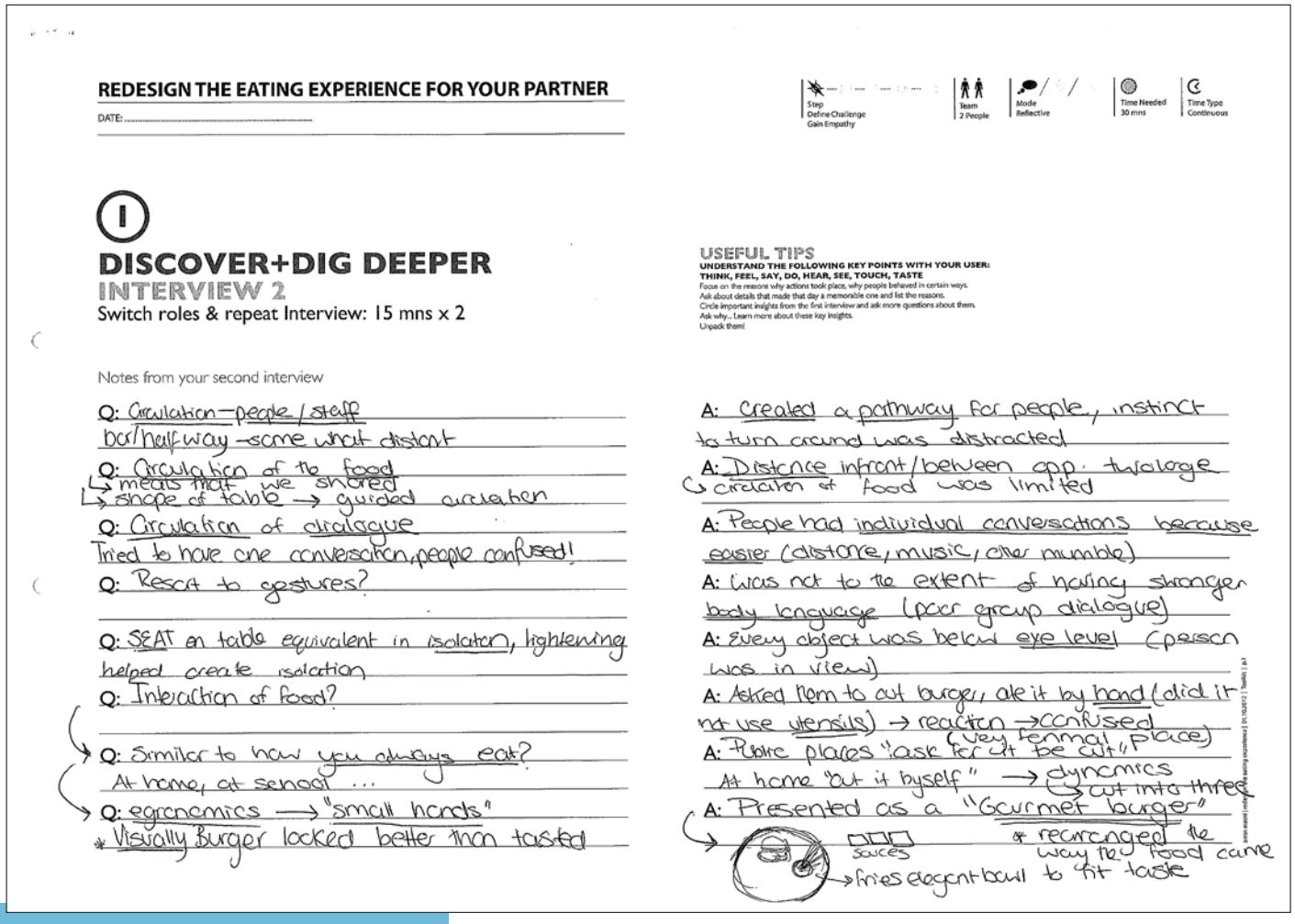


Figure 71- Sample page of the discovery phase part 2.

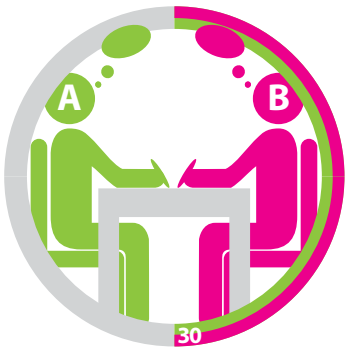


Figure 72- Reflecting and mapping the interview findings.

In addition, the X-plane graph provided a tool to isolate their findings based on the actions, thoughts, emotions and sensorial inputs of the users. This step helped the students to apply and understand user-needs, and define the core ingredients of their problem statement.

Students were provided thirty minutes to map the findings and interpret them. Each student worked alone on this step to reflect on the content and postulate their findings. Below the sample page of step 2 from the same student.

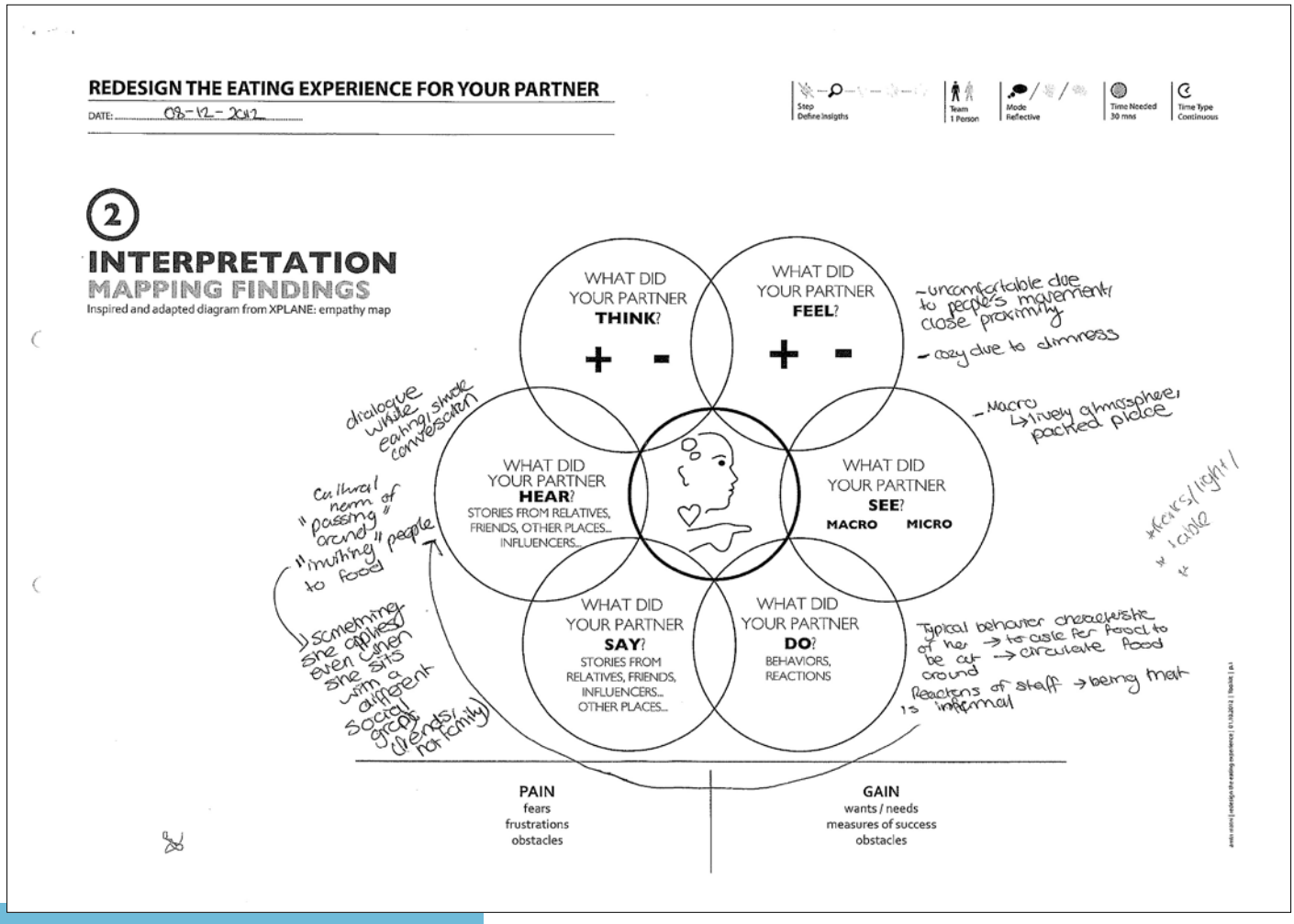


Figure 73- Mapping the user-insights using X-plane model.

During this part, almost half of the class remained confused. They were not previously exposed to an ill-defined problem. They were engaged in previous projects were they had a defined or relatively defined design problem in the brief. Hence, they would jump into the inspiration phase through looking into precedents using the Internet and heuristically ideate possible scenarios.

In this workshop, not having a defined and tangible problem statement at the beginning of the inquiry to directly engage and ideate for was unfamiliar to their learning experience. Students were uncomfortable with the level of ambiguity at this stage and this inquiry put them outside their comfort zone.

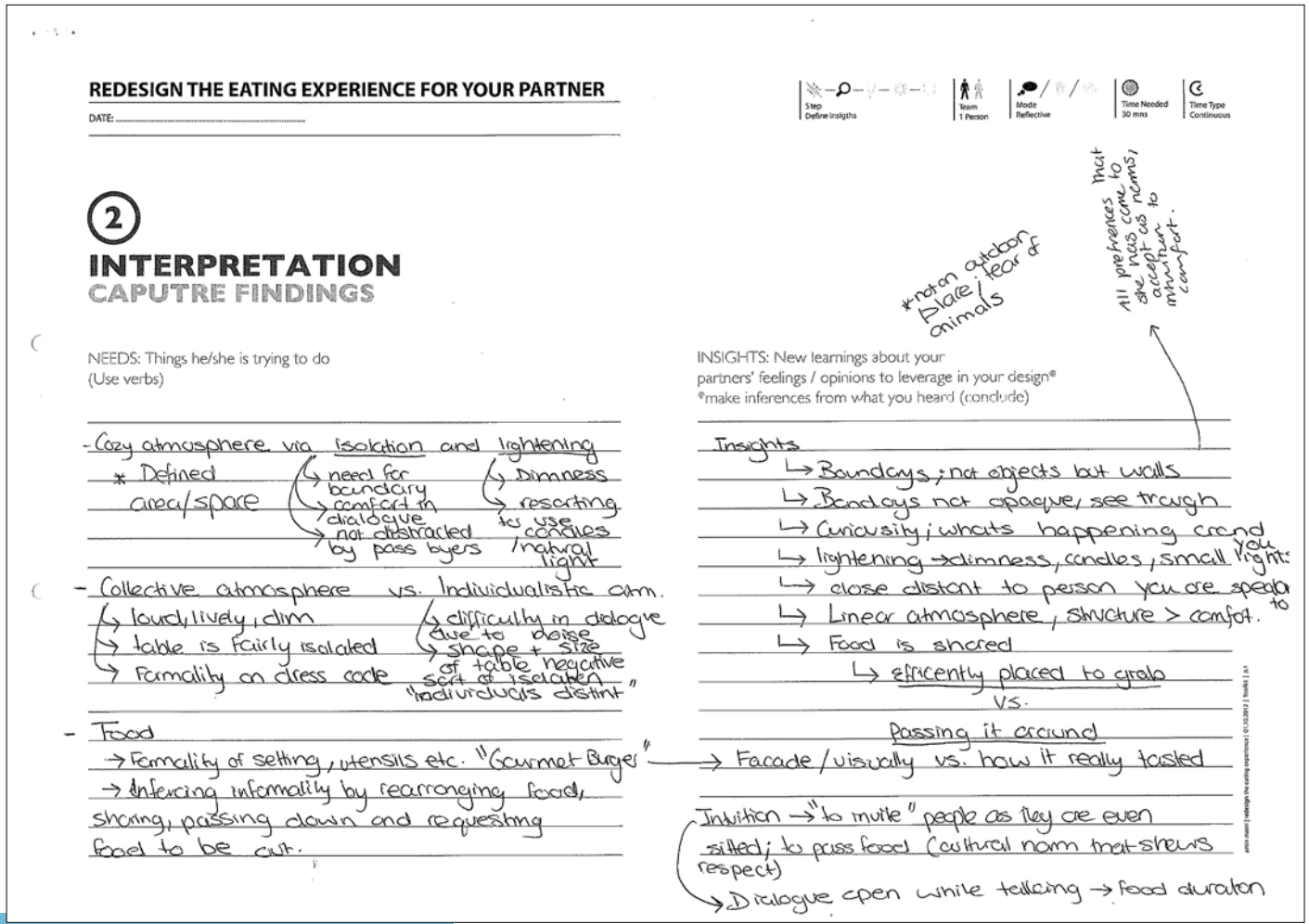
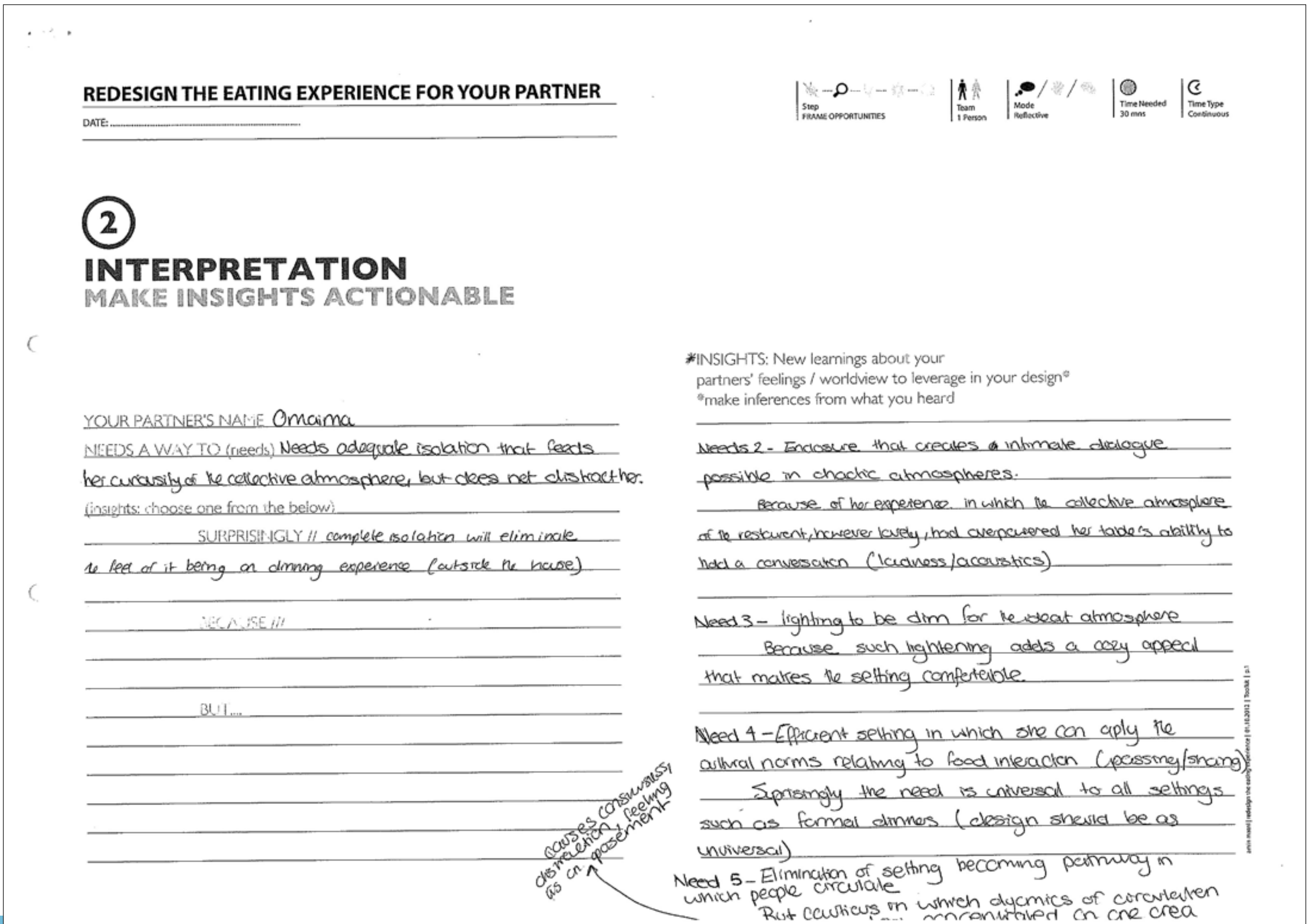


Figure 74- Capturing the user insights.

After reflecting and interpreting the findings from the interviews, each student engaged in the problem statement formulation using "My partner ….. needs a way to …… because / surprisingly ….." format. The below figure showcases how the same student developed the problem statement of her partner.



REDESIGN THE EATING EXPERIENCE FOR YOUR PARTNER

DATE:

Step FRAME OPPORTUNITIES | Team 1 Person | Mode Reflective | Time Needed 30 mns | Time Type Continuous

2

INTERPRETATION

MAKE INSIGHTS ACTIONABLE

YOUR PARTNER'S NAME Omaima

NEEDS A WAY TO (needs) Needs adequate isolation that feeds her curiosity of the collective atmosphere, but does not distract her.

(insights: choose one from the below)

SURPRISINGLY // complete isolation will eliminate the feel of it being an dinning experience (outside the house)

BECAUSE //

BUT...

causes consciousness/ distraction/ feeling as an harassment

INSIGHTS: New learnings about your partners' feelings / worldview to leverage in your design

*make inferences from what you heard

Needs 2 - Enclosure that creates a intimate dialogue possible in chaotic atmospheres.

Because of her experience in which the collective atmosphere of the restaurant, however lovely, had overpowered her table's ability to hold a conversation (loudness/acoustics)

Need 3 - lighting to be dim for the ideal atmosphere

Because such lightening adds a cozy appeal that makes the setting comfortable.

Need 4 - Efficient setting in which she can aply the cultural norms relating to food interaction (passing/sharing)

Surprisingly the need is universal to all settings such as formal dinners (design should be as universal)

Need 5 - Elimination of setting becoming pathway in which people circulate

But cautious in which dynamics of circulation concentrated on one area

Figure 75- Converting insights into a brief.

At this point, the students were asked to share their findings through storytelling. Students were asked to present their findings in the format that they find best. In the below presented example, Betina engaged her colleagues in the story as she gave them blindfolds to cover their eyes, and told the story of Emilie who once went for a dinner with her parents to a completely dark restaurant. The restaurant aimed at offering its customers a similar experience to blind people. The interview revived a memorable eating experience and deep feelings while Emilie was at school and living with her parents. Those meaningful moments generated in Emilie a new understanding of what blind people experience in their lives, and Betina wanted to capitalize on those feelings and memories. Students shared their findings at the end of this step. Through storytelling and role-playing, students related to Emilie's perspective (user), what insights Betina was trying to build upon to formulate her problem statement.

Figure 76- Bettina engages other students while she narrates the user-insights and brief formulation.

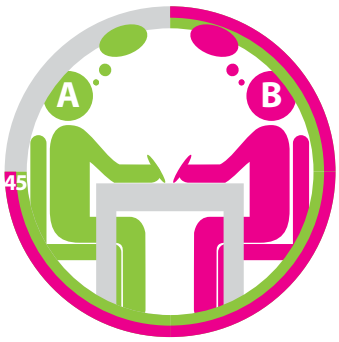


Figure 77- Individual ideation step.

Once the problem statement was formulated, the anxious students felt more relaxed and started to ideate possible solutions through the *what if* exercise. At this step, students were encouraged to formulate an abundance of questions without editing themselves and focusing on the appropriate solution. Forty five minutes were provided to complete this step. Below you will find the ideation phase from Najd's booklet.

Many students were challenged at this stage as they were used to sticking to the first idea they came up with. In addition, it seemed unorthodox for the students at this ideation stage to express their thoughts in a design project using literature. Usually, designers use visual thinking and utilize mood boards, storyboards and sketches to express their thoughts. Furthermore, the students felt uncomfortable producing a quantity of ideas using literature.

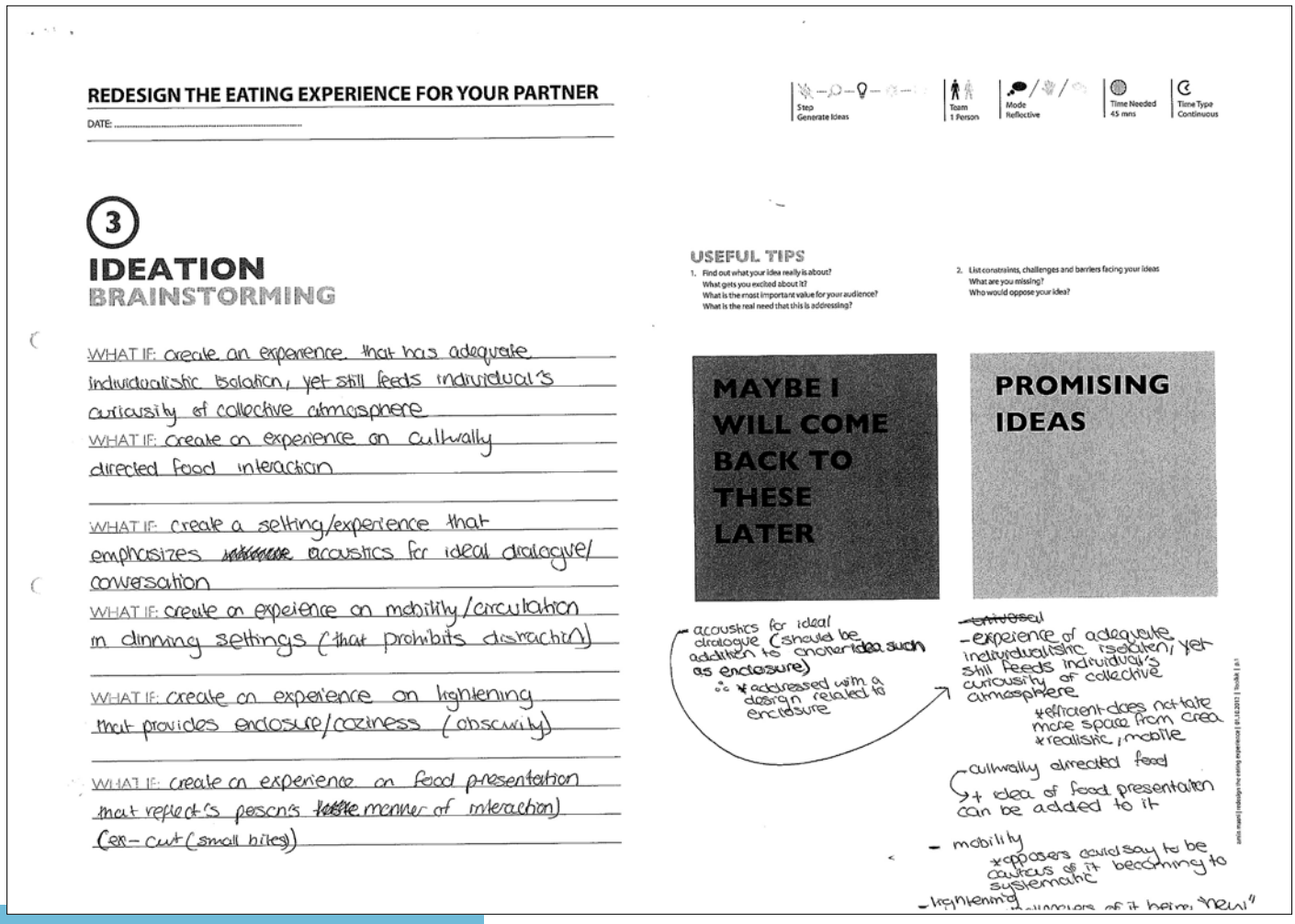


Figure 78- Sample brainstorming step.

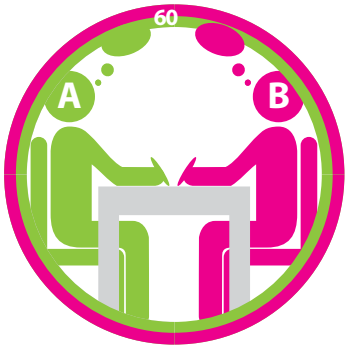


Figure 79- Ideation dynamics.

After the ideation and brainstorming phase finished, students moved to sketching the speculative solutions previously generated in what if scenarios. Moreover, encouraging the students to aim for an abundance of sketches helped them to get less attached to the first and dearest ideas. At this point, a higher level of clarity and meta-cognition eased the students' anxiety level. They sensed that each sketch holds meaning for the user and potential to be explored in various ways. They went through this step in sixty minutes and each team member worked alone in their booklets.

The students related to the scaffolding steps of the process and realized that they are familiar from this point onwards with the idea development steps. Below are sample pages from the same student expressing the ideation phase through sketching.

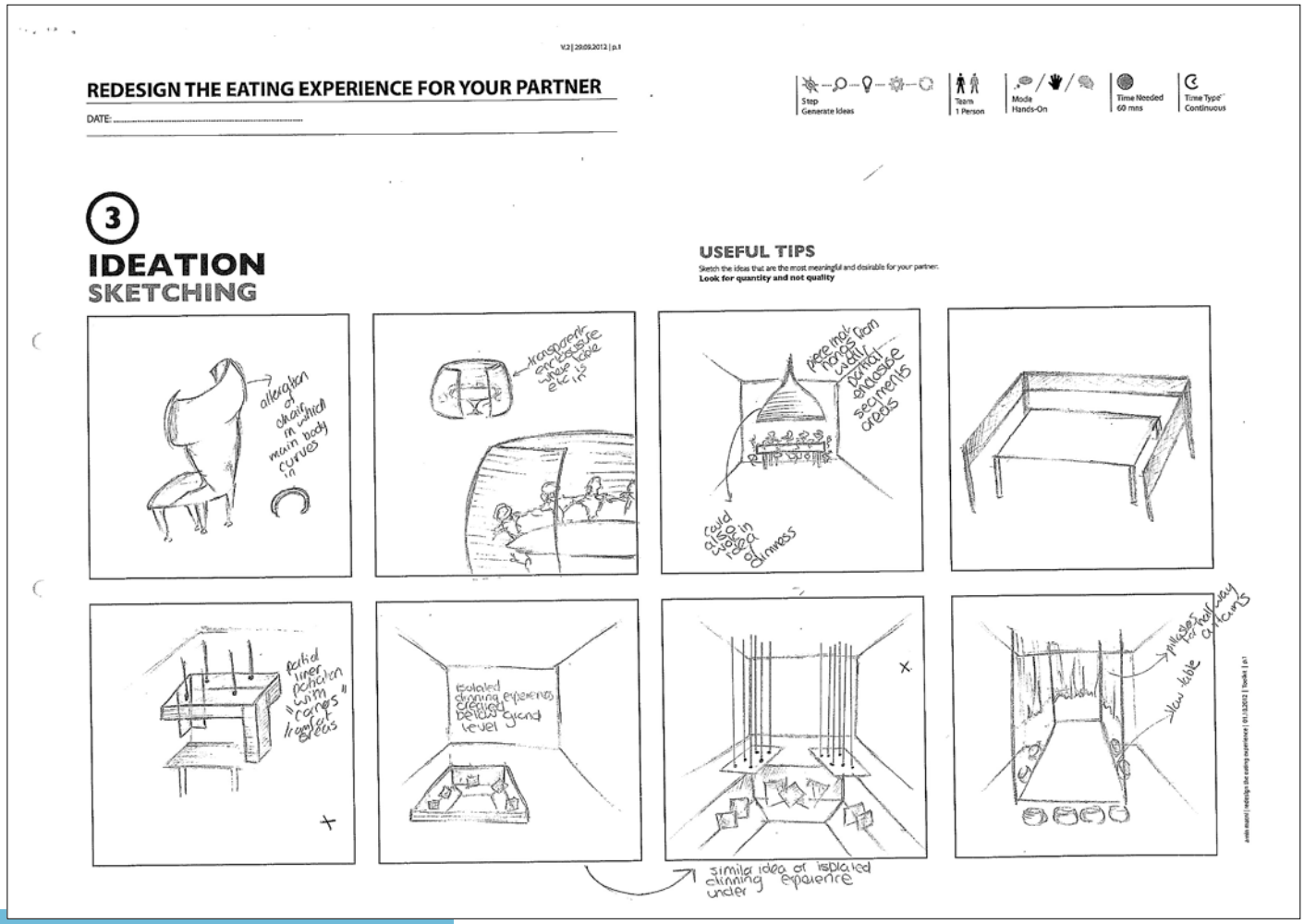


Figure 80- Ideation phase and the sketching step.

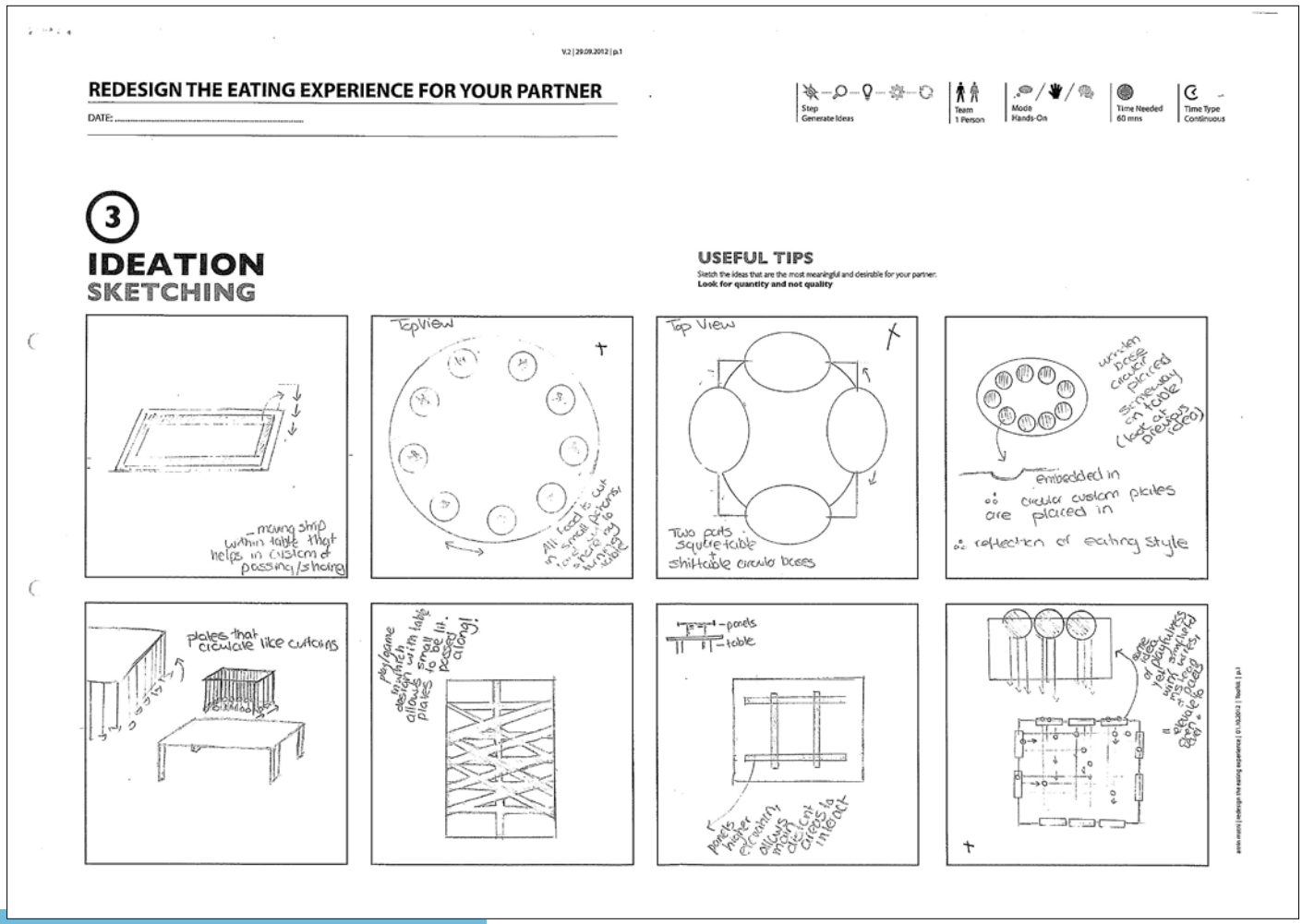


Figure 81- Ideation phase and the sketching step.

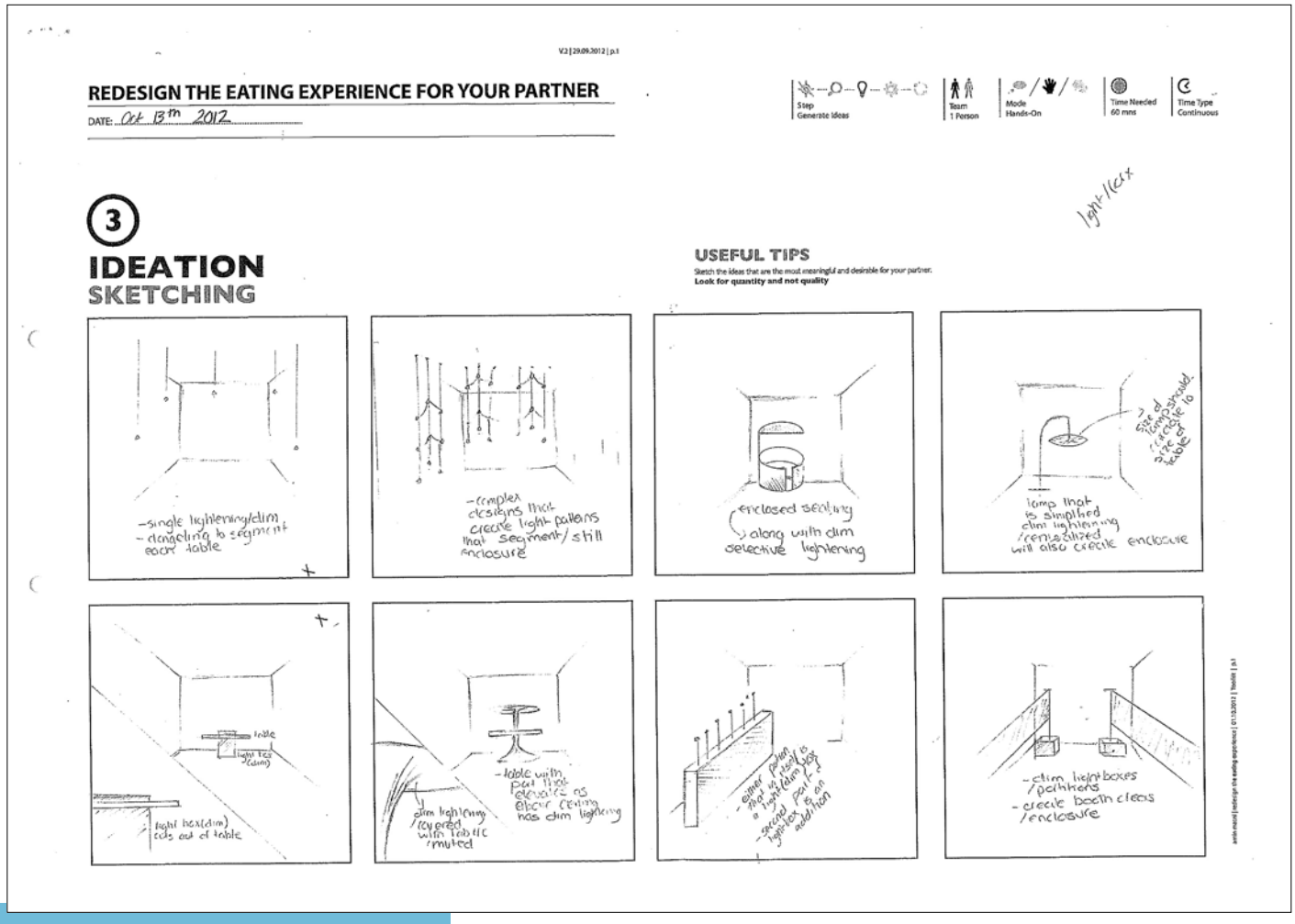


Figure 82- Ideation phase and the sketching step.

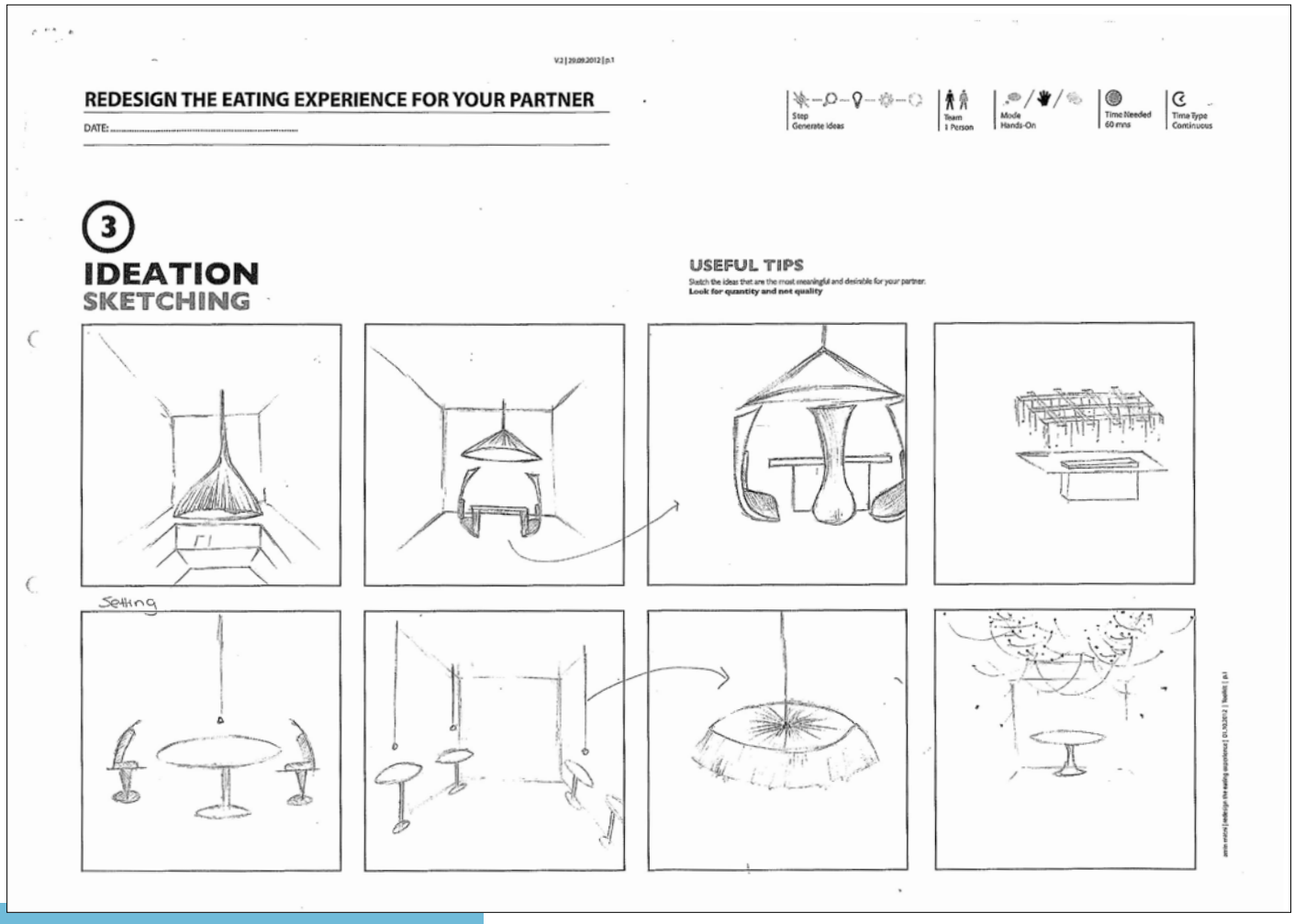


Figure 83- Ideation phase and the sketching step.

These sketches explored various directions formulated in the ideation literature. They concretized the core interests and needs of the interviewee through various scenarios. Each sketch holds the potential for an in-depth exploration and it was left to each team to discuss each direction. After diverging in the ideation phase, each team member reviewed their sketches and selected a few options with their partner. The feedback was important to narrow down the generated ideas and to pass to the rapid prototyping step.

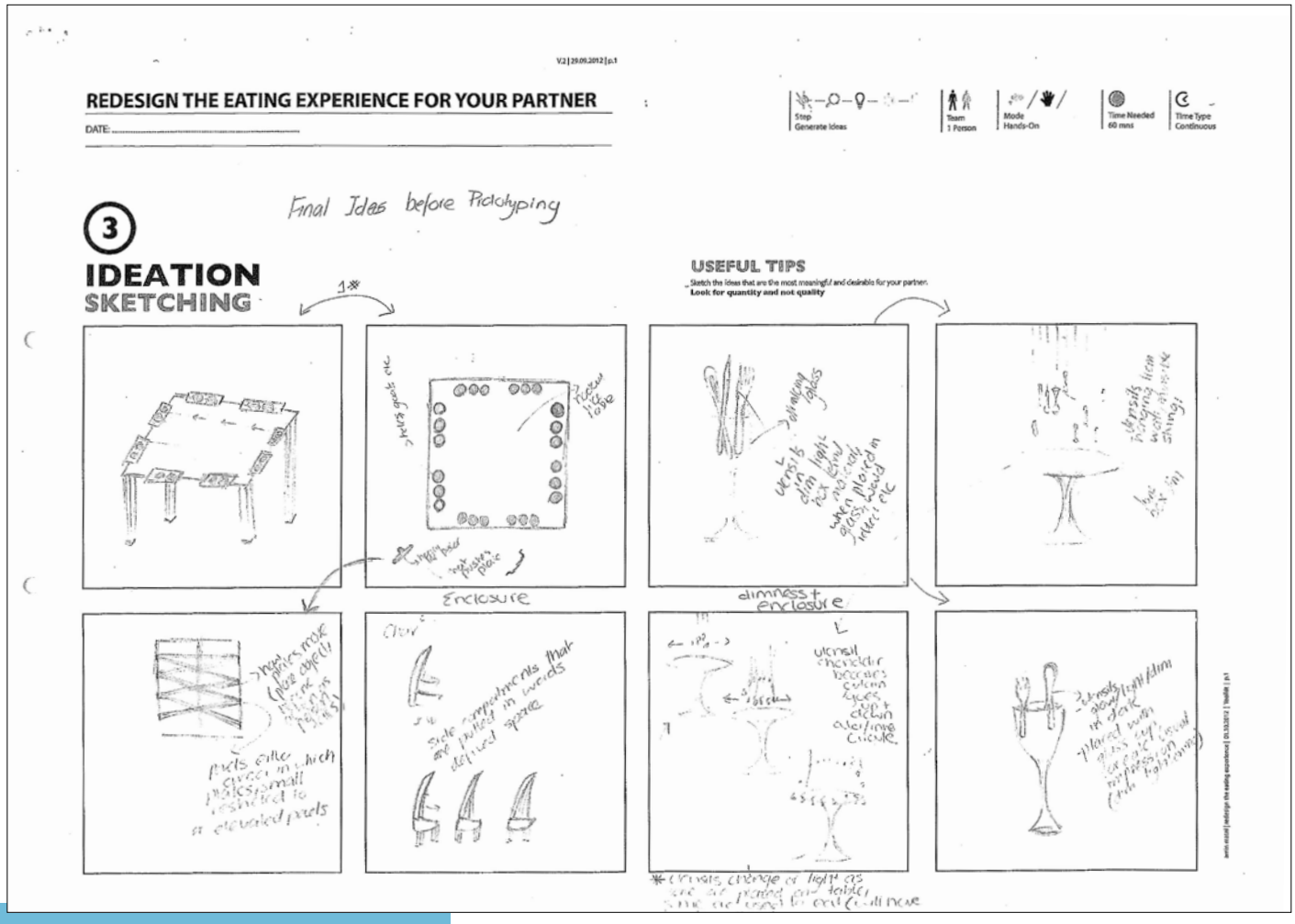


Figure 84- Ideation phase and the sketching step.

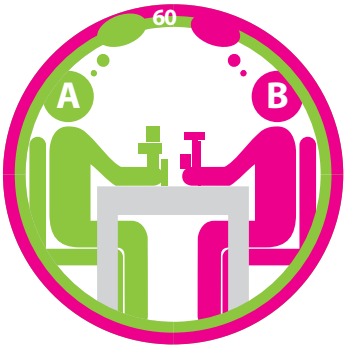


Figure 85- Individual prototyping phase and instant reflective conversations with the user.

At this point, the converging process started through the selection process and extended with the development of the selected prototype. Sixty minutes were provided to cover this step.

The below picture illustrate the formulated rough prototypes for the same groups, the user feedback under each value proposition.

Figure 86- Students prototyping their ideas.

As roles were alternated between the user and problem solver, each team member widened their perspective during the inquiry through various themes raized by their partner. Learning through difference helped them explore areas that passed unnoticed. Also, new ideas emerged by mixing various ideas together, which opened up additional possibilities.

The quick prototyping step helped the user and the problem solver to reflect on a tangible output and communicate the value proposition. This step can be also named *prototype to think*. The process is presented in this workshop in a linear manner, yet the problem solver can start with the idea generation phase in order to trigger a user-centered interaction and achieve deep empathy with the user. Those prototypes could probe and trigger conversations with the user.

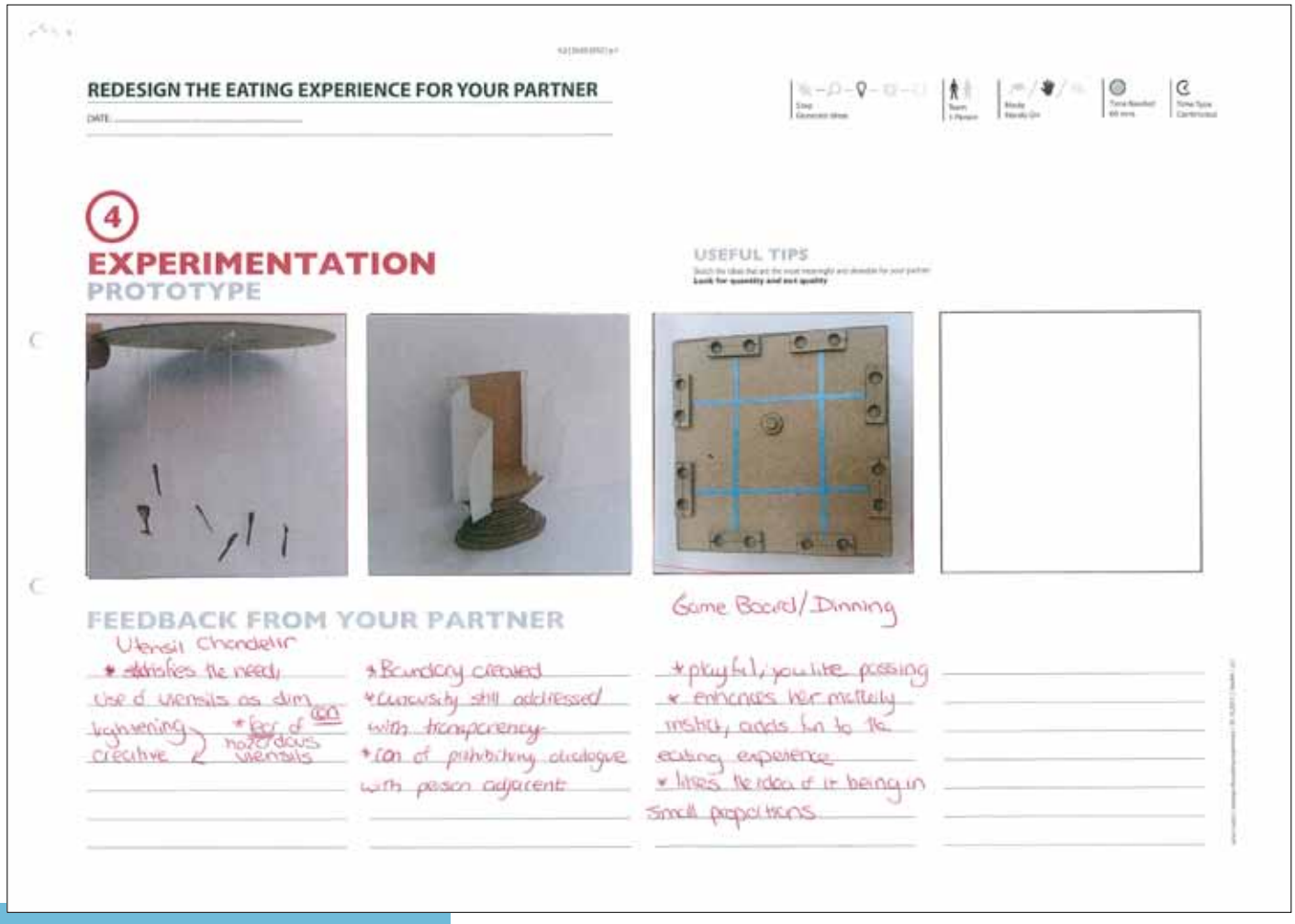


Figure 87- Sample documentation of three prototypes with user feedback.

At this point of the workshop, students selected with their respective partners the most relevant prototype to be developed further. Simultaneously, the stress level gained momentum, as the deadline was two days away. Although students were focused on their idea, making the prototype with a better craft became a time-based challenge. Below are few pictures that illustrate the studio's dynamics at this point.

Figure 88- Students working on their final prototype.

As the last studio session finished, students had almost 36 hours to complete their prototypes and preapre for the final presentation.
They were asked to prepare their final presentation holding at least 3 main areas:
1- Problem statement and the user needs
2- The value proposition with the formulated "What if"
3- Sketches / rough prototypes explored
4- Final prototype

Below five sample presentations from the 21 students who participated in the workshop.

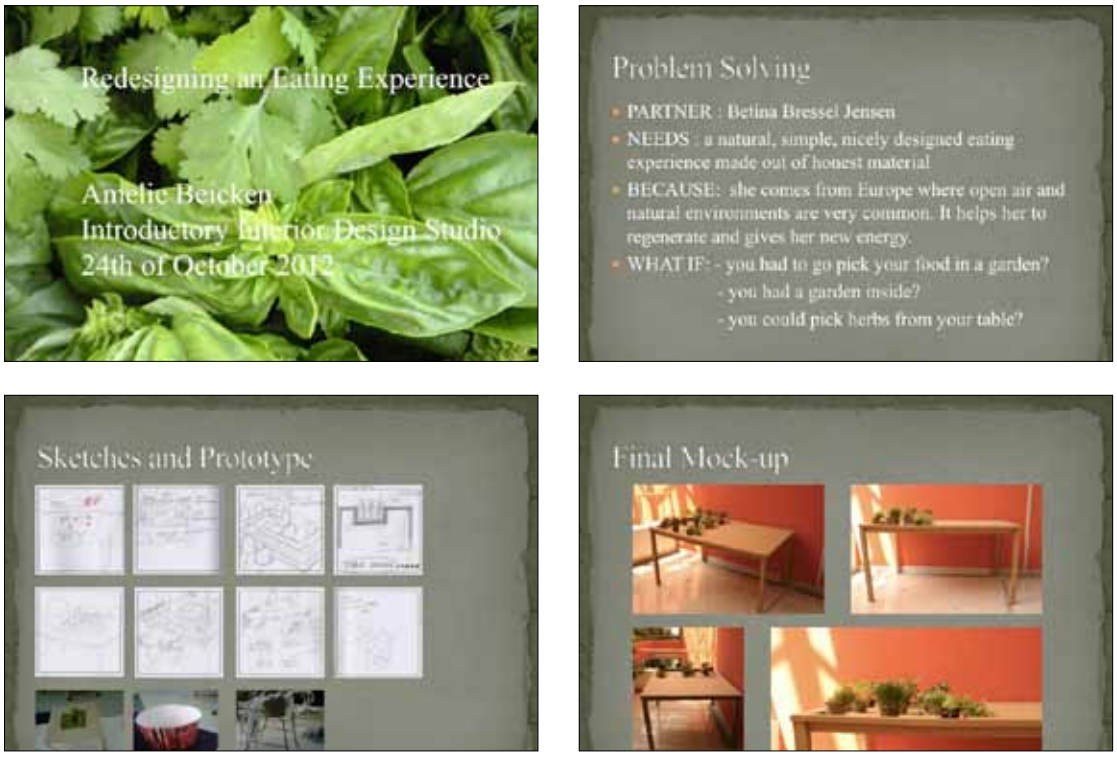


Figure 89- Amelie's final presentation.

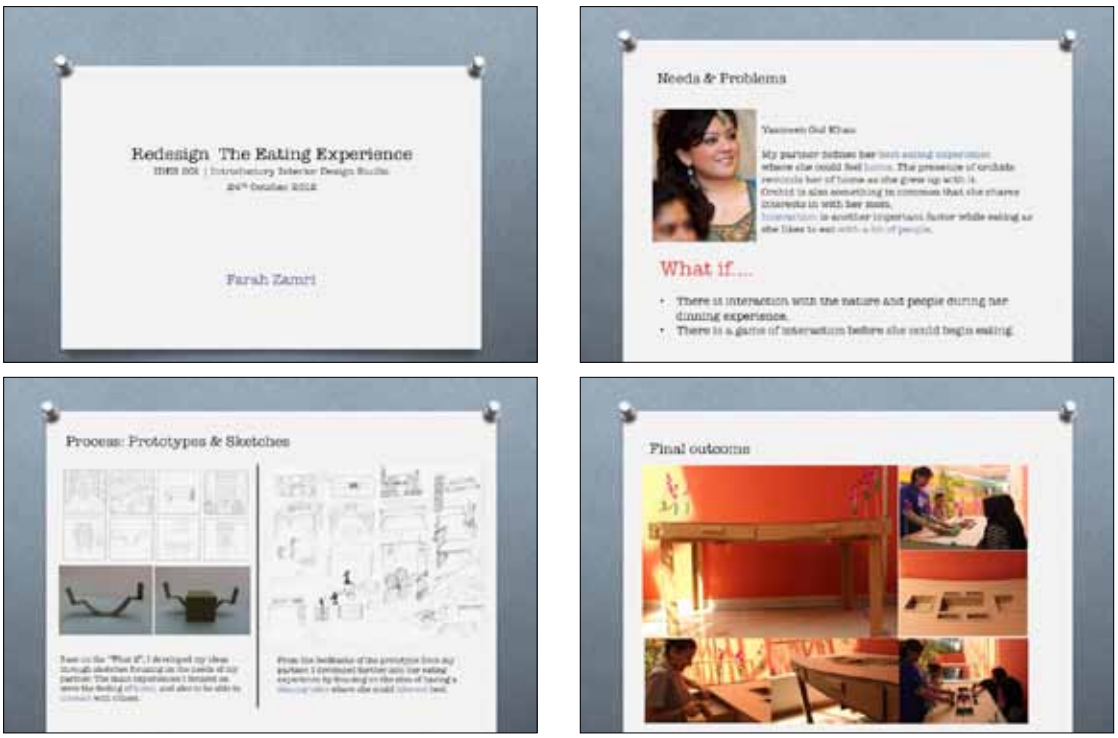


Figure 90- Farah's final presentation.

Figure 91- Geetha's final presentation.

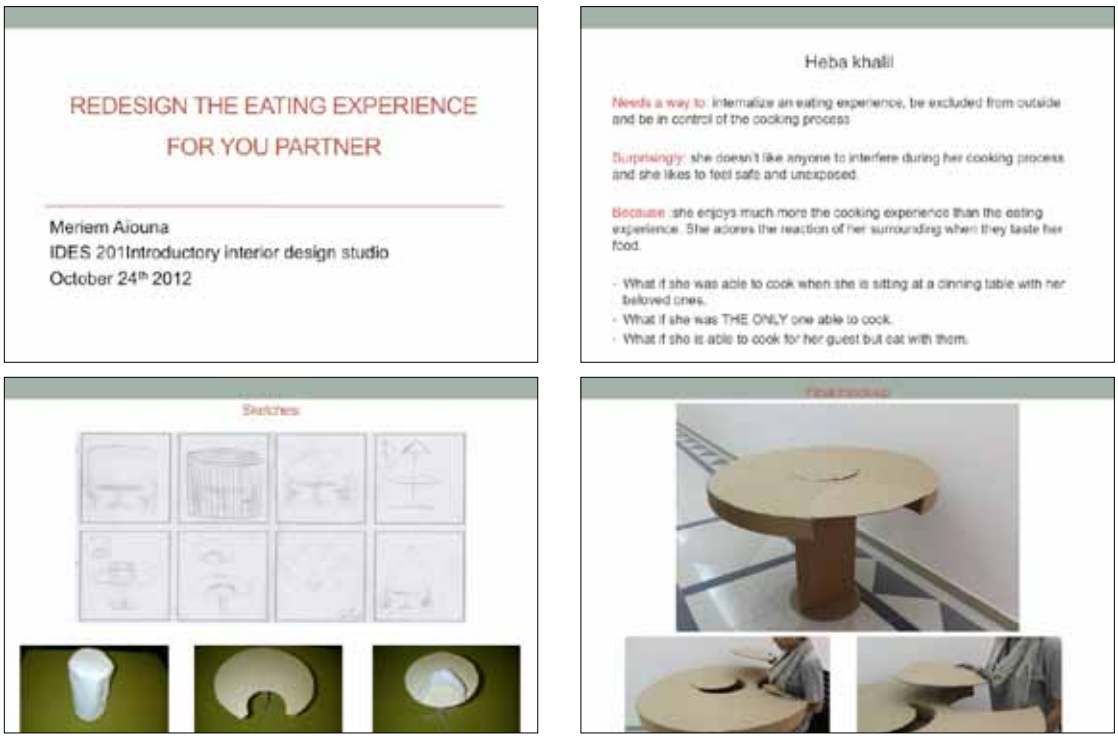


Figure 92- Meriem's final presentation.

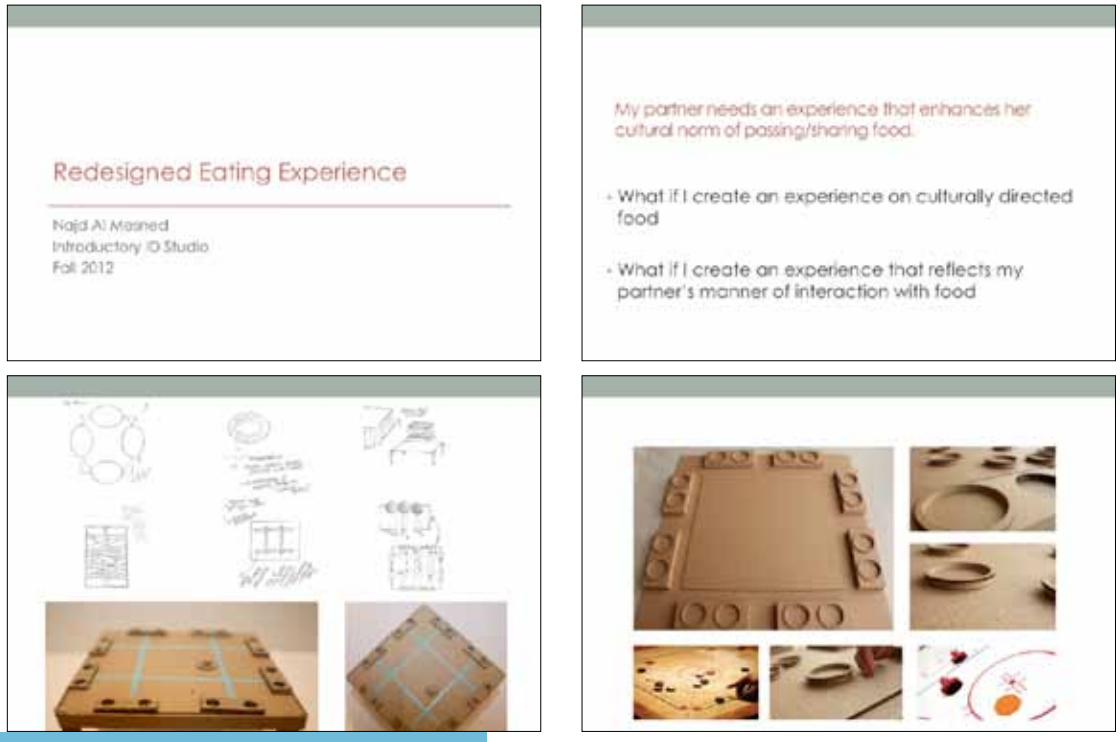


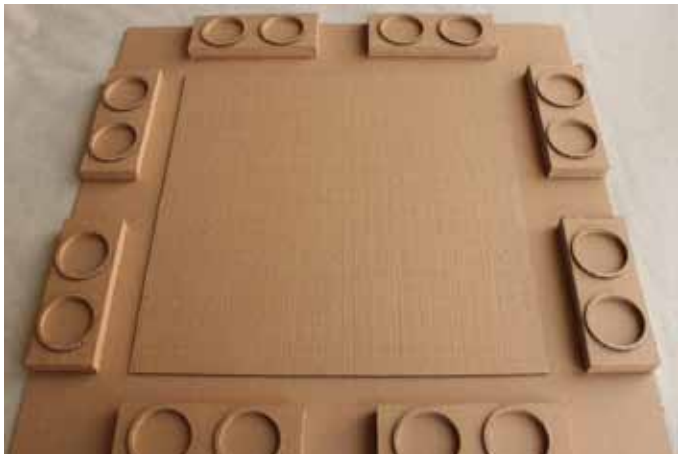
Figure 93- Najd's final presentation.

At the end of the workshop, the students filled the evaluation sheets. Four students were interviewed to reflect on the experience. Some material was included in the documentary video that was displayed in the thesis exhibition stand. In addition, two video-recorded interviews conducted with Prof. Kinnermark and Al-Mumin provided further feedback for the thesis. Their reflections on the topic, the process and the students' performance will be further discussed in the findings section.

SEED CONCEPTS

SEED 1
EAT, PLAY AND SHARE

PROBLEM STATEMENT The user needs an experience that emphasizes the culture of passing / sharing food in a playful experience.



SEED 2
INCLUSIVE AND EXCLUSIVE

PROBLEM STATEMENT The user needs a way to internalize an eating experience, be excluded from the environment and in control of the cooking process.

Figure 94- Selected seed concepts from VCUQ workshop.

WORKSHOP 2: BUSINESS ADMINISTRATION MAJOR CARNEGIE MELLON UNIVERSTIY QATAR

After the first unsuccessful pitch to CMU faculty, Prof. George White agreed to provide the opportunity for a workshop in the Introduction to Entrepreneurship course. One session was provided to interact with sophomore students enrolled in the Business Administration major. The 70-minute session was delivered on the 12th of November 2012 and 11 students attended the class. An inspirational presentation for 15 minutes set the stage, similar to the first workshop at VCUQ, and 55 minutes were left to deliver and evaluate the workshop. The class was divided into two groups, and the pace was fast and challenging. The below figure provides a summary of activities in addition to the workshop factsheet.

SETTING THE STAGE

Similar to the interior design workshop, this session started with an inspirational lecture to introduce the topic of the eating experience and the design thinking process. The students were asked to consider themselves as "social entrepreneurs" where they identify a social gap and convert it into an innovation opportunity. The eating experience and slow food were presented within the context of Qatar as a reframed problem statement

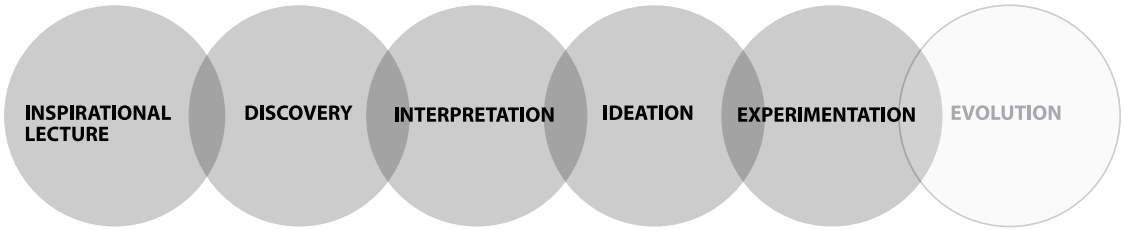
CMU WORKSHOP 12 NOVEMBER 2012

11 + **1.2** CONTACT HOURS

01 SEED CONCEPTS

01 SIGNED UP FOR MULTI-DISCIPLINARY WORKSHOP

WORKSHOP STRUCTURE



20 mns lecture on social entrepreneurship, obesity slow food, the eating experience and design thinking

1- Interview (10mns)
- Conduct the first interview
- Highlight needs and interests
- Conduct the second interview
- Dig deeper into the needs
- Gain Empathy with the user

2- Reframe the problem (10mns)
- Capture insights and needs
- Take a stand: A point of view
- Reframe the problem
- Tell the story

3- Ideate (15mns)
- Brainstorm with "what ifs"
- Sketch the ideas
- Share your solution

4- Build and test (15mns)
- Build your prototype
- Think small and fast
- Share your solution
- Get feedback

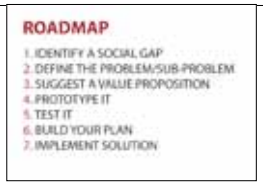
5- Tell your story (10mns)

Figure 95- CMUQ's workshop factsheet and structure.

to the obesity grand challenge. The time constraints required a clearer problem statement then the one presented for the design students. In addition, a fast-pace workshop needed to engage the students and produce seed outputs in just 45 to 50 minutes. The workshop was prepared for 20 students, yet only 11 attended the course that day. Hence, there was a need to adapt and restructure the dynamics of the workshop, and split the class into two groups.

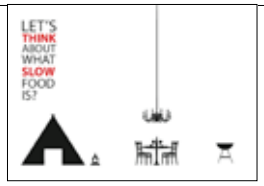
The slides were similar to the design workshop. Yet further attention was paid to the eating experience topic and with the slow food movement. The objective was to create an area of focus and channel the student's efforts within the 50 minutes of the workshop. The example of the Japanese cuisine contrasted the dynamics of the traditional eating experience with the introduction of the sushi conveyor belt. The experience moved away from floor seating with a hidden cuisine and following the Japanese etiquette. The newly innovated casual eating experience suggested sitting on a bar next to each other and facing the

Slide 1 - A suggestive mindshift for the students.



Slide 2 - Workshop roadmap.

Slide 3 - Eating experience in relation to slow food vs. fast food.



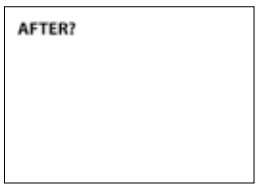
Slide 4 - Various eating situations and slow food.

Slide 5 - Various elements that form an experience.

Slide 6 - Terminologies, disciplines and the HCD.

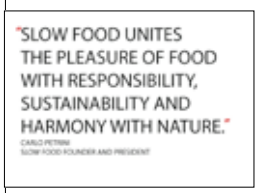
Slide 7 - Evolution of the Japanese eating experience.

Slide 8- Eating and cooking rituals of the bedouins.



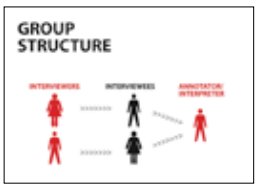
Slide 9 - Invitiation to redesign the eating experience of the bedouins.

Slide 10 - Deep empathy with the user.



Slide 11 - Definition of slow food.

Slide 12 - The relationship between the content and the context.



Slide 13 - Deep empathy for the user to generate relevant and meaningful content.

Figure 96- Slides for CMUQ lecture.

chef. The live cooking by the chef gives the customers the freedom to pick the small plates they wish to try from the belt. With this intervention, the Japanese cuisine gained popularity and a healthy culinary experience was scaled globally. In contrast with the Japanese example, the healthy diet of the nomad was presented as an unexplored area of development and ideation. The slides hinted to the "mendi" slow cooking method, where nomads used to wrap the lamb with palm leaves and put on a pit of charcoal for 10 to 12 hours.

The students were asked to reflect and engage on what might come after the nomadic eating experience sub-topic. The class was divided into two groups, and the workflow was explained in the last slide. Differing from the VCUQ workshop format, each team of 5 members was divided into two pairs and an annotator. Each pair of students performed the same steps that occurred in the design workshop, and the annotator collected and interpreted the insights on the spot.

Afterwards, the same A3 toolkit was distributed to students except that the time for each step was reduced to 10 minutes to accommodate the 50-minute session, without counting the time for the feedback. The following pictures illustrate the interviews conducted by the two groups during the workshop.

Figure 97- CMUQ students conducting the interviews.

Figure 98- The annotator on the left marking the generated insights from the interview.

Figure 99- Team dynamics during the interview.

Figure 100- Team dynamics of the interpretation phase.

Each team had two interviewers, two interviewees and an annotator. The students in each team paired to start the interview phase. The annotator was marking the major highlights of the interview, which helped the participants to interpret the results faster.

Figure 101- Team dynamics during the ideation phase.

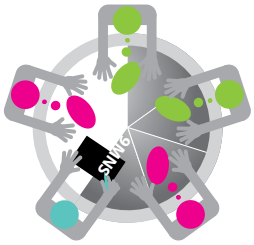


Figure 102- Team dynamics during the ideation phase.

After they finished their interview phase, each team gathered to discuss the collected insights and formulate collectively the user-needs brief.

One team reframed their point of view and focused on how they can make slow food more accessible and affordable within the context of Qatar.

They formulated the idea of a faster slow-food solution. The students projected the idea of preparing

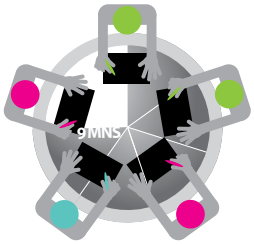


Figure 103- Team dynamics during the ideation phase, sketching step.

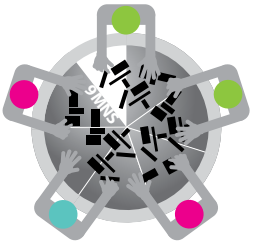


Figure 104- Team dynamics during the prototyping phase.

slow food in a mobile kitchen hub that delivers food to customers. This way, they can reach their customers earlier and gain more time for the food to be cooked, at the food's own pace.

Their strategic thinking helped them to ask meaningful questions on the eating habits, traditions and trends. That capacity helped them explore rigorously the topic of the slow food eating experience and innovate possible responsive scenarios.

They sketched their ideas in 10 minutes and reviewed their outputs before agreeing to go ahead with the most successful options. Finally, they used the building blocks to prototype their ideas.

The toolkit from team 1 illustrates, students articulated the content of the workshop. The same group of students suggested another idea for the slow food accessibility and affordability.

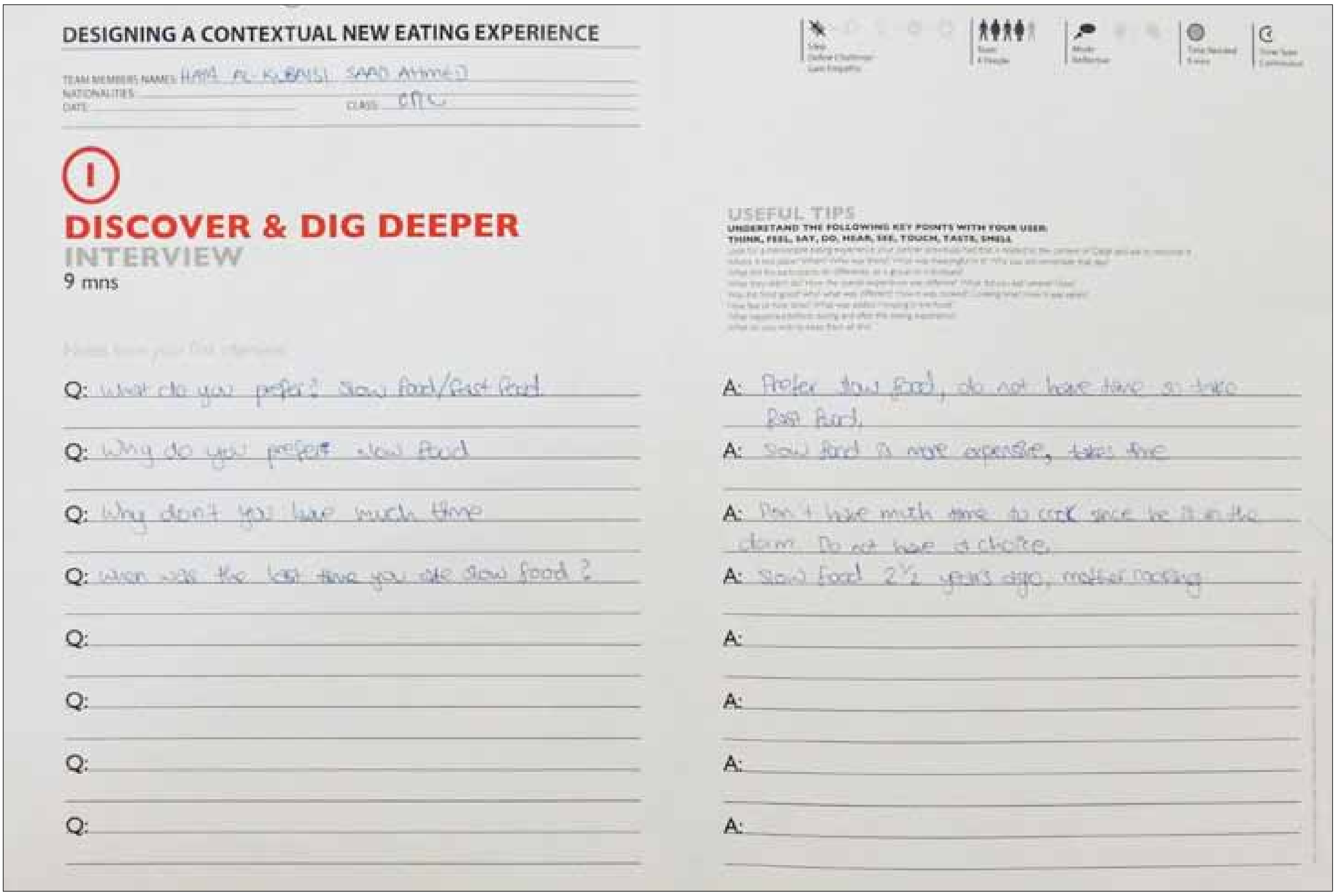


Figure 105- Discovery phase of team 1, interview 1.

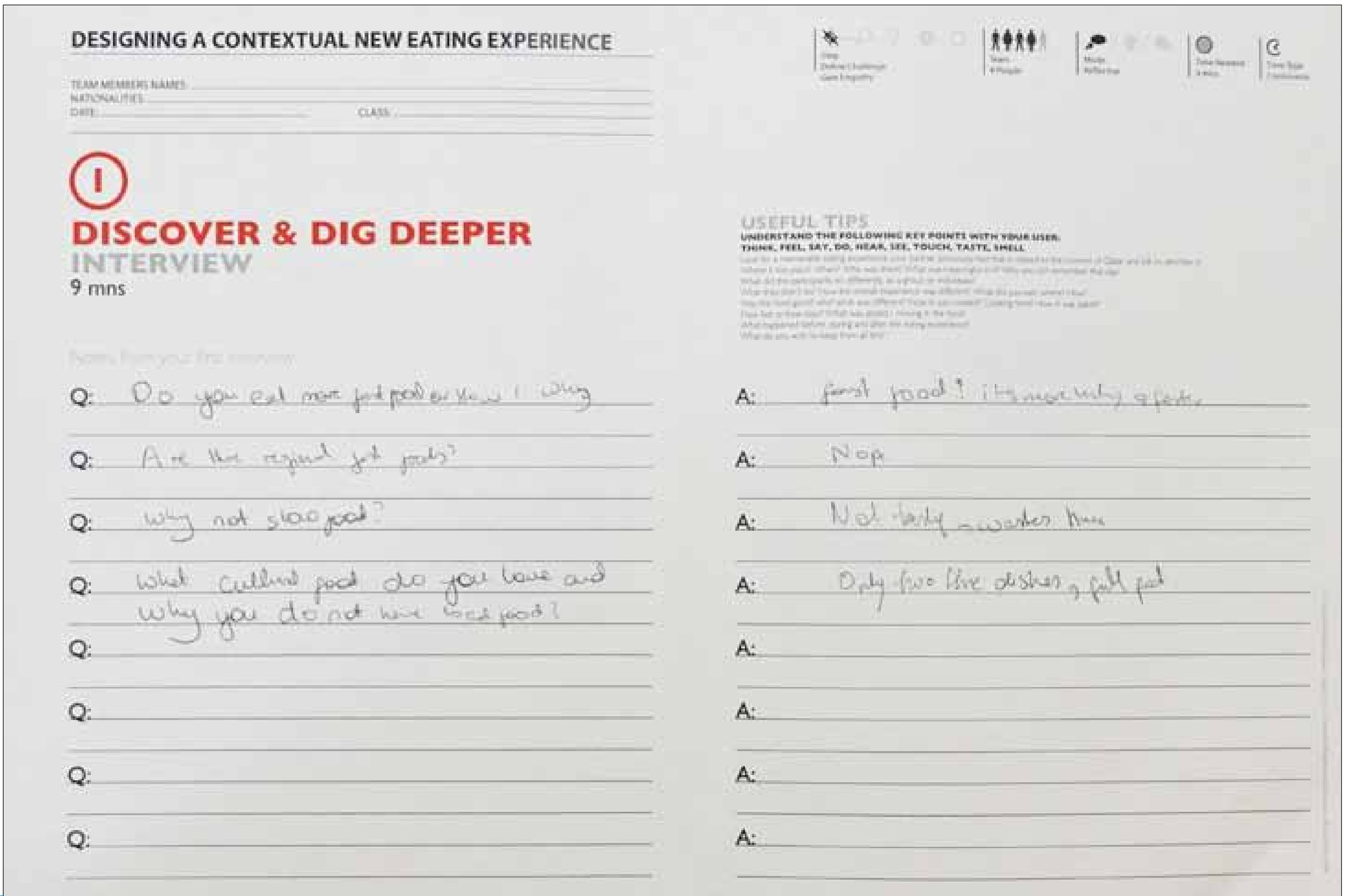


Figure 106- Discover phase of team 1, interview 2.

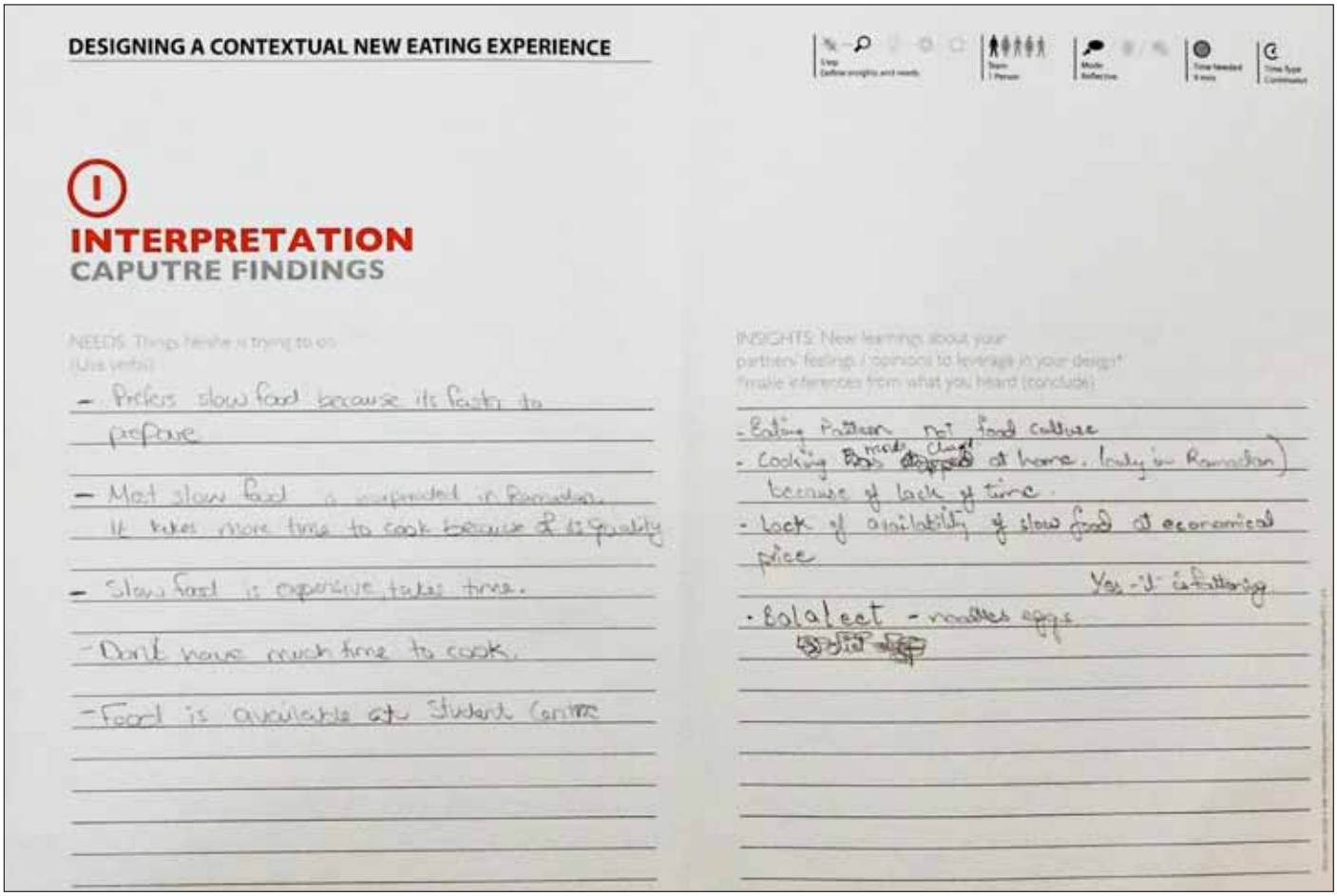


Figure 107- Interpretation phase.

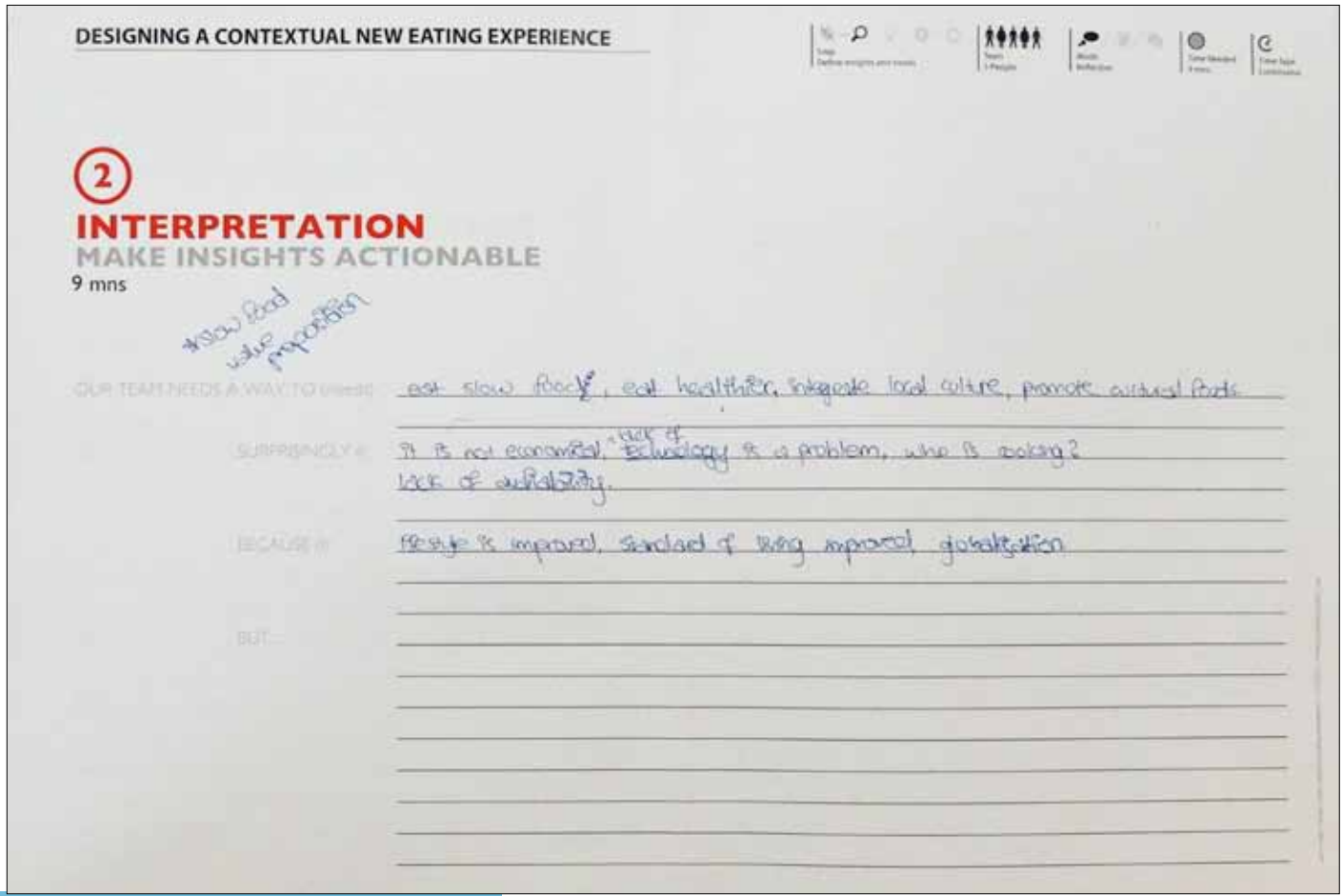


Figure 108- Interpretation phase and brief formulation.

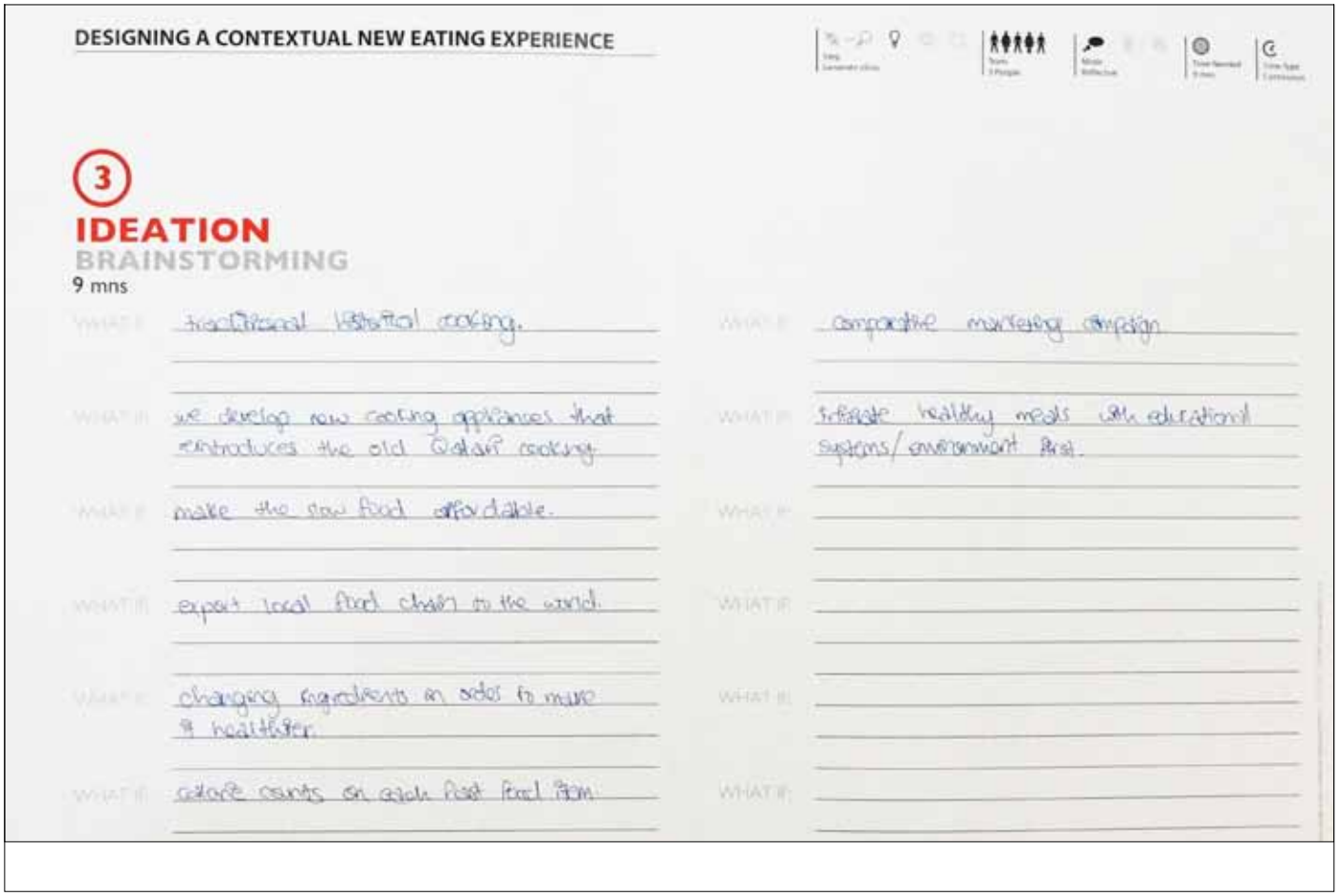


Figure 109- Ideation phase of team 1.

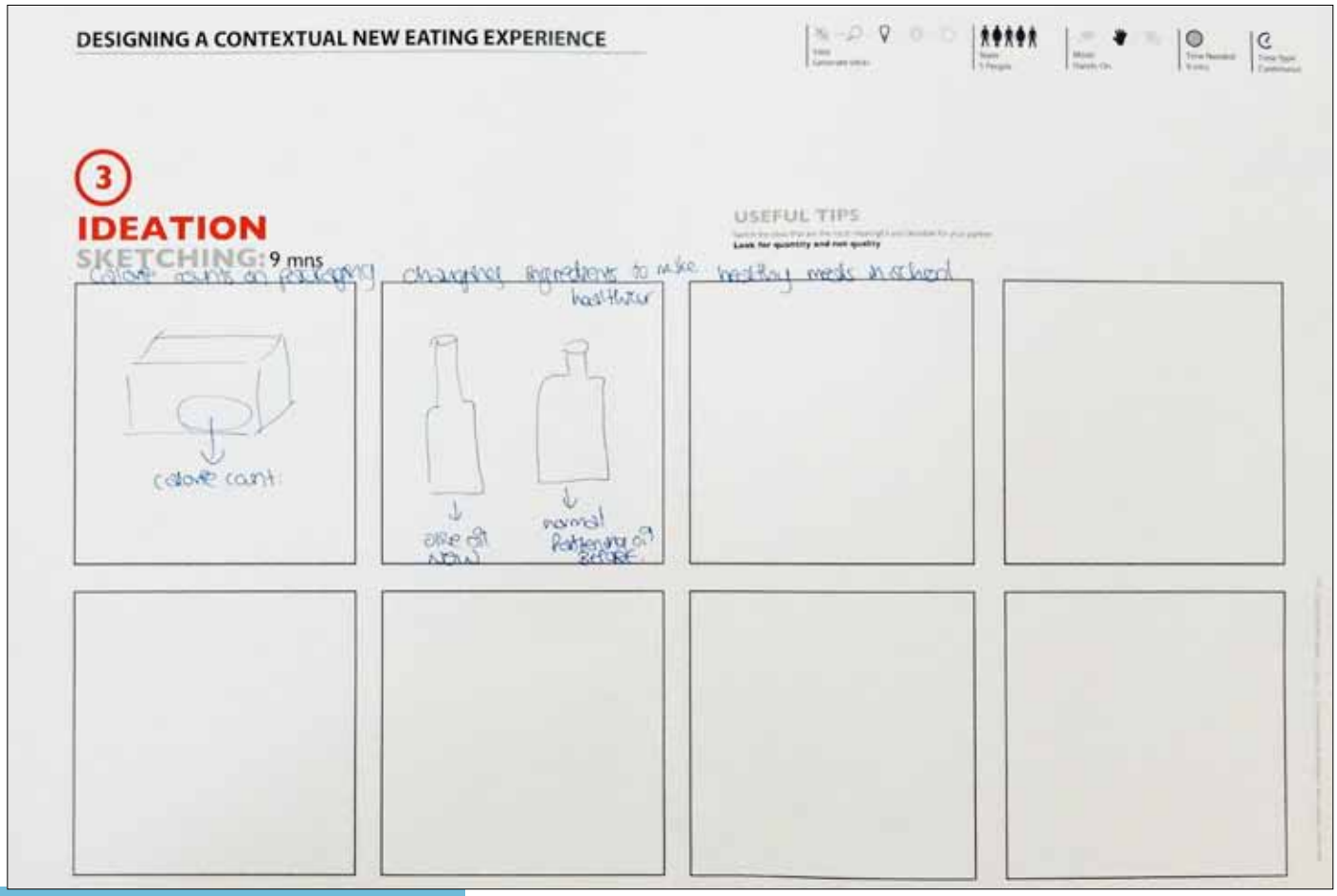


Figure 110- Ideation phase of team 1.

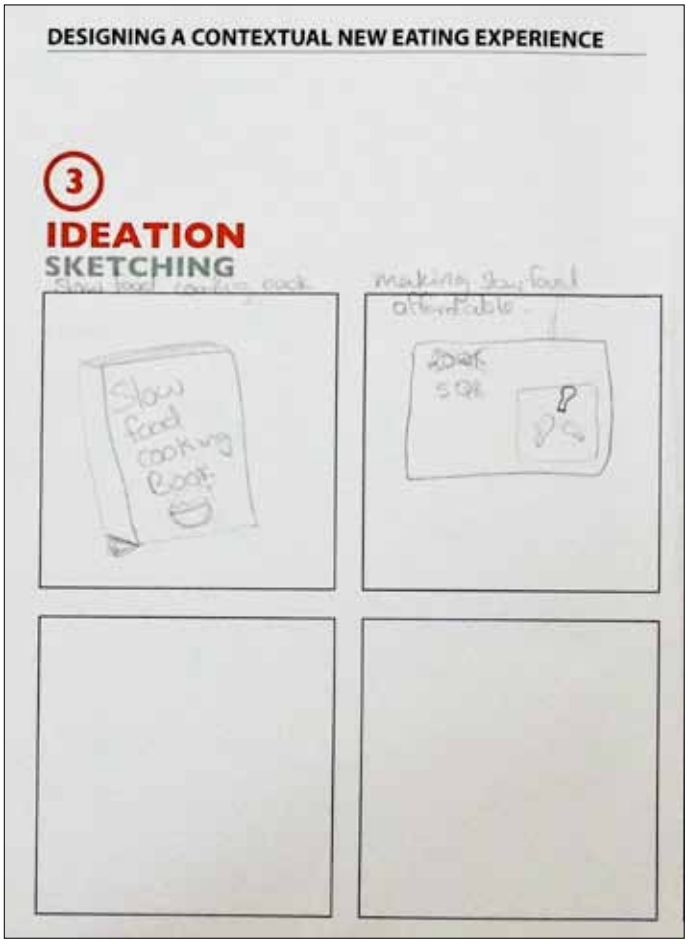


Figure 111- Ideation phase of team 1.

Figure 112- Ideation phase of team 1.

Figure 113- Ideation phase of team 1.

Figure 114- Ideation phase of team 1.

Two students pitched a suggestive evolution to the traditional *mendi* pit cooking experience, that is similar to the individual study on articulating the obesity challenge.

The building blocks were handed to the students to prototype the selected ideas. The method helped the students achieve a physical model to reflect upon.

At the end of the workshop, one student from each group presented their process and pitched their value proposition.

Before the session ended, the students filled the evaluation sheets. After the workshop, an interview was conducted with Dr. White to reflect on the experience in his course.

SEED CONCEPTS

SEED 1
NEW COOKING APPLIANCES AND OLD HEALTHY COOKING METHODS

PROBLEM STATEMENT The user needs a way to bring back the slow food cooking method in a new cooking appliance.

Figure 115- Prototype of the "faster slow food cooker."

INDEPENDENT PARALLEL STUDY ON THE SAME VALUE PROPOSITION

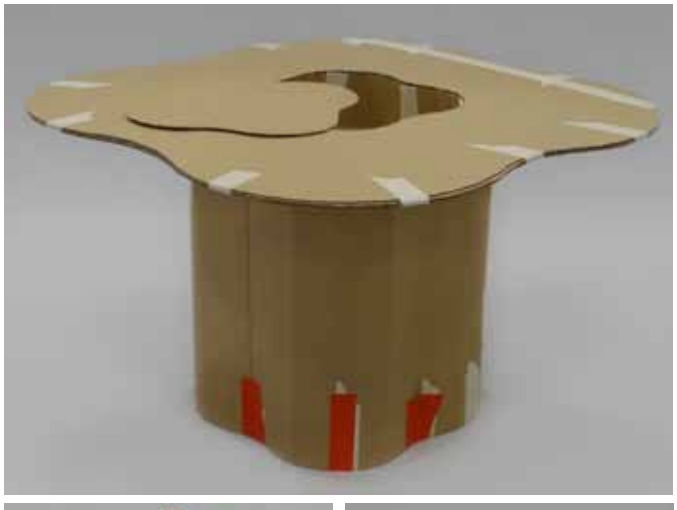


Figure 116- Prototype of the individual study on the pit idea.

WORKSHOP 3: ENGINEERING MAJOR TEXAS A&M UNIVERSTIY QATAR

The third proposal was submitted to Dr. Eyad Masad and Dr. Hassan Bachir to run a workshop in the engineering and ethics course. They provided the space for two sessions for 50 junior and senior students. Session 1 was on Sunday 19th November with section A and B for 2 hours, session 2 was on Monday the 20th with section A for 2 hours followed by 2 hours with Section B on Tuesday 21st November.

The structure of the workshop is similar to the previous other two, yet the time for each phase varied to fit the provided time in the engineering ethics course. Session 1 started with a 30-minute inspirational lecture that set the stage for the workshop and suggested the topic of social innovation. To make the topic more relevant to the Engineering students, the premise of innovation was complemented with the engineering and ethic theme to present a focal mode of engagement. To contextualize the topic, a few grand challenges from the National Development Strategy 2011-2016 were listed, to present to the students relevant issues to their daily life. Almost all presented challenges were directly related to engineering yet the eating experience for the workshop theme was quiet far from the student's interests. The "aquaduct" example by IDEO was presented as a sample project that testifies the work of design, business and engineering to address the water challenge

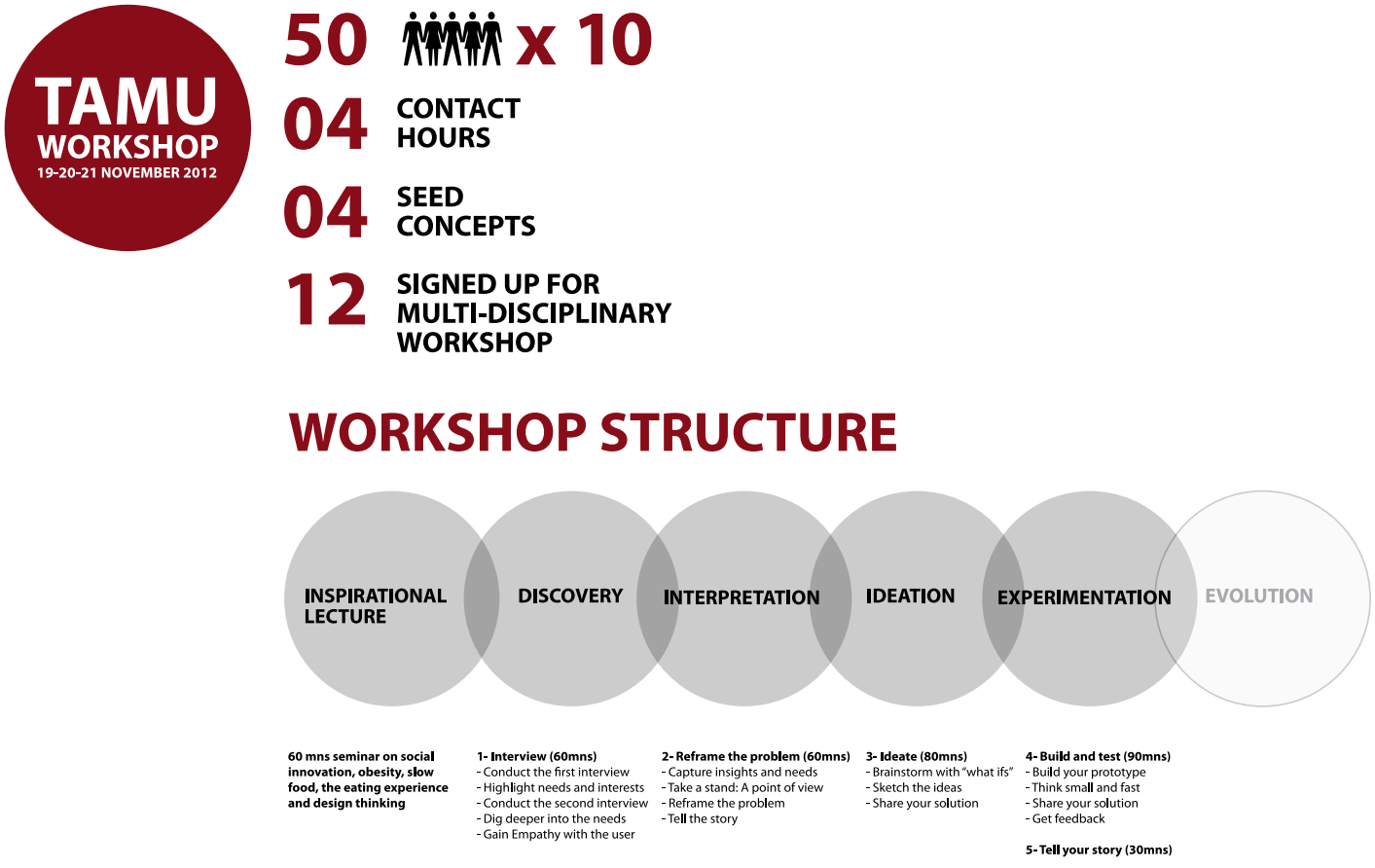
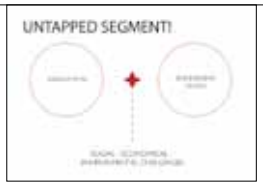


Figure 117- TAMU's workshop factsheet and structure.

in Africa. The value proposition addressed water mobility and sanitization. Hence the "aquaduct" case presented to Engineering students an opportunity on how to use their capacity on socially connected issues. The roadmap slide described the workshop flow. In the next slide the slow food topic as a counter argument to fast food.

Similar to the previous workshops, the same topic was presented, yet from a different strategy to make it more relevant to the discipline and consequently to the students. The "aquaduct" example was associated with the Japanese cuisine and the sushi conveyor belt. The point is to highlight the engineering intervention in an eating experience that made the cuisine popular and scalable worldwide model. Both examples aligned the students' mindset so that they can contribute to the topic of "slow food" and the contextual challenge of the redesigning the eating experience with their engineering capability. The topic of slow food that was practiced by the Bedouin for thousands of years and remained an unexplored topic and an area of innovation, similar to the Japanese eating experience. The class was divided into teams of 5 students. Since the workshop ran over 2 sessions with each section, team effort was needed to build the potential and develop a body of work within 3h30mns.

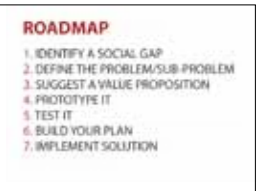
Slide 1 - A suggestive mindshift for the students.



Slide 2 - The ethical framework of the workshop.

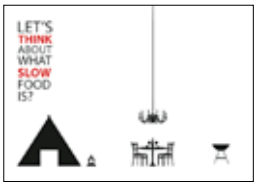

Slide 3 - A list of the national challenges.

Slide 4 - The "aquaduct" example by IDEO.

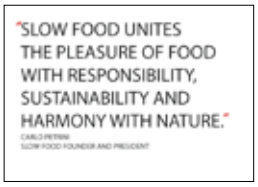


Slide 5 - The roadmap for social innovation.

Slide 6 - Selected steps from the innovation process.



Slide 7 - Various eating situations and slow food.



Slide 8- Definition of slow food.


Slide 9 - The relationship between content-context.

Slide 10 - Various elements that form an experience.

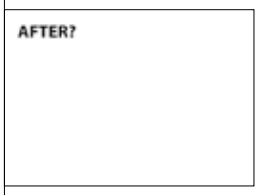

Slide 11 - Design thinking phases and steps.

Slide 12 - Terminologies, disciplines and the HCD.

Slide 13 - Deep empathy toward the user.

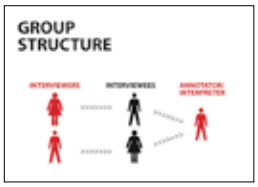
Slide 13 - The evolution of the Japanese eating exprience.

Slide 13 - Eating and cooking rituals of the bedouins.



Slide 11 - Invite to engage in the workshop.


Slide 12 - Explaining the team dynamics.



Slide 13 - The structure and roles within a group.

Figure 118- Slides for TAMUQ lecture.

Figure 119- Team dynamics during the discovery phase and the interview step.

Figure 120- Team dynamics during the interpretation phase, map findings step.

Figure 121- Team dynamics during the interpretation phase, capture findings step.

The team dynamics is illustrated in the above figures.

Similar to the other workshops, the process and the topic created a sense of ambiguity to the students. They were not used to starting with interviewing the user and relying on these generated insights to formulate a problem statement. Yet, the teams followed the roadmap presented in the talk and started the interviews using the A3 toolkit.

The students from section A and B formed teams of five and started the interview phase (see figure 122).

Figure 122- Supporting the teams during the interviews.

Teams picked up the pace and captured the interview findings in 9 minutes. Each interviewer highlighted the insightful answers from their booklets and the annotator formulated the needs and insights.

Afterwards, the students formulated their problem statements with a 40-minutes slot.

Figure 123- Team members discussing the interpretation step at the end of the first session.

Figure 124- Reviewing with another team the formulated problem statement.

Figure 125- Team dynamics during the ideation phase, brainstorming step.

Figure 126- Team dynamics in the ideation phase.

Figure 127- Team dynamics in the prototyping phase.

The first class ended in the ideation and brainstorming step. Most of teams already started ideating step, yet two teams out of ten were still formulating their problem statements.

Fifty students split into their assigned sections for Monday and Tuesday classes. Unlike business admnistration workshop, engineering students had the chance to collectively review the interviews, identify more carefully the user-insights, consolidate their opinions on the problem statement and start ideating potential solutions before the second session started. Teams that did not finish step 2 were asked to complete it in order to start the second session with the ideation and brainstorming step. Twenty minutes were provided to complete the *what if* scenarios.

Afterwards, the teams reviewed and selected the potential seed idea, then started sketching these ideas for 25 minutes, as illustrated in figure 124. For both steps in the ideation phase, students were encouraged to produce an abundance of ideas and disregard any attempt to focus at an early stage one ideas.

Figure 128- Various teams sketching their ideas.

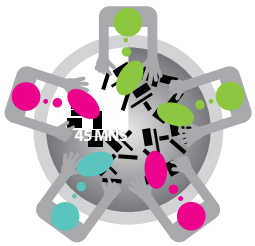


Figure 129- Dynamics of the prototyping phase.

After reviewing and selecting the various produced ideas, team members joined efforts to build the prototypes using cardboards and building blocks. Forty five minutes were left for this stage to be completed.

Figure 130- Work in progress as teams start to make their prototypes using the building blocks.

Finally, the teams presented the process and the final output in 3 minutes. Three sample projects were selected and presented as follows:

The first team presented the *QF Tutu Train* and suggested converting the electrically powered shuttle bus used in Qatar Foundation (that looks like a train) into a healthy mobile Qatari Eating Experience. The food is slowly cooked in one of the train caravans and the food is offered when a commuter hops in the train. The objective of this value proposition is to innovate a healthy Qatari cuisine in a new content and context.

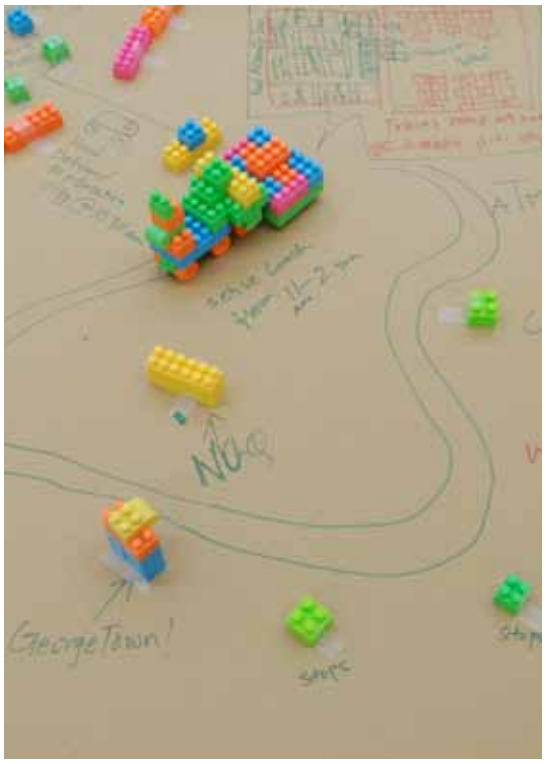


Figure 131- The QF Tutu Train concept presented by the team.

The second team presented the *Qatari Drive Thru* restaurant (refer to figure 132). Their value proposition hijacked the habits of many citizens who like to eat in their cars and collect their food from drive-through restaurants. Their idea suggested a drive through restaurant and a car park to serve slow food. The food is slowly cooked with healthy ingredients, and ordered on the phone while the customer is on the way to the restaurant. The below figures showcase the team pitching the idea.

Figure 132- Team 2 presenting their prototyped service.

The third team presented the Mobile Cooker and focused on how to make the slow food faster. Hence they came out with the Mobile Cooker idea. The value proposition suggested a mobile kitchen that delivers slowly cooked food. The idea consists of a driver, a cook and a call center that coordinates to deliver slowly cooked food to customers.

Figure 133- Team 3 building and displaying the Mobile Cooker prototype.

The following figures will document team3 toolkit with their notes and sketches.

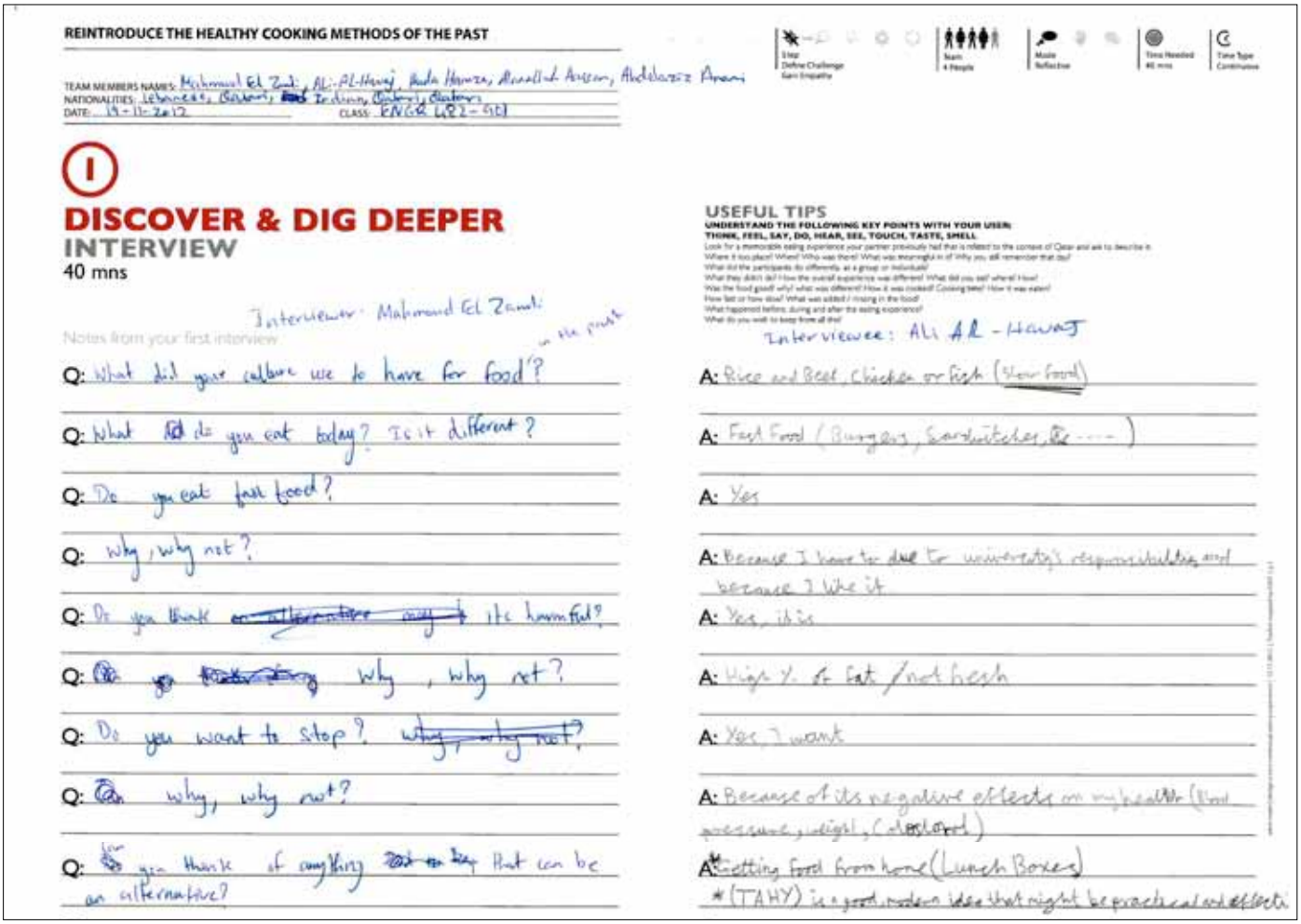


Figure 134- The discovery phase and the interview step of team 3.

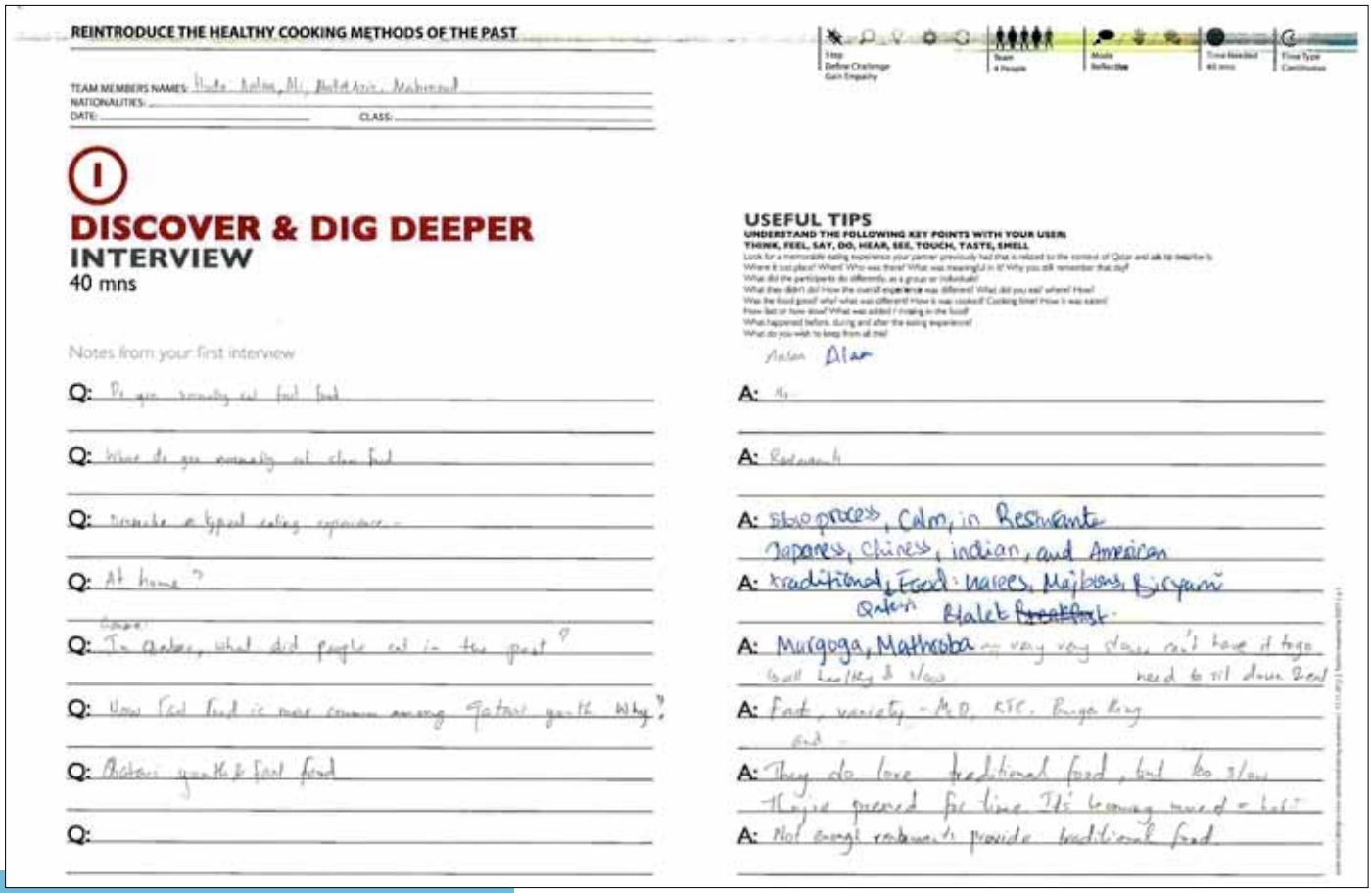


Figure 135- The discover phase and the interview step of team 3.

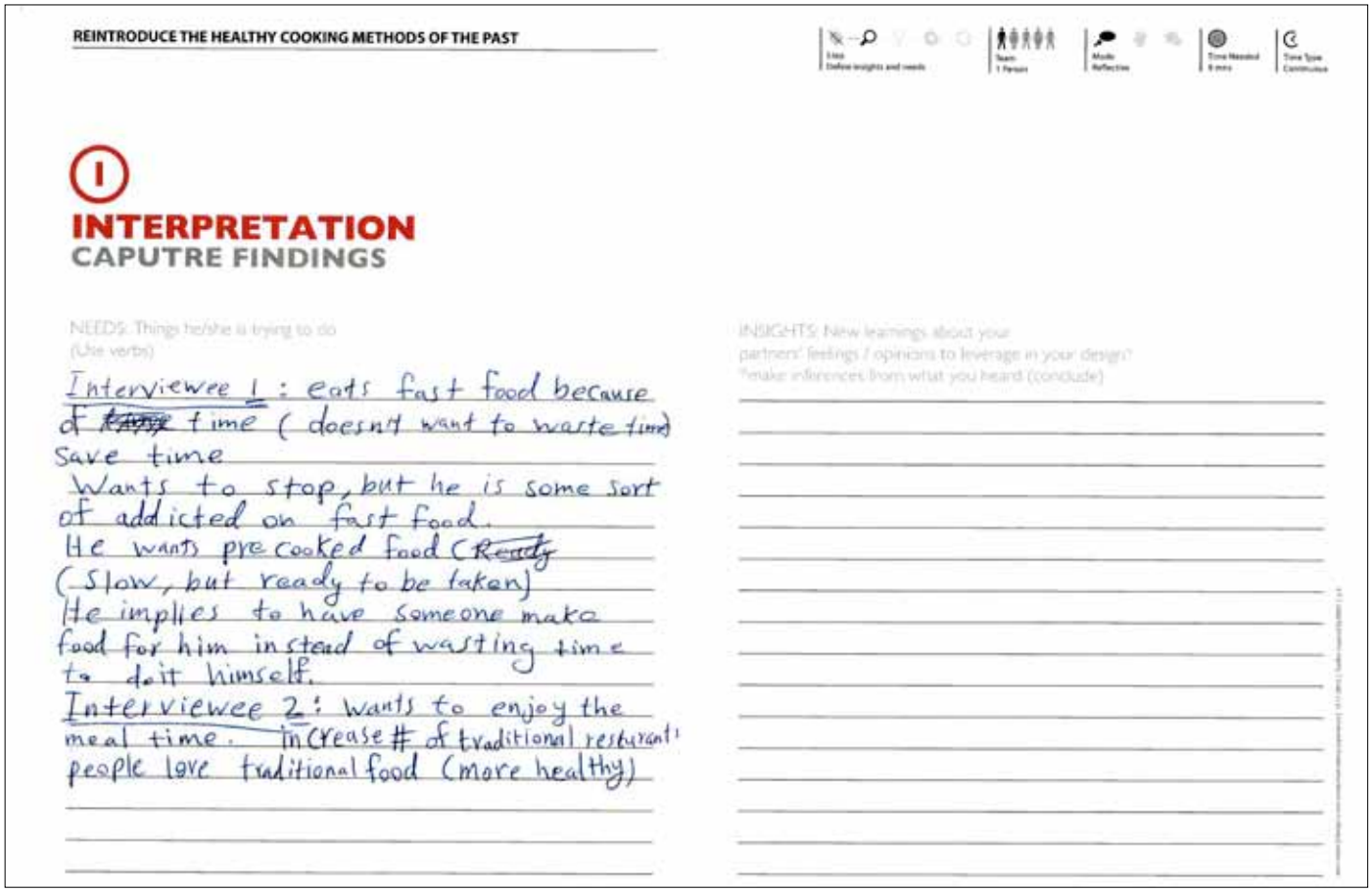


Figure 136- The interpretation phase and capturing the findings step of team 3.

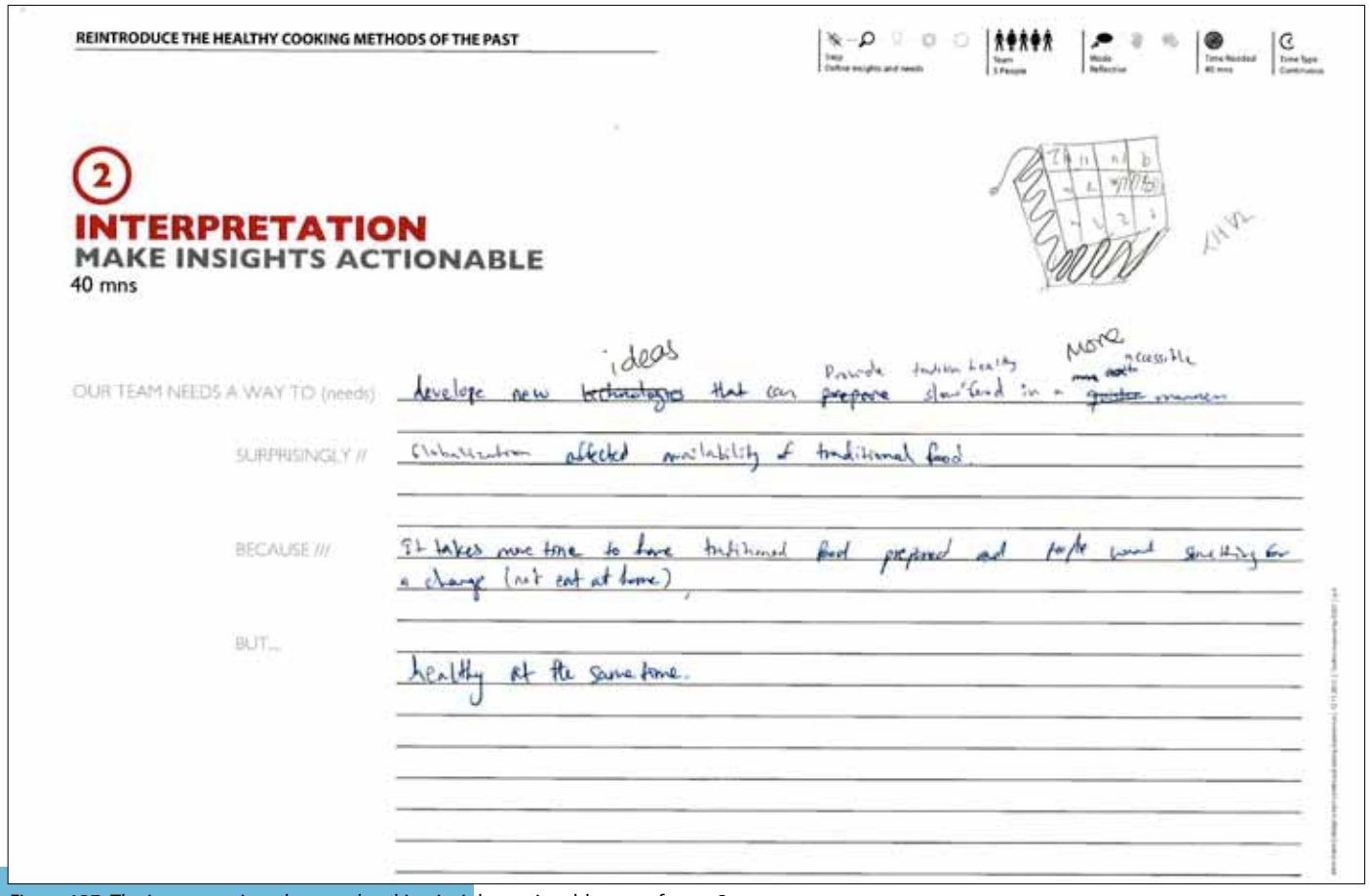


Figure 137- The interpretation phase and making insights actionable step of team 3.

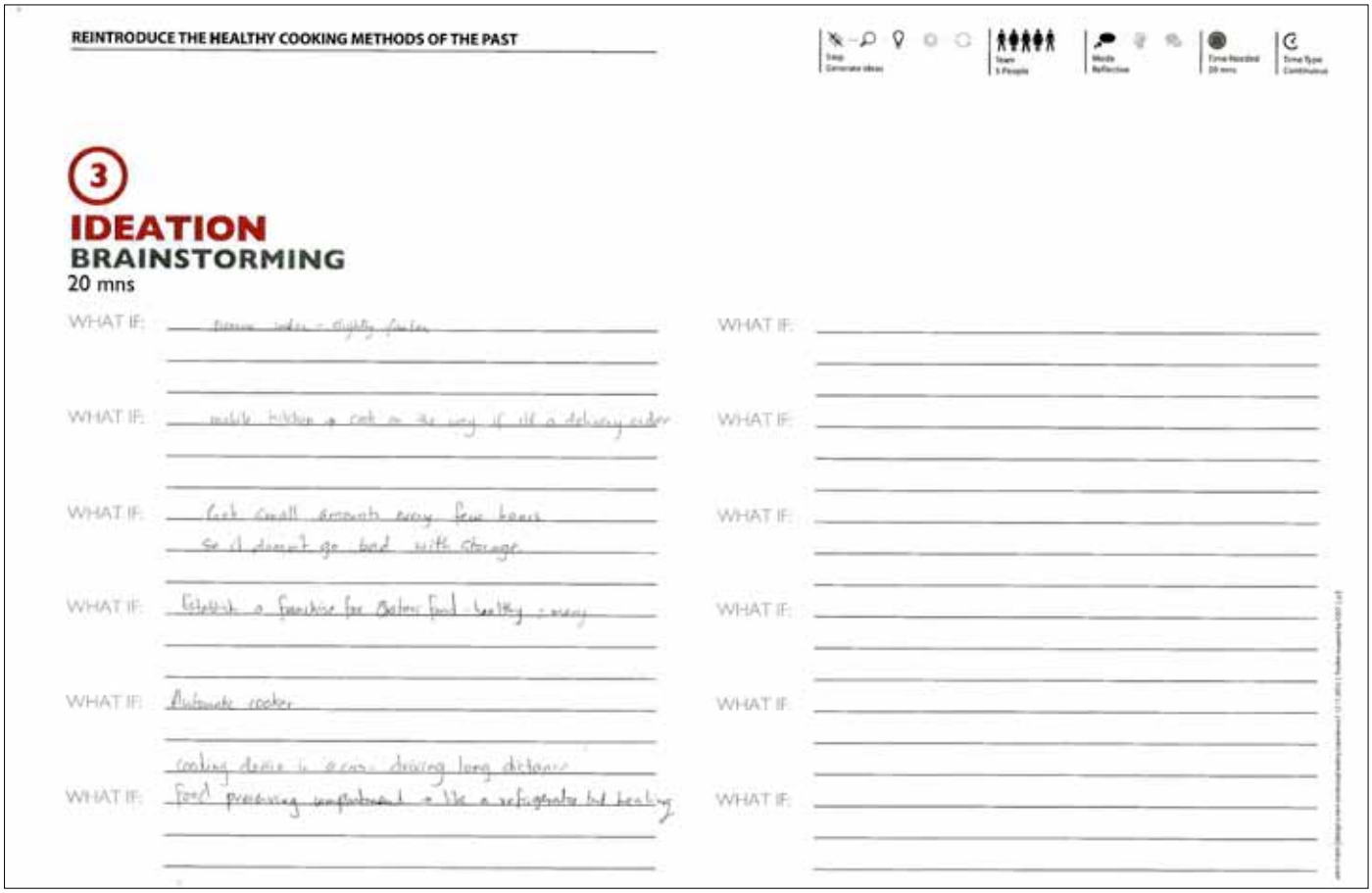


Figure 138- The ideation phase and the brainstorming step of team 3.

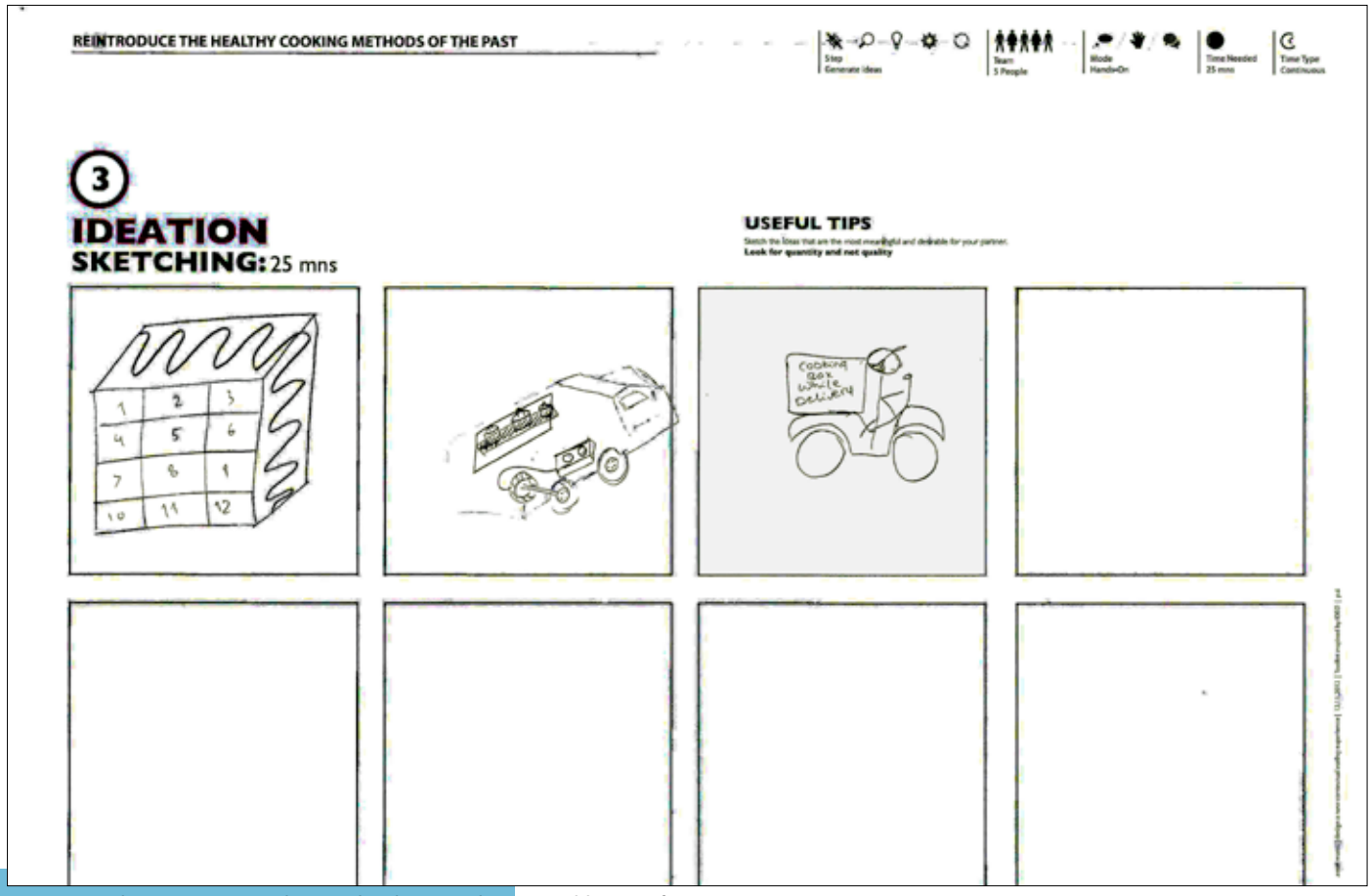


Figure 139- The interpretation phase and making insights actionable step of team 3.

Another team discussed the idea of making healthy Qatari food accessible to the market and suggested a central cuisine with vending machines as distribution channels. It is an interesting value proposition since there is not yet pre-made Qatari food that is cooked in a healthy way.

At this point, the three workshops for the Design, Business and Engineering students were delivered to 81 students and generated 7 interesting seed concepts. All the students filled the evaluation sheets, and 23 students signed up for the multi-disciplinary workshop, as per table 2. Personalized invitations were sent to the students who signed up for the workshop in order to confirm the number of attendants.

	DISCOVERY	INTERPRETATION	IDEATION	EXPERIMENTATION	EVOLUTION
DESCRIPTION OF THE STEPS WITHIN EACH PHASE FOR THE THREE WORKSHOPS	**Lecture on social entrepreneurship, obesity slow food, the eating experience and design thinking**	**1- Interview** - Conduct the first interview - Highlight needs and interests - Conduct the second interview - Dig deeper into the needs - Gain Empathy with the user	**2- Reframe the problem** - Capture insights and needs - Take a stand: A point of view - Reframe the problem - Tell the story	**3- Ideate** - Brainstorm with "what ifs" - Sketch the ideas - Share your solution	**4- Build and test** - Build your prototype - Think small and fast - Share your solution - Get feedback **5- Tell your story**
PERIOD OF THE ACTIVITY FOR A VCU STUDENT	40 mns	30 mns	165 mns	320 mns	390 mns	380 mns 10 mns / student
PERIOD OF THE ACTIVITY FOR A CMU TEAM	15 mns	10 mns	10 mns	15 mns	20 mns	15 mns 5 mns / team
PERIOD OF THE ACTIVITY FOR A TAMU TEAM	20 mns	40 mns	40 mns	45 mns	50 mns	45 mns 5 mns / team

Table 2- Summary of the three delivered workshops.

WORKSHOP 4:
MULTI-DISCIPLINARY WORKSHOP

Out of the 23 signed up students, 13 confirmed their attendance, yet only 4 attended the workshop: two Interior Design students from VCUQ, one business administration student from CMUQ and one engineering students from TAMUQ. The workshop was kindly hosted by the Katara Art Center from 9.30 am until 3.30 pm. The workshop had a different structure than the previous ones as noted in the below figure.

At this stage, the four members went through the process and produced their individual or collective work to address the redesign of the eating experience topic. The main objective of the workshop is to explore multi-disciplinary education and develop one of the previously generated seed concepts in a collaborative way.

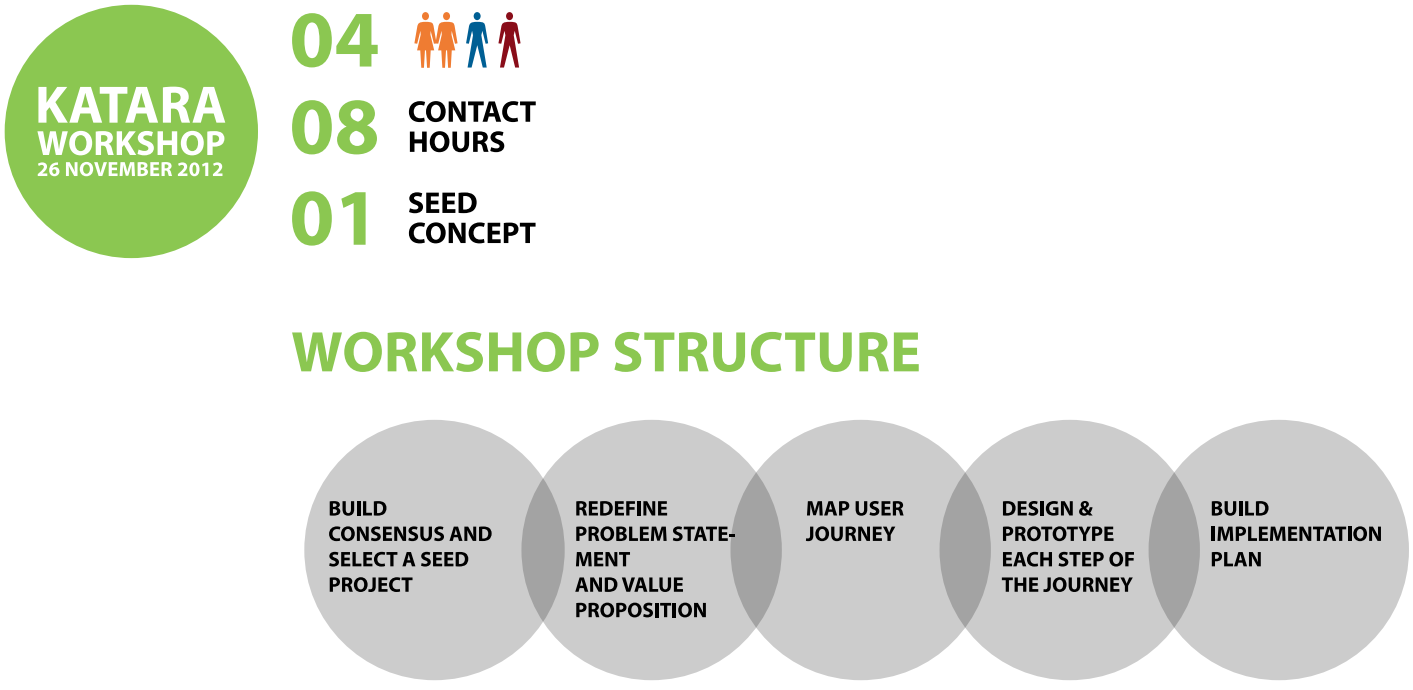


Figure 140- Workshop factsheet and structure.

Figure 141- Roll up poster displayed at the entrance of the workshop area.

The workshop started with a welcome note, a brief reflection on collaboration and the agenda of the day.

Sldie 1-
The first slide honed on the idea of partnership, motivation, competitiveness, inconveniences, servitude, trust, patience and communication for a successful collaboration. The students who attended the workshop were taking part for a first time in a hybrid team from Design, Business and Engineering. It was important to reflect on the attributes of a collaborative spirit before starting the workshop.

Sldie 2-
The scond one mentioned below was my agenda chart with additional three layers of information:

1- The objective of the step
2- The activity conducted to meet the objective
3- The requirements or resources needed to deliver the activity

Slide 1 - Collaboration

Slide 2 - Agenda

Slide 3 - Personal agenda with meta-data

Slide 4 -The seven seed concepts previous generated.

Figure 142- Slides for the multi-disciplinary lecture.

After reviewing the agenda, the students assessed the seed concepts generated from the previous workshops (see figure 150). Seven A3 posters were hung on the wall and the artworks below showcase the details of each concept.

Figure 144- Seed 1.

Figure 145- Seed 2.

Figure 146- Seed 3.

Figure 147- Seed 4.

Figure 148- Seed 5.

Figure 149- Seed 6.

Figure 150- Seed 7.

Students were asked to review and assess the 7 seed concepts posted on the wall. They used post-it notes to write their comments on each poster. Afterwards, a discussion articulated the expressed opinion and aimed to reach a consensus regarding which idea to select and develop during the workshop.

The students finally selected Seed #7:
Mobile Cooker: Making slow food a faster option.

Figure 151- Students assessing the seed concepts.

SEED 1
EAT, PLAY AND SHARE

SEED 2
INCLUSIVE AND EXCLUSIVE

SEED 3
NEW COOKING APPLIANCES AND OLD HEALTHY COOKING METHODS

SEED 4
HOME COOKED MEALS AND VENDING MACHINES

SEED 5
TUTU TRAIN: HEALTHY QATARI FOOD AND SIGHTSEEING AT QF

SEED 6
HEALTHY QATARI FOOD IN A PARKING LOT

SEED 7
MOBILE COOKER: MAKING SLOW FOOD A FASTER OPTION

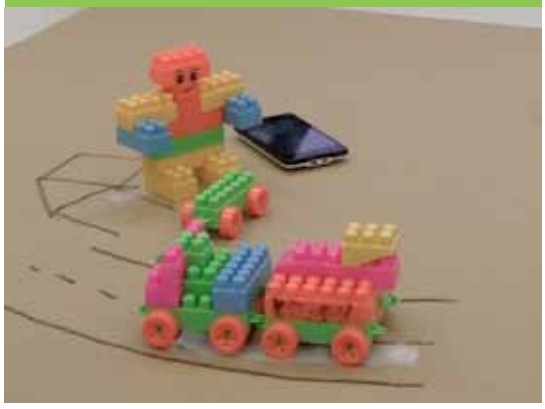


Figure 152- Students selected seed 7 for further study.

Figure 153- Students working on the problem statement.

The four candidates joined the last workshop after they were already initiated in their respective courses on design thinking as a process of inquiry and addressing the eating experience topic. Consequently, students were able to relate to each other using the toolkit and used the same vocabulary to articulate the process.

STEP 1:

The first activity for the workshop was to review the fact sheet of SEED7 and reflect on the problem statement for further development. The team built the user profile and redefined the user needs. The user's name is Abdullah, 22 year old male, Georgetown student majoring in Political Science, doesn't know how to cook, GCC national, lives in the student dorms and likes to eat healthy local/GCC cuisine. Twenty minutes were provided to cover this reflective step in a team based effort. The below figure documents the annotations of step 1.

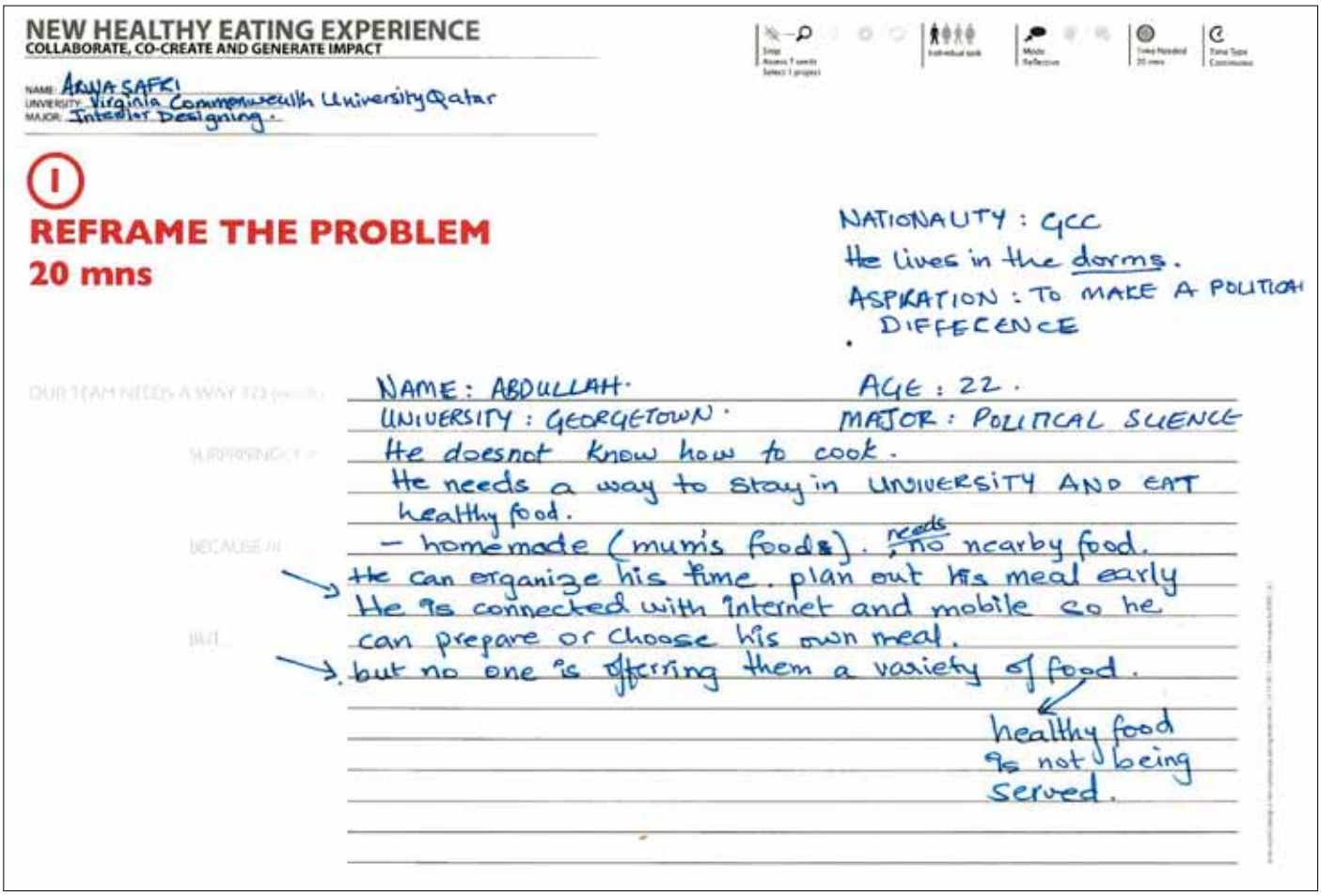


Figure 154- Redefining the problem statement.

STEP 2: IDEATION | BRAINSTORMING

The second step focused on developing the value proposition of the Mobile Cooker. The sample from the toolkit, as per figure 155, clarifies the key features of the concept. The main ideas suggested in the what if tool were: accessibility of healthy food (slow food reaching the user), making slow food faster (effective process to reduce the preparation time) and the variety of dishes from the Gulf region cuisine.

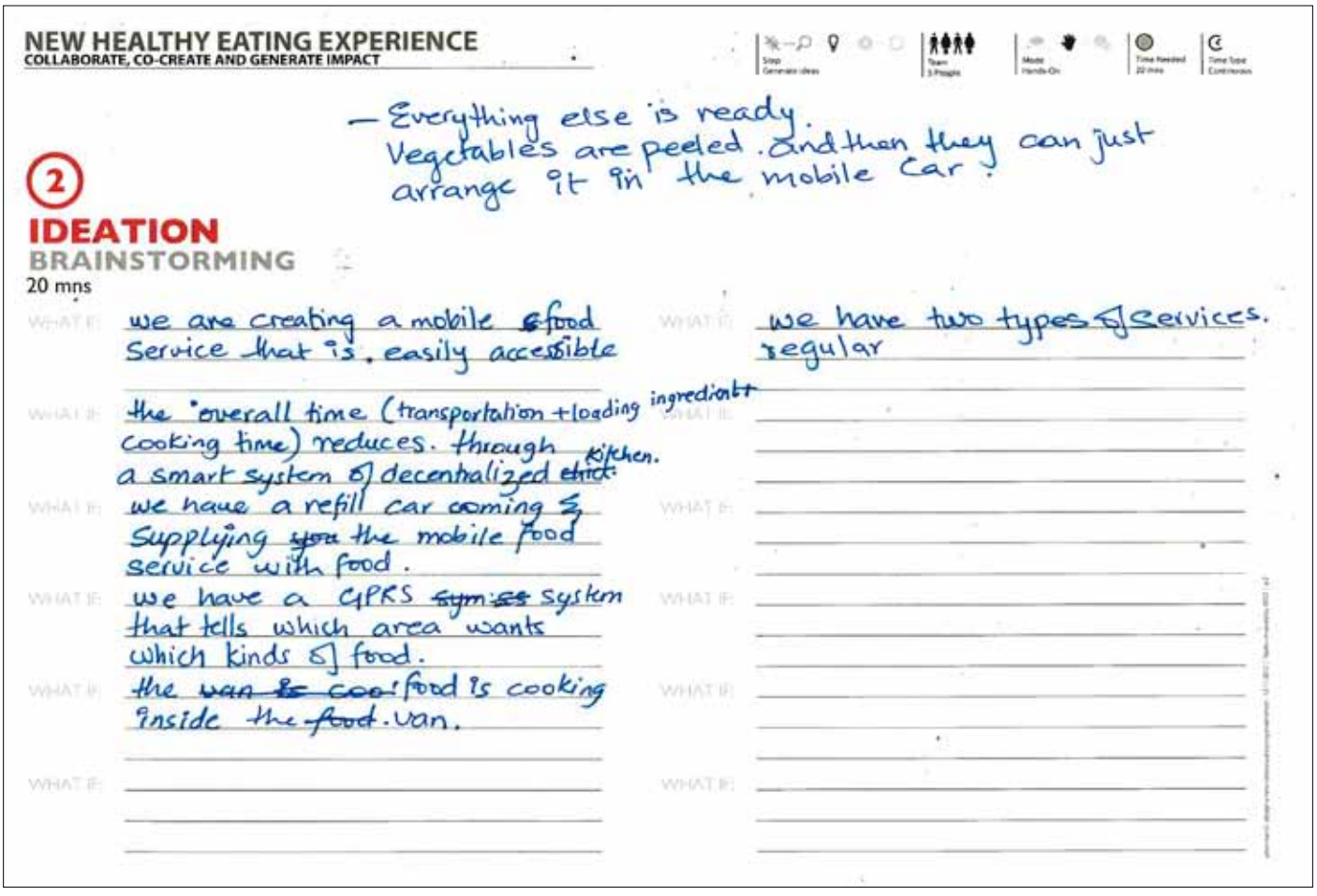


Figure 155- Ideation phase and the brainstorming step.

Step 3: Ideation: Detailed sketches

After the preliminary ideation phase, the students focused on generating sketches for the Mobile Cooker. The two design students sketched the ideas.

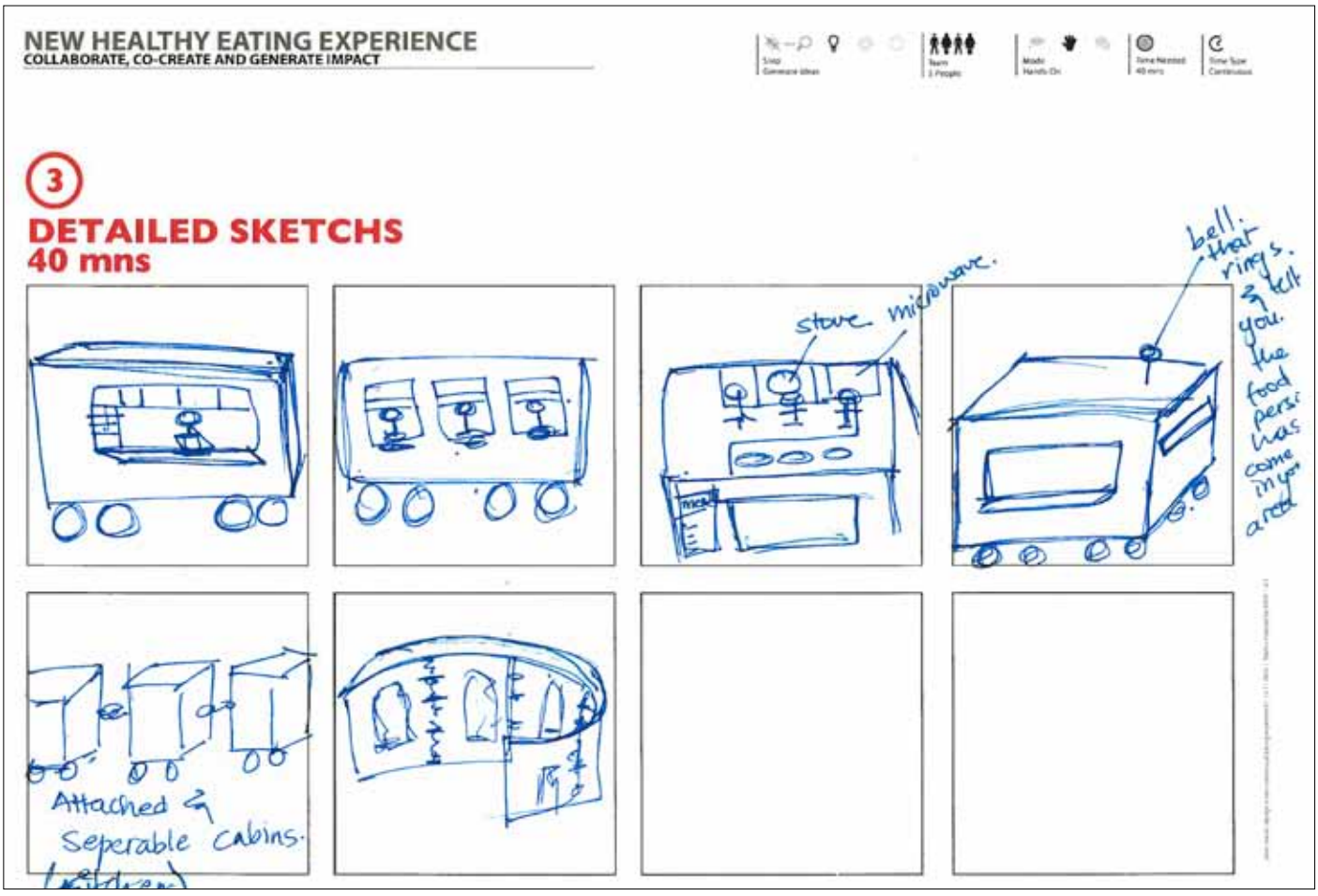


Figure 156- Ideation phase and sketching potential scenarios.

Figure 157- Sketching each step of the service.

At this point, the students realized that the generated sketches of the mobile cooker form an incomplete solution. The product formulated answers *what* the solution is yet *how* to deliver the service emerged as a challenge to be addressed. Consequently, they started to work on mapping the user journey and the milestones required to deliver the service.

The premise of the Mobile Cooker triggered another investigation that did not exist in the previous workshops. The students worked on the user-experience and service design components, which enriched their learning experience. They looked at the soft and hard resources required to deliver the business. They wrote and sketched the needed steps to deliver the service.

The problem became more tangible and quantifiable to the students as they advanced in the solution creation with confidence. Figure 157 points to the guideline generated by the students collected from their post-it notes. They finished this step in 40 minutes.

Step 4: Prototyping the service

The students engaged on this part with a clear idea of what should be done to create the experience. They used a cardboard for the mock-up base, drew the various stages of the service and used the building blocks to prototype the physical items required for the service. Below are few images to illustrate this stage.

	ACTIVITY	REQUIREMENTS
01	USER CALLS THE COMPANY	MAKE MENU ACCESSIBLE TO CUSTOMER
02	CALL RECEIVED BY CALL CENTER ADMINISTRATOR	CALL CENTER CALL ADMINISTRATOR
03	CUSTOMER PLACES ORDER	
04	ADMINISTRATOR REGISTERS THE ORDER	ORDER SYSTEM
05	ADMINISTRATOR REPEATS THE ORDER AND THANKS THE CUSTOMER	
06	ADMINISTRATOR IDENTIFIES THE CLOSEST VEHICLE TO THE CUSTOMER	GPS SYSTEM TRACKER ON VEHICLE
07	ADMINISTRATOR ASSIGNS THE JOB TO THE CLOSEST VEHICLE	SYSTEM INSTALLED IN VEHICLE TO RECEIVE THE ORDER
08	DRIVER AND CHEF RECEIVE ORDER IN THE VEHICLE	SYSTEM INSTALLED IN VEHICLE TO RECEIVE THE ORDER
09	CHEF PROCESSES THE ORDER DRIVER IDENTIFIES THE ROAD TO REACH THE CUSTOMER	CHEF: GOODS, COOKING APPLIANCES, SET UP. DRIVER: GPS SYSTEM
10	DRIVER HEADS TOWARDS THE CLIENT CHEF COOKS THE MEAL	
11	DRIVER REACHES CUSTOMER'S LOCATION CHEF PREPARES THE ORDER	
12	DRIVER TAKES MEAL FROM THE CHEF DRIVER DELIVERS THE ORDER	MOBILE PHONE
13	DRIVER DELIVERS TO CUSTOMER AND COLLECTS MONEY	WIRELESS PAYMENTCARD MACHINE, CHANGE

Figure 158- The service guideline described in 13 steps with the according actions and the resources needed.

Figure 159- Building the platform.

Figure 160- Marking the stages.

Figure 161- Finalizing the service prototype.

Figure 162- Finalizing the service prototype.

Step 5: Build the implementation plan

As students reached this step, a short introduction was given on Alexander Osterwalder's *business model canvas* tool. As defined by the author, it is "the logic by which an enterprise sustains itself financially" (Business Model You, p26) and "a business model describes the rationale of how an organization creates, delivers, and captures value" (Business Model Generation, p14).

Figure 163 – *The Business Model Canvas* worksheet (http://www.businessmodelgeneration.com/downloads/businessmodelgeneration_preview.pdf).

Figure 164– The business administration student leading this step.

The canvas helped the students to prototype their business model using nine blocks, an effective story telling tool used to quickly build a strategic framework for a business.

The student from CMUQ majoring in Business Administration was familiar with this tool and he supported the team during this step.

In parallel, the canvas provided the students another perspective to review the value proposition and develop a sustainable business model. The students finalized this step in 30 minutes. Finally, the students pitched their project to Ms. Yasmeen Hassan and Mr. Saleh Al Khulaifi from Bedaya Center (a training hub for start-up and a platform for entrepreneurs). They gave their valuable feedback to the group after a long challenging day.

Figure 165 – Students presenting the service and the business model.

Figure 166 clarifies the thesis journey and illustrates the various stages, from the topic study, developing tentative problem statements, selecting a more focused problem statement, to delivering workshops in VCUQ, TAMUQ, CMUQ and Katara Art Center. As the journey was concluded in the last multi-disciplinary workshop, it is worthwhile to reflect again on the thesis journey map. This map is a visual representation of another version documented in the appendices.

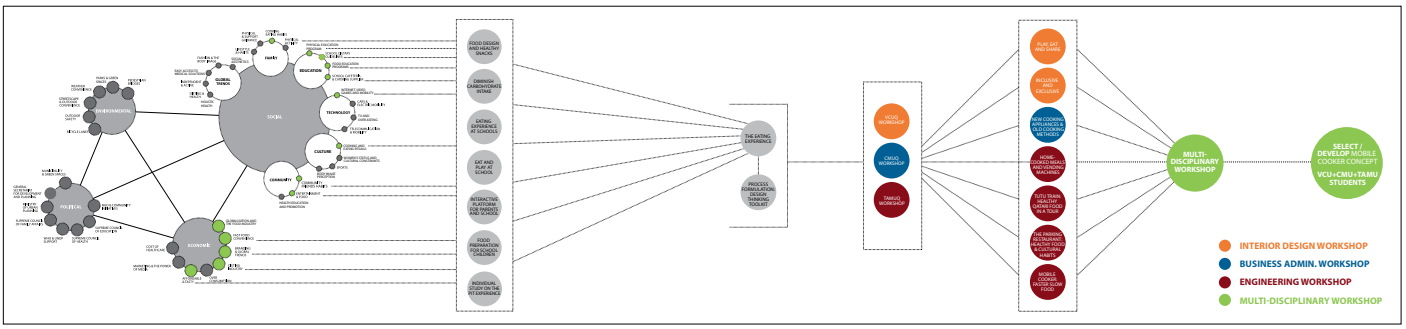


Figure 166 – The map of the thesis journey.

In summary, the inquiry delivered the program in various universities and interacted with students from design, business and engineering. The following graph summarizes all the workshop activities and their related details.

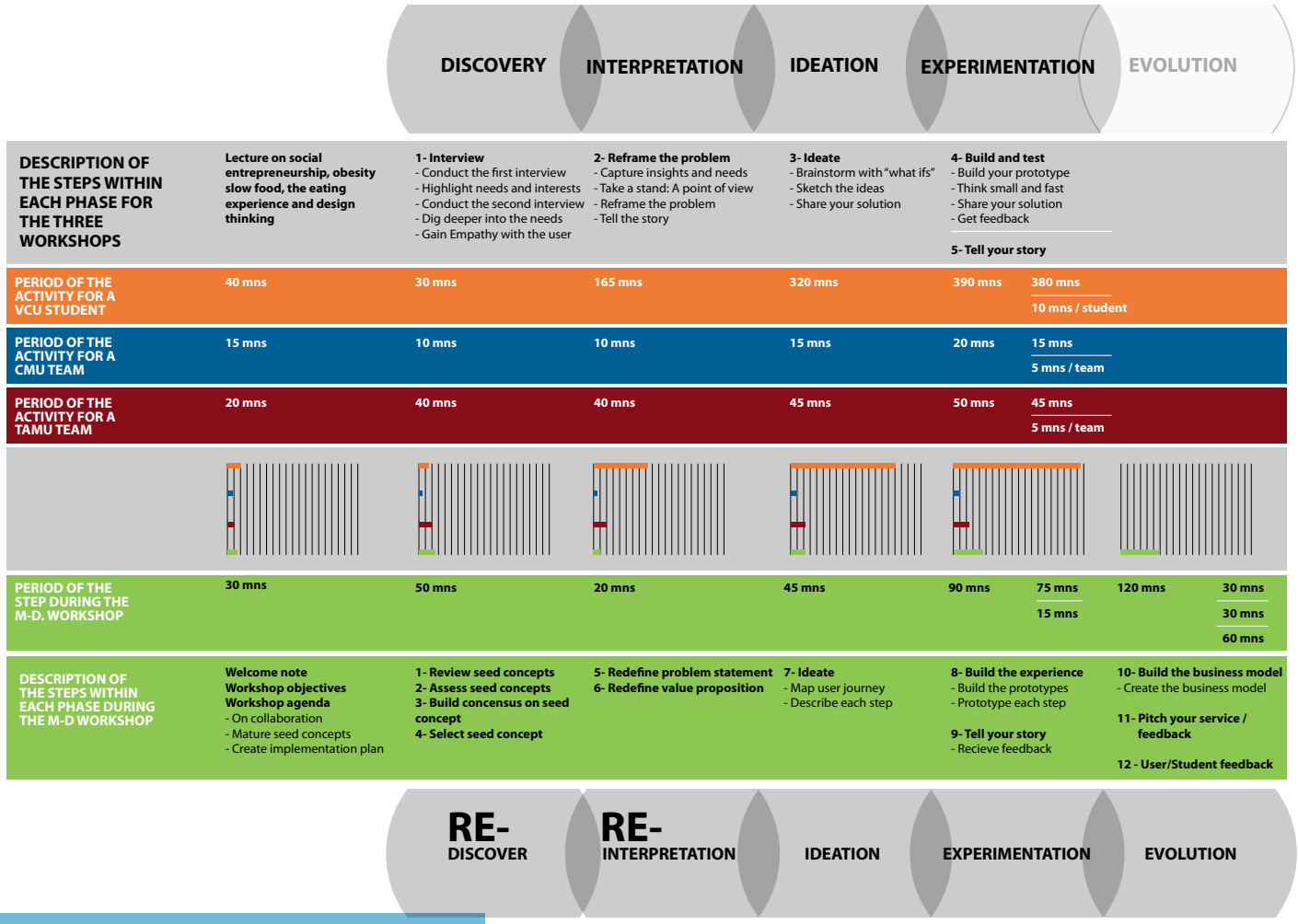


Table 3 – Summary of workshops and the related activities.

CONCLUSION

As mentioned in the beginning of the study, the aim of the thesis is to evaluate the response of undergraduate students (**users**) on the collaborative, human-centered, result-oriented principles of design thinking (**process**) while addressing the eating experience (**problem**), an articulated theme from the wicked problem of obesity within a unique geo-educational landscape (**platform**).

In a wider scope, the intent behind the study will gain further insights on the potential resources needed to **address the gap** between **social needs** and **higher education**, as highlighted in the NDS 2011-2016.

FINDINGS

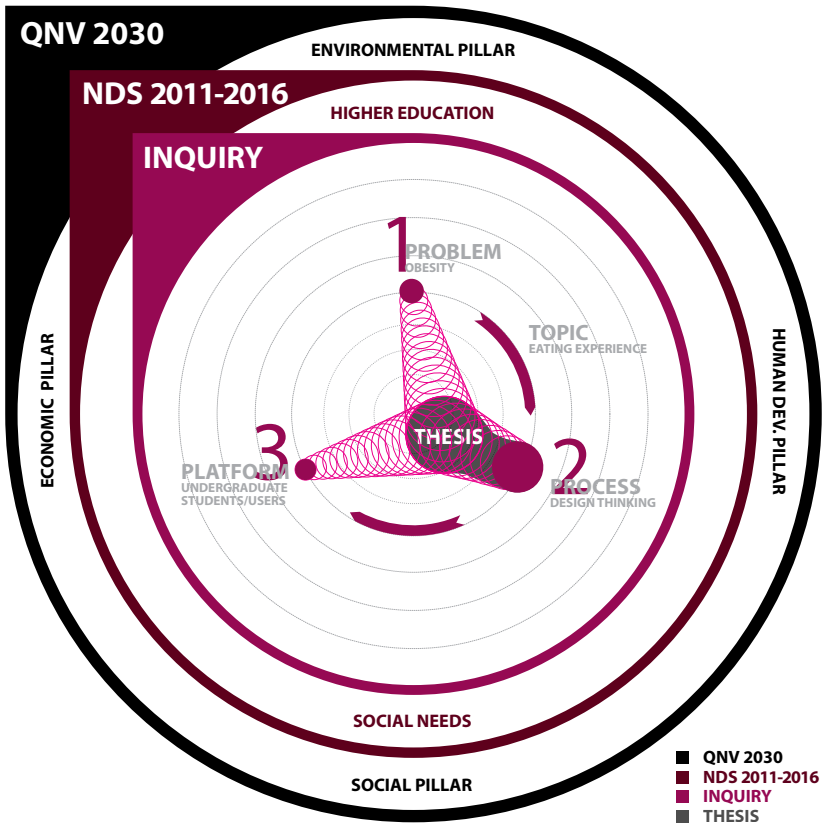


Figure 167 – Positioning the thesis within the inquiry framework.

2- The score sheets compiled the results of the feedback forms are documented in the appendices section.

The findings of the workshops were collected from three input channels; the feedback from the students (feedback forms[2] and interviews with students), interviews conducted with the faculty and personal observations. These findings will provide a deeper understanding on the performance of the design thinking in respect to the problem, process and platform, while addressing a soocially connected topic. The overall reading of the inquiry will point to opportunities that reduce the gap between social challenges and higher education.

How did the human-centered principle of design thinking perform in terms of connecting students to a social topic (a sub-problem of obesity)?

The findings on the human-centered principle as reported by the students during the three workshops came with the following scores:

Did the method facilitate the understanding of the user-needs?	
Design students	6.40 / 10
Business administration students	8.20 / 10
Engineering students	8.31 / 10

Table 4 – The students' assessment results on the user-needs aspect.

In addition to the forms, interviews with the students provided further insights on the performance of the user-centered principle.

Najd noted that initially "I didn't think that the context of food or how we ate is important. The workshop was eye-opening. After walking out, I became more observant as to why people eat the way they are eating. Especially the elders in the family, I didn't notice the traditional habit how they experience food until this workshop, I became an observer." For Arwa, she noted that the user-centered principle is an unfamiliar approach in terms of "the first time meeting the user and focusing on the personality." Emilie mentioned that in the course of understanding her user, she "didn't use lot of questions that start with why, I didn't have an open-mind to ask why. I'm not used to ask why." Since the interview with Emilie occurred one week after the workshop, she mentioned that she is using the design thinking method on a running project as "it really helped me to get to the problem. Thinking about the why and focused on needs finding provided me a rewarding starting point." She added that so many students were confused on what was requested, "because we are not used to have something broad, we always had a paper, that is what we want, that's how it is going to work, that's what you will do, that's what you are going to include. But this time it was broad and we were lost. But I think once you have that and you go with it, it will help." Also Arwa noted that "we didn't know what we were going to make, it was a confusing point." The problem solving mindset of the students was impaired within the state of an ill-defined problem.

On the other hand, students managed to emerge from confusion to clarity during their inquiry. Sara noted that as her partner "progressed in her questions, she achieved a deeper knowledge of me. Than things progressed better, needs emerged."

As for the students' feedback[3] from the multi-disciplinary workshop, they related to the user-centered approach as a means to understand further the eating experience topic and obesity in general. Another interior design student noted that "even if you are not impacting anyone, at least I have the concern of changing and understanding the issue."

3- The feedback from the students was documented in an interview at the end of the workshop.

As per the faculty, Prof. Kinnemark from the interior design workshop acknowledged the interplay between "the personal and the broad areas of the eating experience brief provided the students a great topic for investigation." The relevance of the personal-broad and ill-defined status of problem invited the students to connect with society. From the same workshop, Professor Al-Mumin underlined that "the process was clear in the way it was set up and the students were surprised from their own findings." These reflective situations provided a space for self-awareness, the awareness of others in relation to the societal topic. Dr. Bachir noted that the workshop "made them think beyond engineering while they remain engineers." Also, it made them think "more in terms of humanity and how can they be useful members of the society, other than the expertize of what they have." He continued on "problems, which are non-engineering problems, are also their problems. They have to think about them and bring their engineering knowledge to it. Developing that character requires acknowledging your environment. This workshop made the problem a common problem and readjusted their thought process."

As observed, the majority of students related to the user-centered approach, inquired on behaviors, traditions and social trends. Those themes represent important areas of research for the interior design and business students whereas they are further away from the engineering discipline. With or without this stretch, students identified with the user-centered approach and connected to the social topic.

For the interior design workshop, half of the class focused their questions on user-needs while using questions that start with why. Students articulated the user-centered approach with ease and achieved a deep understanding of their users within the context of the social topic. Yet the other half of the class was confused and did not relate to the fact that they needed to focus on user-needs and formulate their problem statement based on the insights gained from the interviews. In addition, during the course of understanding their users, they got confused between the needs and wants.

Hence it is worthwhile to recall the high stress level as a reaction to the emerging state of ambiguity and an ill-defined problem. The stress factor is an indicator that contrasts the unfamiliar engagement of the students on ill-defined problems with their familiarity to well or relatively defined during their education.

On the other hand, during the intensive workshop for the business administration students, they formulated well-targeted questions toward a deeper understanding of their partner's needs. The insights

generated from the interviews helped the teams to understand key issues from the user perspective and contextualized the captured value in relation to the social topic. The insights gained from the interviews were strategically interpreted and benefited from. It was easy to sense the comfort level of the students in articulating the content. Despite the fast pace of the workshop, they followed the steps and navigated the process with ease. The rated the user-centered approach with high scores.

Similar to the workshop for business administration students, the engineering students focused on user-needs with well-articulated questions that started with *why*. They applied the process with its descriptive steps. Consequently, they identified core behavioral patterns and trends in the society that were smartly converted into transformative opportunities.

As students reacted differently within each workshop, their emotional state fluctuated from the beginning to the end of each session. The below table provides the scores on the mood of the students during the three workshops.

Mood analysis	Start	Middle	End
Average score for Design students	4.75 / 10	3.60 / 10	4.97 / 10
Average score for Bus. admin students	5.65 / 10	6.90 / 10	8.85 / 10
Average score for engineering students	6.22 / 10	6.91 / 10	8.25 / 10

Table 5 – Mood scores of the students in the beginning, middle and at the end of every workshop.

As per the student's reflections, the data points out that design students were almost neutral in the beginning, more stressed in the middle and neutral toward the end of the workshop. The business administration and engineering students equally felt neutral in the beginning of the workshop and became more comfortable as the session progressed.

As for the multi-disciplinary workshops, students were already introduced to design thinking and additionally immersed themselves in a reflective experience. A business administration student highlighted the cognitive and ethical benefits of the workshop. "By knowing why the challenge happened, you become responsible" he stated.

The insights gained from the four workshops conclude that the design-led inquiry provides ample evidence that the user-centered approach bridged the gap between the uncertainty of real-world problems and the relative certainty of the problems in the classroom. Hence, the inquiry enabled the students to examine and respond to a social topic through a user-centered approach. It provided the students with a new point of departure to understand a social topic. Through the alternation of the roles between an interviewer and an interviewee, students gained key insights and built their own definitions or reality of the social problem. A deep sense of awareness emerged through their reflective thinking. This level of awareness provided students in the last workshop a sense of responsibility.

How did the results-oriented principle of design thinking perform in terms of getting students to develop applicable insight toward the social topic?

The findings on the result-oriented principle as reported by the students during the three workshops came with the following scores:

How did the method facilitate the creation of implementable ideas?	
Design students	6.68 / 10
Business administration students	8.45 / 10
Engineering students	8.19 / 10

Table 6- The students' assessment results on the result-oriented aspect of design thinking.

As per the faculty, Dr. White was "impressed that the teams has been productive to generate novel ideas" within the provided 50 minutes in the workshop. In addition, Dr. Bachir supportively stated that "what you did helped them see that there are actual applications for ethics." The applied nature of the process provided tangible results that embody the ethical arguments in the generated ideas.

As observed, students from all disciplines responded to the eating experience topic with tangible products and services using the design thinking toolkit. It is worthwhile to note that the generated prototypes were linked to the speculative and sketched ideas to address the "what if" questions. These questions themselves were based on the formulated brief that responded to the identified gaps from the insights, previously harvested from the interviews with the users. This scafolding effect of the process linked the conversion of the user insights (whether the students focused on the needs or wants) into tangible outcomes and prototypes. Hence, the interior design students who did not formulate well-targeted questions on the user–needs reached the interpretation phase with less rigorous insights, formulated tangent problem statements and "what if" scenarios. Consequently, the resulting sketches did not address user-needs. Nevertheless, the same group of students related to the overall process, developed their sketches and produced the prototypes.

During the business administration workshop, the tight schedule mandated a 10-minute period for each step of the process. In the ideation phase, students felt more comfortable using the building blocks toolkit to prototype their ideas instead of sketching them.

The investigation section provides evidence that each team generated tangible results to address the social topic. The generated prototypes from the three

workshops were reviewed and a few were selected based on the originality of the idea, the potential for further development, contextual relevance and potential implementation in the market. The selection criteria were not far from the desirability, feasibility and viability lenses of design thinking.

Seed concepts selected from the workshops for the last multi-disciplinary workshop:	
Workshop with the Interior design students	2
Workshop with the Business administration students	1
Workshop with the Engineering students	4

Table 7- Number of seed concepts selected from each workshop.

Unlike the workshops delivered to design, business and engineering students, the last one focused on developing one seed concept and looking into the implementation phase. Students selected the "Mobile Cooker" idea, developed the service blueprint and drafted the business. One of the students majoring in business administration reflected on the process as he "learned something new, how to create ideas into reality. It is a good tool to innovate and bring ideas through collaboration. Knowing a challenge and why issues happen, you become responsible." This reflective anecdotal evidence provides an interesting indicator on the cognitive and ethical impact of this academic experience on the students.

The insights gained from the workshops indicate that the result-oriented princpline of design thinking facilitated the creation of tangible and desirable outcomes for the users. The investigation section provided ample evidence that the result-oriented process is an effective resource to convert user-needs into tangible outcomes. The transformation from gained knowledge into a tangible (product) or an intangible (service) outcome indicates the validity of the process to generate a contextual value while addressing a social topic.

How did the collaborative principle of design thinking enable students to interact among each other and engage on a social topic?

The findings on the collaborative principle as reported by the students during the three workshops came with the following scores:

How did the method facilitate collaboration?	
Design students	6.76 / 10
Business administration students	8.70 / 10
Engineering students	8.45 / 10

Table 8- Students' scores on the collaborative aspect of design thinking.

As stated in the interview with Sara from the interior design workshop, she acknowledged that through "collaboration, we can achieve a deeper learning on the topic." The linkage between the benefits of collaboration as a means to attain knowledge was profoundly voiced in this statement.

As observed, students effectively collaborated to address the social topic. Whether they were in a team of two or five, students managed to communicate effectively, respected each others' opinions and built upon them. The frustrations that rose from the ambiguity factor in the design workshop did not hinder the collaborative spirit of the students. They focused on the process and achieved deeper insights. The frustrations were reflected in the low scores.

As for the business administration students, they responded to the eating experience theme, focused as teams to generate meaningful insights, created the briefs, ideated and prototyped interesting value propositions in 50 minutes. The process channeled their efforts to complete each step together. Professor White noted the "buzz" during the workshop as teams successfully collaborated during the workshop and generated tangible ideas.

The engineering students worked effectively as teams and navigated the two sessions with a collaborative spirit. Teams followed the steps and benefited from the hints mentioned in the toolkits. Their assessment on collaboration posted a high score for both sessions. Similar to the results posted on the user-centered and the result-oriented principle, section B scored more than section A on the collaboration principle as they had an additional day to develop their material.

It is worthwhile to note that the thesis measured the collaborative principle of design thinking without taking into account the "radical" collaboration approach by IDEO. Their approach relies fundamentally on the multi-disciplinary engagement and the interaction with various stakeholders. Since the absence of an academic platform did not favor the encounter of an eclectic audience of students to collaborate and co-create, consequently, each workshop measured the feedback of the students on collaboration in a disciplinary environment.

Beyond assessing the collaborative principle of design thinking, students were asked in the feedback form to enroll in a last multi-disciplinary workshop. This question aimed to measure the students' need to experience a broader sense of collaboration. Their reply came as follows:

Do you wish to participate in a last multi-disciplinary workshop?	
Design students	4 / 20
Business administration students	0 / 10
Engineering students	12 / 51
Total	**16 / 81**

Table 9 – Number of students enrolled in the last multi-disciplinary workshop.

Najd from the interior design student noted that a multi-disciplinary workshop "is a perfect combination. It wouldn't constrain the process, from an engineering and business. It will be much richer if we are a team." Although she did not participate in the last workshop, her reflections suggested that the process enabled the interaction between disciplines to generate value.

Beyond the disciplinary feedback on collaboration, the last multi-disciplinary workshop provided ample evidence on the impact of this experience on the students.

As per the collected figures, 81 students participated in three workshops and 16 signed up for the last workshop. Almost 20% of the students were interested in a multi-disciplinary interaction. Afterwards, 13 students apologized for not being able to attend the last workshop as they were overloaded with

projects and exams. In addition, one student from business administration changed his mind and joined the workshop. Finally, 4 students attended the workshop, a 5% figure from the original 81 students. Dr. White noted that the "students are overwhelmed about their responsibilities along their studies". He inquired on the "incentives for the students to participant in multi-disciplinary interaction". Both presented reflections showcase the workload and the absence of incentives as key insights to achieve multi-disciplinary collaboration.

As for the findings from the multi-disciplinary workshop, it was the first time that the four participants from design, business and engineering majors collaborated on a project. When asked about how they managed to attend the workshop, two students noted that they were available as they already finished their capstone projects. Whereas the other two students noted that they were interested in the multi-disciplinary experience and wanted to attend although they had a considerable workload for the weekend. These two students put an additional effort to explore multi-disciplinary education.

As they started the journey, they reached a consensus on the selection of the seed concept and used the design thinking toolkit for the workshop. Consequently, the process aligned the vocabulary and the expectations of all team members during the last inquiry. Students collaborated effectively and built upon each other's contributions. The hybrid team came along with a collaborative spirit, leveraged by a shared interest and enriched from their differences. Each member brought different skills, knowledge and their familiarity to the process from the previous workshop. Dialogue and constructive communication provided the means to exchange knowledge between team members. The feedback of the engineering student highlighted the benefits of multi-disciplinary collaboration as "teamwork helps the exchange of knowledge and get new knowledge that we don't have. This type of collaboration pushes new ways of learning."

To conclude the analysis on collaboration, the design-inquiry provided ample evidence that the collaborative principle of design thinking bridged the knowledge gap between individuals enrolled in different academic institutions to collectively engage on a social topic. Within the course of understanding others and societal issues, self-awareness was also attained. Collaboration facilitated the creation of tangible outcomes to harvest the learning process. Hence, collaboration acted as a means to create value and as an end to build an ethical and responsible human capacity. The last multi-disciplinary workshop nurtured the students with an ethical and responsible capacity while addressing a social topic.

On the other hand, the inquiry had to interact, inspire and recruit individuals from various disciplines in order to attain a multi-disciplinary experience with four students. Hence, collaboration in its broad sense and the value generated on social issues will remain both unexplored within the current disciplinary divide. The obstacles that hinder the realization of these transformative learning experiences for undergraduate education are the workload and time constraints as reported by the students in addition to the absence of incentives as noted by Dr. White.

The following table summarizes the scores of the performance section:

	Human-centered	Collaborative	Result-oriented
Design students	6.40 / 10	6.76 / 10	6.68 / 10
Business administration students	8.20 / 10	8.70 / 10	8.45 / 10
Engineering students	8.31 / 10	8.45 / 10	8.19 / 10

Table 10- Summary of scores for the human-centered, collaborative and result-oriented aspects of design thinking.

As per the overall assessment by the students, we conclude that the ill-defined nature of the topic has impacted the scores on the principles of design thinking and the inquiry in general. In another note, Professor Kinnemark pointed out to the need to focus on the process and "its stage of analysis as it is somehow been forgotten because of other skills they needed to learn. This is really the content, the meaning, what makes things. I really appreciated the direct steps on the method. It is about critical thinking, and the process was more exposed to them." On the same note, Professor Al-Mumin noted the relevance and the value of this process in contrast with their current practice.

CONCLUSION

Given the findings of the inquiry on the performance of design thinking, what is the potential to close the gap between higher education and a social topic in higher education?

To summarize the performance of the three principles of the design thinking, the user-centered approach bridged the gap between the uncertainty of real-world problems and the relative certainty of problems in the classroom. It provided a new point of departure to generate a deeper understanding of the self and others within the social construct.

The result-oriented principle bridged the gap between the gained knowledge from individuals and value creation for societal development. Transforming knowledge into societal value presents itself as a means to achieve a sustainable knowledge based economy.

The collaborative principle bridged the gap between students, academic institutions and social needs. Collaboration is an indispensible means to generate value and build an ethical human capital.

Consequently, the benefits harvested from the activation of design thinking holding the three principles provide evidence that the method is a relevant resource to gauge the gap between higher education and social topics, whether they are relatively defined challenges or wicked problems. In addition, the inquiry has successfully navigated the academic landscape (platform), implemented the process and activated the students' (users) engagement on the social topic (problem).

The cognitive impact on the students resulted in a mind-shift in regards to their role as scholars in society. These students experienced the ethical and innovative attributes of a required human capacity to address complex social challenges.

This provides evidence that the student experienced a transformative academic inquiry that engaged, responded and generated further insights how to the gap between higher education and social needs. The inquiry explored the ethical and innovative human capital required to address the complex interplay between higher education and social needs. Closing the gap between the higher education and social needs will generate ethical, adaptive, collaborative and innovative human capital. The later is an indispensible resource to meet the targets published in the National Development Strategy 2011-2016 and achieve QNV 2030.

CONCLUSION

The thesis presented covered various areas of interest and revealing opportunities for further study. The Problem, Process and Platform clusters point out to the emerging topics.

On the problem
First, it will be beneficial to enact the wicked problem of obesity on a wider audience of students and test their response. Potential engagement on various themes related to obesity will provide a breadth of research opportunities.

Second, integrating another social challenge from the NDS 2011-2016 such as water consumption or road safety will provide further insights on how it will be articulated and reacted to the topic.
Third, the thesis identified an interesting area of research and poses the question of how to articulate ambiguity during the pursuit to understand ill-defined social themes in undergraduate education? Further study needs to look into this state of uncertainty and the required resources to equip the students with methods and tools to achieve clarity.

On the process
First, the study underlines the need to explore further the reactions of a wider audience of disciplines toward the method. This will deepen and widen our understanding on its effectiveness and relevance in this academic landscape, while addressing social topics, whether ill or relatively defined.
Second, an interesting area of research will be to look into contextualizing design thinking and what will be the resulting region-centered approach.

On the platform
Further study on multi-disciplinary education for undergraduate students would provide a deeper and wider understanding on the resources needed to achieve an innovative and holistic human capacity.

By looking at the problem, process and platform components, the thesis points out to various opportunities for further research and engagement on social challenges within the context of higher education. Further study needs to look into how to engage students from various disciplines through systems thinking and holistic thinking on social challenges. In these transformative academic situations, further research will investigate the benefits for the students and design-led education in addition to emerging social impact.

APPENDICES

Tangential research

Two interesting projects were identified while exploring the topic of obesity.

Topic 1:

How old and existing healthy recipes can be re-designed to trigger new eating experiences?

Topic 2:

How can we learn the eating rituals of bedouins and re-discover them in today's eating experiences?

	ST 1	ST2	ST3	ST4	ST5	ST6	ST7	ST8	ST9	ST10	ST11	ST12	ST13	ST14	ST15	ST16	ST17	ST18	ST19	ST20	Total pts	AVR.
METHOD ASSESSMENT																						
Understanding user needs	6	7.5	8	8.5	2	8	5	6.5	6	5	8	9	5	5	7	5.5	8	9.5	4.5	4	128	6.4
Generate insights	5	8	6	7	2	7	6	7.5	5	8	8.5	7.5	5	6	9	5	6	8	5	6	127.5	6.375
IDEATION / Explorations	7	8.5	5	9	6.5	6	4	7.5	3	6	6	5	4	5	9	6	4	9.5	6	7	124	6.2
Prototyping explorations	10	8.5	6	8	3.5	7	5	7.5	5	5.5	5	9.5	5	7	8	7.5	7	7.5	9	9	140.5	7.025
Workshop time structure	4	7	3	10	4	4	4	7.5	2	4.5	7	4	4	4	6.5	2.5	4	6	8	6.5	102.5	5.125
Method facilitated innovation	6	8.5	7	9	8	5	5	7.5	-	7.5	8	6	4	4.5	7.5	4.5	6	7	8	8	127	6.68421053
Method facilitated collaboration	6	9	7	9	8	4	4	8	-	7.5	9	5	5.5	5	7	4.5	6	8	8	8	128.5	6.76315789
WORK ASSESSMENT																						
Innovation leap	7	8	7.5	9.5	5	5	5	4.5	8	8	7	10	4	6.5	7	8.5	7	9	6	-	132.5	6.97368421
Desirability of your partner's solution	10	8	7.5	9.5	7	8	4	4.5	4	4.5	9	9	7	7.5	8	9	8	9	8.5	-	142	7.47368421
ASSESS YOUR FINDINGS FROM YOUR USER																						
Emotional	7	9	8.5	8	7	8	5	8.5	4	9	8	4	7	6	7	7	8	9.5	7	7	144.5	7.225
Rational	4	9	7	9	4	7	5.5	7.5	3.5	4.5	3.5	4.5	5.5	6	8	7	6	6.5	7.5	4.5	120	6
Behavioral	8	9	7	9.5	3	8.5	5	7.5	5.5	4.5	9	8.5	8	6	9.5	7	7	9	7	7	145.5	7.275
Physiological	8	9	7	10	6	8	5	8.5	2.5	9	5.5	8	5.5	6	7	7.5	3	5	7.5	-	128	6.73684211
Socio-cultural	5	9	8	10	7	6	5	8	5	6	7	10	4	7	9	9	4.5	9.5	7	8	144	7.2
Environmental	9	9	9	7.5	3	-	5	7	4	6	9.5	2	4	5	6	8	8	9	7	-	118	6.55555556
WORKSHOP OVERALL ASSESSMENT	5	7	7	-	4.5	5	-	7.5	7	7.5	7	6	6	6	8	7	7.5	6.5	-	7	111.5	6.55882353
MAP YOUR EMOTIONS																						
Start	2	2	8	2	1.5	1	5	7.5	5	6	5	2	1.5	7.5	10	10	2	9.5	2.5	5	95	4.75
Middle	4	3	6	3	3.5	5	2	1.5	5	3	2	3	3	5	6	3.5	4	3.5	5	1	72	3.6
End	8	7	1	9.5	10	1	1	5.5	1.5	10	1	10	7.5	2	1	5	4	4	3	7.5	99.5	4.975
MAP YOUR FUN LEVEL																						
Start	4	6	8	9	1.5	5	5	5.5	5	9	10	7	1	6	9	10	10	10	-	5	126	6.63157895
Middle	10	8	7	5	5.5	5	2	6.5	2	2	7	7	4	4	2	8	7	9	-	2.5	103.5	5.44736842
End	5	7.5	4	7	8	5	1	8	1	9	2	10	7	7.5	8	9	6	5	-	6	116	6.10526316
MODERATOR ASSESSMENT																						
Clarity explaining the workshop	4	7	6	8	3	2	2	3.5	5	6	3	3.5	3	4.5	6.5	5.5	6	5	2	4.5	90	4.5
Facilitating, mentoring and inspiring	9	8	5	7	4	3	2	8	4	7.5	4	9	3	6	5	4	5	5.5	2.5	5.5	107	5.35
Support your progress	9	8	3	8	6	3	2	9.5	2.5	7.5	2.5	8	6	9	6	5.5	7	6	7	7.5	123	6.15
Knowledge on the subject	6	9	7	9.5	7	8	2	7	6.5	10	6.5	10	3	7	9	9	7.5	8	6	10	148	7.4
APPLY METHOD LATER?	MAYBE	MAYBE	MAYBE	MAYBE	YES	MAYBE	MAYBE	-	-	MAYBE	YES	MAYBE	MAYBE	MAYBE	YES	MAYBE	-	YES	YES	MAYBE	5 YES/12 MAYBE/3 NR	
PARTICIPATE IN WORKSHOP?	NO	NO	NO	NO	NO	-	NO	NO	NO	NO	YES	MAYBE	NO	NO	YES	NO	NO	NO	YES	YES	4 YES / 15 NO / 1 NR	

Table 11- Score sheet of the interior design students.

		ST 1	ST2	ST3	ST4	ST5	ST6	ST7	ST8	ST9	ST10	Total pts	AVR.
METHOD ASSESSMENT													
Understanding user needs		6	10	5	7	8	10	9	8	9	10	82	8.2
Generate insights		7	10	8.5	7	8	7	7	5	9.5	10	79	7.9
IDEATION / Explorations		9	10	7.5	7	8	8	7	10	9	9	84.5	8.45
Prototyping explorations		4	10	9.5	7	8	8	6	2	9	10	73.5	7.35
Workshop time structure		6	10	5.5	7	9.5	6	3	4	10	7	68	6.8
Method facilitated innovation		6	10	9	7	9.5	9	8	10	9	7	84.5	8.45
Method facilitated collaboration		9	10	7.5	7	9	9	8	9.5	9	9	87	8.7
WORK ASSESSMENT													
Innovation leap		7.5	10	10	5.5	9	8	7	9	9.5	8	83.5	8.35
Desirability of your partner's solution		7.5	10	9.5	5.5	9.5	8	8	6	9.5	8	81.5	8.15
MAP YOUR EMOTIONS													
	Beginning	3.5	5.5	7	5.5	7	5.5	7	5.5	5	5	56.5	5.65
	Middle	6	10	8	5.5	7.5	5.5	5	5.5	8	8	69	6.9
	End	8	10	9	5.5	9	10	9	8	10	10	88.5	8.85
MAP THE COGNITIVE LEVEL													
	Beginning	1.5	5	0	10	7	1	5.5	3	2	10	45	4.5
	Middle	6	7.5	5	10	7.5	5	7	6	5.5	10	69.5	6.95
	End	8	10	10	10	9	10	7	9	9	10	92	9.2
MAP YOUR FUN LEVEL													
	Beginning	3.5	5	8	5.5	3	3	5.5	2.5	5	7	48	4.8
	Middle	8	10	7.5	5.5	7.5	10	7.5	9	7.5	8	80.5	8.05
	End	7	10	9.5	5.5	9	10	8	5	10	10	84	8.4
ASSESS THE OVERALL WORKSHOP		7	9	8	7	8.5	10	7.5	8	10	9	84	8.4
MODERATOR ASSESSMENT													
Clarity explaining the workshop		3	10	8.5	7	8	10	7	3.5	5	9	71	7.1
Facilitating, mentoring and inspiring		8	10	9.5	7	8	7	8	5	7	1	70.5	7.05
Support your progress		8	10	9	7	8	10	7	9	9	10	87	8.7
Knowledge on the subject		8	10	9	7	7.5	8	9.5	9	9	10	87	8.7
Is it your first workshop on socially connected problem?		YES	YES	YES	YES	YES	YES	YES	NO	NO	YES	8 YES	2 NO
Are you interested in exploring further similar workshops?		NO	NO	NO	NO	-	NO	NO	NO	YES	NO	1 YES / 8 NO / 1 NR	
Will you consider using this method in your projects?		MAYBE	MAYBE	MAYBE	MAYBE	MAYBE	MAYBE	MAYBE	MAYBE	MAYBE	MAYBE	10 MAYBE	
Do you wish to participate in a multi-disciplinary workshop?		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO		10 NO

Table 12- Score sheet of the business administration students.

		ST 1	ST2	ST3	ST4	ST5	ST6	ST7	ST8	ST9	ST10	ST 11	ST12	ST13	ST14	ST15	ST16	ST17	ST18	ST19	ST20	Total pts	AVR.
METHOD ASSESSMENT																							
Understanding user needs		9	8	10	-	6.5	10	7	6	6	6	8	8	10	9	8	8	8	8	9	10	154.5	8.131578947
Generate insights		10	9	7	10	8.5	10	8	7.5	7	9	9	7	9	8.5	7.5	9	8	6	8	10	168	8.4
IDEATION / Explorations		9	7	4.5	-	8	10	5	8	8	3	7	8	-	8	8	9	9	8	10	10	139.5	7.75
Prototyping explorations		8	9	3.5	8	9	10	4	7.5	7	1	8	8	9.5	8.5	7.5	7	8	7	7	10	147.5	7.375
Workshop time structure		10	9	5	5.5	7.5	10	4	4	8	6	3	8	8	8	7	9	7	7	7	10	143	7.15
Method facilitated innovation		9	8.5	6	10	9	10	7	6	8	6	7	8	9.5	7	7.5	9	9	7	8	10	161.5	8.075
Method facilitated collaboration		10	9	8.5	10	8	10	9	6.5	8	6	7	8	8	6.5	8.5	9	8	7	4	10	161	8.05
WORK ASSESSMENT																							
Innovation leap		9	8	8	3.5	5	7	-	5	5	7.5	5	6	9	8	6.5	9	8	7	8	10	134.5	7.078947368
Desirability of your partner's solution		10	7	8	3.5	7	7	-	7	7	6	7	6	10	8	6	9	8	7	9.5	10	143	7.526315789
MAP YOUR EMOTIONS																							
	Beginning	10	7	4	-	5.5	8	5	5	5	10	5	7.5	10	8.5	5.5	5	5	8	1	10	125	6.578947368
	Middle	5	8	5	-	7	8	5	5	5	10	1.5	7.5	-	7	6	8	3	8	5	10	114	6.333333333
	End	1	9	6	-	9.5	8	5	5	5	10	1.5	7.5	-	6.5	9	10	9.5	8	10	10	130.5	7.25
MAP THE COGNITIVE LEVEL																							
	Beginning	10	8	7	1	5	8.5	3	5.5	2	1.5	1.5	8	9	6.5	3.5	3	4	1	2.5	10	100.5	5.025
	Middle	10	9	7.5	10	6	8.5	5	5.5	2	1.5	6	8	-	7	5.5	5	2.5	6	5	10	120	6.315789474
	End	10	8	8.5	10	8	8.5	8	5.5	10	9.5	4	8	-	8.5	8.5	7	9.5	10	9	10	160.5	8.447368421
MAP YOUR FUN LEVEL																							
	Beginning	6	9	5	1	5.5	9	3	6	2	1	2	2	10	7	3.5	3	8.5	6	1	10	100.5	5.025
	Middle	9.5	9	6.5	5	6.5	9	5	6	4	1	4	4	8.5	6.5	5	5	9.5	6	5	10	125	6.25
	End	7.5	9	8.5	10	8	9	8	6	6	9	3	8.5	-	7	9	9	9.5	6	9	10	152	8
ASSESS THE OVERALL WORKSHOP		9	8.5	8.5	8.5	8.5	9	7	6	4	6	10	8	9.5	7	8	9	9	9	9.5	10	164	8.2
MODERATOR ASSESSMENT																							
Clarity explaining the workshop		10	8	8	5.5	9.5	-	7	6	3	1.5	6	8	10	7.5	5	8	9	6	9	10	137	7.210526316
Facilitating, mentoring and inspiring		10	8.5	8.5	6.5	8	-	8	6	3	1.5	9	8	9.5	8	7	9	8	8	8	10	144.5	7.605263158
Support your progress		10	9	8.5	7.5	8.5	-	9	6	5	5	7	8	9	7	7.5	10	8	8	8	10	151	7.947368421
Knowledge on the subject		10	9	9	8.5	8.5	-	9	6	4	5.5	8	8	10	6.5	7.5	10	9	9	7	10	154.5	8.131578947
Is it your first workshop on socially connected problem?		YES	YES	YES	YES	YES	YES	NO	yes	NO	YES	NO	YES	YES	YES	YES	YES	NO	NO	NO	NO	13 YES	7 NO
Are you interested in exploring further similar workshops?		YES	YES	NO	YES	YES	NO	NO	NO	NO	NO	NO	YES	YES	YES	YES	YES	YES	YES	YES	NO	12 YES	8 NO
Will you consider using this method in your projects?		YES	YES	MAYBE	MAYBE	MAYBE	MAYBE	MAYBE	NO	MAYBE	YES	MAYBE	YES	MAYBE	MAYBE	YES	YES	YES	MAYBE	YES	MAYBE	8 YES / 1 NO / 11MAYBE	
Do you wish to participate in a multi-disciplinary workshop?		YES	-	NO	NO	-	NO	NO	NO	NO	NO	-	NO	MAYBE	NO	YES	YES	YES	YES	YES	NO	6YES/10NO/1MAYBE/3 NR	

Table 13- Score sheet of the engineering students: section A.

		ST 1	ST2	ST3	ST4	ST5	ST6	ST7	ST8	ST9	ST10	ST 11	ST12	ST13	ST14	ST15	ST16	ST17	ST18	ST19	ST20	ST21	Total pts	AVR.
METHOD ASSESSMENT																								
Understanding user needs		10	7	9	-	10	10	7	6	8	5	8	10	7	10	8	7	6.5	7	8	9	9	161.5	8.5
Generate insights		8.5	7	8.5	10	10	10	7	5	9	5	7.5	10	7	7	8	8	7	7	7.5	8	7	164	8.2
Ideation / Explorations		7.5	7	9	-	10	10	8.5	6	7	5	7	10	6	8	8	8	7	7	8.5	9.5	7	156	8.21052632
Prototyping explorations		8.5	7	8	8	10	9	9.5	4	8	5	6	9	6.5	8	9	6.5	7	7	8	8.5	6	158.5	7.925
Workshop time structure		8	7	7	5.5	10	9.5	6	3	9.5	5	7.5	8	7.5	4	7	2.5	3	7.5	8	9	8	142.5	7.125
Method facilitated innovation		8.5	8	7.5	10	10	9.5	7	6	9	5	8.5	6.5	7	7	8	8.5	7.5	7.5	8	9.5	8	166.5	8.325
Method facilitated collaboration		8.5	9	8	10	10	9.5	8	6.5	9.5	5	9	9.5	8	9	9	8	7.5	7.5	8	9.5	8	177	8.85
WORK ASSESSMENT																								
Innovation leap		7	8	9	3.5	7	10	8	6	8	4	9	10	6.5	8	9	-	8	5	6.5	9.5	8	150	7.89473684
Desirability of your partner's solution		7	8	8	3.5	7	10	7	5	9	4	3.5	9.5	7	8	9	-	7.5	6	6.5	9.5	7	142	7.47368421
MAP YOUR EMOTIONS																								
	Beginning	9	5	2	-	8	5	5	3	9.5	5	9.5	9.5	6	2.5	5	-	5	6	9.5	2.5	5	112	6.22222222
	Middle	9	8	5.5	-	8	3	5	5	9	7	9.5	9	7	5	5	-	6.5	6	9.5	4.5	3	124.5	6.91666667
	End	9.5	9.5	9.5	-	8	5	5.5	5	9.5	4	9.5	10	7.5	9	5	-	7	8	9.5	8.5	9	148.5	8.25
MAP THE COGNITIVE LEVEL																								
	Beginning	9	5	2.5	1	8.5	10	4	1	5	4	9.5	10	3	2	10	3.5	5	4	6	5.5	9.5	118	5.9
	Middle	9	5	6	10	8.5	10	6	4	8.5	5	9.5	9	4.5	4	10	6	7	5	6	8.5	4	145.5	7.275
	End	10	5	9.5	10	8.5	10	9	5	8	6.5	9.5	10	5	10	10	8.5	9	6	6.5	8.5	9.5	174	8.7
MAP YOUR FUN LEVEL																								
	Beginning	8	-	1	1	9	3	2	5	9	4.5	10	10	1	5.5	10	4	7	3	8	2	8	160.5	8.44736842
	Middle	9	-	5.5	5	9	10	5.5	7	9.5	5.5	10	9.5	1	5.5	10	3	7	5.5	8	6	4	160.5	8.44736842
	End	10	-	10	10	9	10	9	7	9.5	8	10	8.5	1	10	10	2	8.5	8	8	9.5	9	160.5	8.44736842
ASSESS THE OVERALL WORKSHOP		-	9	9	8.5	9	9	8	6	8.5	7	10	9	5	8	8	8	8	7.5	8	8	8	160.5	8.44736842
MODERATOR ASSESSMENT																								
Clarity explaining the workshop		8	7	8.5	5.5	-	9	4	7	9	5.5	8.5	10	4	7.5	8	8.5	9	4.5	8	8	8	160.5	8.44736842
Facilitating, mentoring and inspiring		9	6	8	6.5	-	9	7	5.5	8	5.5	9	9.5	4	10	7	9	9	6.5	8	8	8	160.5	8.44736842
Support your progress		7	5	8.5	7.5	-	9	8.5	6	9	5.5	9.5	10	4	10	8	9	9	7	8	8	9	160.5	8.44736842
Knowledge on the subject		8	10	8	8.5	-	9	8.5	8	9	5..	9.5	9	5	10	10	10	10	6.5	8	8	9	160.5	8.44736842
Is it your first workshop on socially connected problem?		YES	YES	NO	YES	YES	NO	YES	YES	NO	YES	YES	YES	YES	NO	YES	YES	YES	NO	YES	YES	YES	16 YES	5 NO
Are you interested in exploring further similar workshops?		YES	YES	YES	YES	NO	YES	YES	YES	YES	NO	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	18 YES	3 NO
Will you consider using this method in your projects?		YES	MAYBE	YES	MAYBE	MAYBE	YES	MAYBE	MAYBE	MAYBE	NO	YES	MAYBE	NO	MAYBE	YES	YES	YES	YES	MAYBE	YES	YES	10 YES / 2NO / 9 MAYBE	
Do you wish to participate in a multi-disciplinary workshop?		NO	NO	NO	NO	NO	NO	YES	NO	YES	NO	NO	NO	NO	NO	NO	YES	NO	YES	YES	NO	YES	6 YES	15 NO

Table 14- Score sheet of the engineering students: section B.

PROBLEM

GAP BETWEEN HIGHER EDUCATION AND SOCIAL NEEDS

PROBLEM STATEMENT

HOW CAN A DESIGN-LED ACADMIC INQUIRY ON A SOCIAL NEED (OBESTIY) CAN INFORM US MORE ABOUT THE GAP TO POTENTIALLY ADDRESS IT LATER ON?

HOW CAN DESIGN THINKING AS A PROCESS WILL PERFORM WHILE STUDENTS ADDRESS AN EMERGING, RELEVANT AND ACTIONABLE SBU-TOPIC FROM OBESTIY?

DESIRED STATE

GOALS:
- MEASURE THE PEFORMANCE OF DESGIN THINKING ON A SOCIAL TOPIC IN THE ACADEMIC CONTEXT
- UNDERSTAND THE STUDENTS' REACTION WHILE APPLYING DT AND WORKING ON THE TOPIC
- REFLECT ON THE INQUIRY AND THE GAP

OTHER BENEFITS
- REVEAL MORE DETAILS ABOUT THE GAP
- IDENTIFY FUTURE OPPORTUNITIES TO UNDERSTAND AND ADDRESS THE GAP

AN

DEFINE OVERALL PROBLEM

CONTENT: OBESITY

CONTEXTUALIZE + UNDERSTAND THE PROBLEM

WHAT IS OBESITY?	WHAT ARE THE REASONS?	WH
WHY ON OBESITY?	HOW TO ENGAGE?	HO IS T
WHO ARE THE STAKEHOLDERS?	WHAT WE NEED?	WH TO
WHAT HAS BEEN DONE?	WHAT ARE THE REASONS?	WH SU

RESEARCH METHODS

LITERATURE REVIEW
MAPPING

WHAT METHOD TO USE ON"WICKED PROBLEMS

DESIGN THINKING AND COMPLEX PROBLEMS

WHAT IS DESIGN THINKING?

- IT IS HOLLISTIC/SYSTEMIC
- CALLS FOR RADICAL COLLABORATION
- HUMAN CENTERED & DEEP EMPATHY WITH TH
- EXPERIMENTAL
- RESULT ORIENTED FOR SUSTAINABLE SOLUTI

Figure 168- Thesis journey mapping.

ALYSIS

M

NOW?

W COMPLEX
HE PROBLEM?

AT WE NEED
SOLVE IT?

AT ARE THE
B-PROBLEMS?

S"?

HE USER

ONS

UNPACK THE PROBLEM

ARTICULATING SUB-PROBLEMS

- SUB-PROBLEM 1 FOOD & SCHOOL
- SUB-PROBLEM 2 LOW PHYSICAL ACTIVITIES IN SCHOOLS
- SUB-PROBLEM 3 MEAL PREP. FOR SCHOOL STDS
- SUB-PROBLEM 4 LINK PARENTS AND SCHOOLS
- SUB-PROBLEM 5 HIGH CARB. INTAKE
- SUB-PROBLEM 6 FAST FOOD INDUSTRY
- SUB-PROBLEM 7 UNAVAILABLE HEALTHY SNACKS
- SUB-PROBLEM 8 DESIGN HEALTHY FOOD TO ENTICE

RESEARCH METHODS

LITERATURE REVIEW
INTERVIEWS
FIELD OBSERVATIONS
MAPPING

SYNTHESIS

EXPLORATION

SUB-TOPICS

PROTOTYPE TO THINK

- EXPLORATION 1
- EXPLORATION 2
- EXPLORATION 3
- EXPLORATION 4
- EXPLORATION 5
- EXPLORATION 6
- EXPLORATION 7
- EXPLORATION 8

SUB-PROBLEM STATEMENT

HOW CAN WE CAN CREATE A HEALTHY EATING EXPERIENCE INSPIRED FROM THE RITUALS OF THE PAST?

INNOVATION AND COLLABORATION

HOW TO CREATE A COLLABORATIVE EXPERIENCE BETEEWN VCUQ & OTHER HBKU CAMPUSES?
HOW TO CREATE A USER-CENTERED EXPERIENCE?
HOW TO BE EXPERIMENTAL IN THE QUEST?
HOW TO GENERATE SOLUTION ON THE SUB-PROBLEM?

- CREATE AN EDUCATIONAL WORKSHOP TO REACH THE USER AND STIR UP COLLABORATION
  - IDENTIFY THE GOALS
  - TOPICS AND TOOLS NEEDED
- PITCH IT FOR FACULTY AT VCUQ, CMU, TAMU & SCHEDULE WORKSHOPS
- PREPARE LECTURE & LOGISTICS
- DELIVER WORKSHOP
- DOCUMENT PROCESS
- RECRUIT POTENTIAL CANDIDATES FOR THE MULTI-DISCIPLINARY WORKSHOP
- PREPARE THE MULTI-DISCIPLINARY WORKSHOP
  - IDENTIFY GOALS
  - TOPICS AND TOOLS NEEDED
- INVITE STUDENTS FROM VCUQ, CMU & TAMU SESSIONS
- DELIVER WORKSHOP
- DOCUMENT PROCESS

SUB-PROBLEM ARTICULATION

PROCESS-TOPIC FORMULATION

ENGAGE PAR

DEFINE SUB-PROBLEM

PROTOTYPE THE "PIT"

THE EATING EXPERIENCE

APPLY / TEST / RE

CONTEXTUALIZE + UNDERSTAND THE SUB-PROBLEM

- LEARNING ABOUT THE EATING RITUALS OF THE PENINSULA
- EVOLUTION OF THE COOKING METHODS
- COOKING RITUALS OF THE PENINSULA
- QATARI RESTAURANTS
- NOMADS, SETTLERS AND SEA PEOPLE
- RECIPES OF THE QATARI CUISINE

PROBLEM SEEKING / SOLVINGMETHODS

- LITERATURE REVIEW
- FIELD TRIPS
- MAPPING
- PROTOTYPE TO THINK ON THE "EATING EXPERIENCE" WORK SESSION WITH ADISORY COMMITTEE AND PROFESSIONALS

SUGGEST SUB-SOLUTION	PIT PROTOTYPE 1
WORKSHOP 1	1 JUNE 2012 ADVISORY BOARD
SUB-SOLUTION DEV.	PIT PROTOTYPE 2
	PIT PROTOTYPE 3
	PIT PROTOTYPE 4
WORKSHOP 2	5 JULY 2012 5 GUESTS
SUB-SOLUTION DEV.	PIT PROTOTYPE 5
	PIT PROTOTYPE 6
	PIT PROTOTYPE 7
	PIT PROTOTYPE 8

TOPIC FORMULATION	ALL PREVIOUSLY ARTICULATED THEMES CONVERGED INTO THE REDESIGN OF THE EATING EXPERIENCE
READ	REVIEW LITERATURE ON DESIGN THINKING, D.SCHOOL, HELEN HAMLYN CENTER FOR DESIGN, RCA
WRITE	WRITE WORKSHOP AND LECTURE FOR VCUQ

VCUQ WORKSHOP	SEE EAT SHA
	SEE SCE
CMU WORKSHOP	SEE NEV APP OLD
	SEE LIVE QAT RES
TAMU WORKSHOP	SEE QF QAT QF
	SEE HEA FOC PAR
	SEE FOC FOR MA
	SEE MO COC SLO
	SEE FLO RES
	SEE HOM MEA VEN MA

UNDERSTAND THE CONTEXT OF HBKU

LITERATURE REVIEW

- HBKU VISION AND MISSION
- HISTORY
- EDUCATION AND NDS 2011-2016

UNDERSTAND PRECEDENTS

COLLABORATION & EDUCATION

- HELEN HAMLYN CENTER OF DESIGN
- D.SCHOOL | STANFORD UNIVERSITY
- DEVINCI CENTER | VCUQ

RT I

CRUIT

D 1
LITTLE,
RE & PLAY

D 2
NT MENU

D 1
V COOKING
LIANCES &
D METHODS

D 2
E COOKING
TARI
TAURANT

D 1
TUTU TRAIN
TARI FOOD &
SITE SEEING

D 2
LTHY QATARI
OD IN A
KING LOT!

D 3
OD STORAGE
R A HOME-
DE MEAL

D 4
BILE
OKING AND
W FOOD

D 5
ATING
TAURANT

D 6
ME COOKED
ALS AND
NDING
CHINES

ENGAGE PART II

CO-AGREEMENT

KATARA WORKSHOP

DEVELOPMENT

SEED 1
EAT LITTLE, SHARE AND PLAY

SEED 2
NEW COOKING APPLIANCES & OLD METHODS

SEED 3
QF TUTU TRAIN QATARI FOOD IN QF

SEED 4
HEALTHY QATARI FOOD IN A PARKING LOT!

SEED 5
FOOD STORAGE AND QATARI HOME COOKED MEAL

SEED 6
MOBILE COOKING AND SLOW FOOD

SEED 7
FLOATING RESTAURANT

SEED 8
HOME COOKED MEALS AND VENDING MACHINES

STEP 1:
BUILD CONCENSUS ON 1 SEED CONCEPT

STEP 2:
REDEFINE THE PROBLEM STATEMENT

STEP 3:
DEVELOP IDEA

STEP 4:
DEVELOP IMPLEMENTATION PLAN

STEP 5:
DEVELOP IMPLEMENTATION PLAN

STEP 6:
PITCH THE IDEA

STEP 7:
REFLECT ON EXPERIENCE

ANALYSIS / SYNTHESIS

EXHIBIT

REPORT / EXHIBIT

- EVALUATE EACH EDUCATIONAL EXPERIMENT
  - ON THE METHOD
    - RELEVENCE TO THE PROBLEM
    - DESIRABILITY BY USER
    - EFFICTIVENESS
    - EFFICENCY
    - GENERATIVENESS
    - IDENTIFY GAPS
  - OUTCOMES
    - QUALITY OF SEED CONCEPTS
    - VARIETY OF SEED CONCEPTS
  - FEEDBACK
    - STUDENTS
    - FACULTY

- OVERALL FINDINGS IN THE TOUR
  - THREATS AND FAILURES
  - OPPORTUNITIES AND SUCCESSES

ANALYSIS / SYNTHESIS

REFLECT / REPORT

WRITING THE THEESIS

EXHIBITION

Figure 169- Front side of the exhibition stand.

Figure 170- Back side of the exhibition stand showing the workshop pods and the booth.

Figure 171- Details of the engineering workshop and the resulting seed concepts.

Figure 172- Details of the multi-disciplinary workshop with the video running in the background.

Figure 173- Details of the business administration workshop and the resulting seed concepts.

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