shaping waste

Exploring the materiality of waste through community participation.

MA Final Thesis
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Shaping Waste
Exploring the Materiality of Waste Through Community Participation

Final Thesis
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Abstract

According to the Cambridge Dictionary, this is the definition of Waste - unwanted matter or material of any type, especially what is left after useful substances or parts have been removed. While this may be common knowledge, to think about what constitutes this "unwanted matter" or who defines what is "useful", and more importantly, who retains the power to define usefulness, or functionality. These are questions I explore within the scope of this thesis.

My investigations were born out of the frustration of seeing waste being mismanaged in my hometown in Delhi, India throughout my life. These frustrations increased when I realised that as designers, we contribute to huge piles of waste, and embolden a model of unsuitability and inequality that India, and the world rely on. Since I grew up in a country where waste-management is stratified into the community, wherein only specific communities bear the cost and labour of disposing waste, and keeping our cities clean, I became inclined to note the effect of waste on these communities.

Moreover, in the world of design, by constantly designing new products, working within capitalistic structures of production and catering to consumer-centric tendencies, designers have contributed to environmental damage. To start questioning my own practice of how I interact with the materials around me, my own consumption and waste generation, is how I began the journey of this thesis. Through it, I try to understand if certain waste-materials are truly unwanted, or can rather be modelled into usable materials, and experimented with so value can be derived from them.

Keeping all this in mind, the proposed design intervention is a circular materials lab framework called - The Playground. I envision The Playground as an adaptable and low-tech lab, which is not resource or cost intensive. With a focus on experimenting with circular materials, and rendering value and elasticity to concepts of utility, I explore what can be re-used and re-imagined. My research aspires to involve communities in building sustainable futures together. This thesis also addresses how The Playground framework can work in different contexts, across continents and what challenges lie ahead in adapting and applying its lessons to the same.

"Design must be an innovative, highly creative, cross-disciplinary tool responsive to the needs of men. It must be more research-oriented, and we must stop defiling the earth itself with poorly-designed objects and structures." - Victor Papanek

overview of parts and structure

This thesis began as an exploration of food waste systems, how it affects communities and how design through community driven practices can help break barriers. This thesis has been a journey of personal discovery and constant questioning. I began with looking at waste structures and systems in New Delhi, India, focusing my initial research and design process with that context in mind. After my initial research and thesis definition, I decided to work on my practice-based design solution with Matthew de Kretser, a fellow Masters student and friend from Johannesburg, South Africa. The reasons to work together were two-fold: while we both are from completely different countries, our end goal of creating sustainable learning spaces that are driven by community knowledge and participation were somewhat similar. Secondly, the coronavirus pandemic led us to rethink how we would be able to conduct research without being able to access resources in our home countries. In order to take on this intimidating task of developing an entire system within learning spaces, we decided to work together to prototype an adaptable system within our school, the Köln International School of Design (KISD) that we could then reimagine in our home countries. With this in mind, this thesis has been structured into 3 parts:

Part 1: Research and project definition
This part of my thesis deals with my initial research and findings, based within a context I am familiar with - the neighbourhood I grew up in New Delhi, India. I explore what the waste management system in India is, discover schools of thought I want to borrow from and look at projects that inspire me. During this part of the thesis, I develop my research question along with defining my goals and principles to guide my project. It ends with re-visiting my research question in perspective and developing a plan of action to begin my practice-based design prototype.

Part 2: The Playground: Developing a circular materials lab
Coming from my initial findings and base research, I begin prototyping my design solution in this part of the thesis. Part 2 of this thesis has been co-authored with Matthew de Kretser. With our individual theses in mind, we develop our combined project with KISD as our testing ground. We spent four to five months testing and developing a circular lab system within learning environments. This part of the thesis ends with imagining how the circular system we developed can potentially be applied in the context of New Delhi and Johannesburg.

Part 3: Imagining circular systems in New Delhi
As a way of sense-making and bringing Part 1 and Part 2 together, Part 3 of this thesis analyses how this circular lab system works in the context of India. Coming back to the context of my neighbourhood in New Delhi, India, I develop a potential idea for this system to work in my apartment complex and map out the possible challenges and opportunities. This thesis ends with future plans, goals and ambitions as this is just the starting point of my journey and definitely not the end.

Contents

PART 1

decoding waste structures

contextual research and project definition

personal motivation

I grew up in New Delhi, India, a place where rapid urbanisation and a growing economy without proper solid waste management systems have posed great environmental challenges and societal issues. The National Capital Region of India, which accounts for New Delhi and surrounding areas, is one of the largest metropolis areas in the world, with a population of around 31 million in 2021 ('Delhi Population 2021 (Demographics, Maps, Graphs)' n.d.). This growing urban population comes with its own set of challenges. I grew up in a privileged background, with my immediate ecosystem always being "well taken care of", in a housing complex, where someone would come to take out our trash and deal with it. Outside of this gated complex was the real world, a place where boundaries between people are more visible, where you see the complexity in the hierarchical caste system, and the the way Indian society has segregated it's population on the basis of class, caste, religion, social and economic status and the subsequent injustices that come with this segregation. Growing up, I encountered people on a daily basis who were from different backgrounds but did not come to understand how this segregation plays into their everyday life, jobs, societal status, economic status and human dignity. This segregation and disrimination plays into each aspect of the Indian system, waste management being one of them. Sanitation workers have long been marginalised as this profession was and continues to be marked by caste status. Among an estimated 1.2 million sanitation workers in India, most are Dalits or from denotified* tribes (Majumdar 2021). These sanitation and waste pickers, who are a part of the informal economy, are key players in dealing with waste and ensuring maximum extraction of resources. The ragpickers, scrap dealers and sanitation workers have been integral stakeholders in the waste management system but are not given the credit, respect and even basic health support. While the upper caste population, similar to the environment I grew up in, enjoys their hygienic lifestyles, they are blind to who cleans their waste, what happens to it and where it ends up.

While this is a deep rooted societal issue and one that I cannot fathom to solve, with this thesis I try to understand how waste and, more specifically, food waste can be reused, extracted and made into a viable, usable material. By thinking about the waste and sanitation workers, and other stakeholders involved in the system, I try to build a context of what the system looks like.

Through this thesis, I worked partly in my neighbourhood in India, to understand the system along with challenges and opportunities. My design and prototype however, takes place in a German context, within the structures of the Köln International School of Design. I try to understand how to bring my experience in both these vastly different contexts together and analyse the differences and adaptability of my thesis.

*The term 'De-notified Tribes' stands for all those communities which were once notified under the Criminal Tribes Acts, enforced by the British Rule between l87l and l947. These Acts were repealed by the Independent lndian Government in l952, and these communities were "De-Notified". A few of these communities which were listed as de-notified were also nomadic('Vikaspedia Domains').

waste in India

Waste pickers segregating garbage atop a landfill in Delhi.
Source: Saumya Khandelwal, The Dump Killed My Son, The New York Times, June 10, 2018.

Understaning the Indian Waste Management System

Rapid urbanization in the recent past has contributed to a waste management problem in India. Over 377 million urban people live in 7,935 towns and cities and generate 62 million tonnes of municipal solid waste per annum. Only 43 million tonnes (MT) of the waste is collected, 11.9 MT is treated and 31 MT is dumped in landfill sites (Lahiry 2019). The key to efficient waste management is segregation at source. This however does not happen in India at the household level. While there have been efforts to segregate waste at source by waste generators into three streams: biodegradable (wet waste), non-biodegradable (dry waste) and domestic hazardous waste, in practice, it has not been implemented efficiently. According to an article published by the Indian newspaper The Hindu, civic bodies across Delhi initiated a drive to tackle the problem of waste management. While some people responded with an understanding of the new system, total compliance was an unrealistic goal. Some residents blamed the waste collectors for not complying despite residents segregating at source, while others said this was all too new for them and they were used to putting their waste out on the street for the waste pickers. In an interview with a reporter from The Hindu, a waste collector said "They are supposed to sort the waste, but they don't. If I tell them to separate degradable and biodegradable waste, they say it is my job. I end up segregating the garbage myself. Though most of the garbage gets segregated, a few wrappers or pieces of paper might be sometimes left behind"(Ghosh and Ravi 2019).

According to the Daily Dump, an organization promoting composting in India, India's Municipal Solid Waste (MSW) is largely organic, biodegradable waste - 60% can be recycled into compost, and another 30% can be recycled into new raw materials, sending only 10% to landfill. So technically India can recycle up to 90% ("Daily Dump" n.d.). Delhi has a constantly growing urban population resulting in growing consumption levels and waste production. India's tallest landfill, the Ghazipur landfill located in East Delhi, is on it's way to become as tall as the iconic Taj Mahal, at around 65 metres in height. All 3 landfills in Delhi have reached their capacity after years of neglect and bad policy making. The MSW Rules, 2016 which replaced the MSW Rules, 2000, mandate the waste generator to segregate the waste into biodegradable and non-biodegradable waste before it is collected, thus shifting the onus of segregation onto the household ('Delhi's Waste Woes: Is There a Way Out?' 2015).

The Impending Problem of Food Waste

The majority of waste generated in India is biodegradable organic waste, including food waste. Each year, an estimated 1.3 billion tonnes of food is wasted globally, which accounts for one third of all food produced for human consumption ('FAO - News Article: Food Wastage: Key Facts and Figures'). Food waste can be divided into two categories: the first being "Food loss" which usually refers to food lost in earlier stages of production such as harvest, storage and transportation. The second is "Food waste" which refers to items that are fit for human consumption but thrown away, often at supermarkets or by consumers (Depta 2018). Since the dawn of globalisation, consumers have had access to a varied range of food products. With avocados from Mexico in the Netherlands, bananas from Ecuador across the EU, to Indian tea in Germany, our options and consumption practices have drastically changed over the years. Greater consumption of products leads to greater waste generation which further contributes to the overflowing landfills, toxic rivers and oceans, and soil degradation. The discourse over proper waste management systems, the need for recyclable products and the resistance to plastics along with re-evaluating unsustainable systems have been growing and are desperately needed.

The Journey of Waste and Key Players in the System

Waste is a significant income generator for many communities in India. Many key players are involved in the complex web of waste management and play a crucial role in diverting waste from reaching the landfill. These waste segregators are not given their due credit and oftentimes come from marginalised and oppressed communities in India.

Due to the lack of segregation of waste at its source, the process of tidying up the waste at later stages becomes a tedious task. On average, organic waste in India accounts for 50% of the waste generated('How Can India's Waste Problem See a Systemic Change?' 2015). This implies that in the case of Delhi, almost 4,810 tonnes/day can be composted. As of 2015-16, Delhi had one compost plant processing 150 tonnes of waste per day and an integrated waste processing plant that processed 1,250 tonnes of waste per day('Delhi's Waste Woes: Is There a Way Out?' 2015). The rest of the organic waste ends up in landfills. The mixing of waste also leads to recyclable waste becoming soiled and therefore not being treated as recyclable anymore. According to Chintan, an environmental action and research group based in India, the lack of segregation at source is a contributing factor to environmental degradation. While 50% of waste is compostable, the mixing of waste leads to poor compost. According to them, composting done at various levels, individual, community and organisational, can help reduce the burden on the landfills.

When waste is not segregated at source, the journey of waste from individual households to the landfill is one that is highly complex. Households dump their waste either on the street or waste pickers come to individual houses to collect waste. These waste pickers further segregate the waste into recyclable and non-recyclable waste and it is then passed onto waste collectors. Waste collectors vary in size and capacity of handling and collecting waste. There are waste pickers who collect waste from garbage stations, residencies, roads etc. Cycle kabadis*, work within a small space, like a cart and buy waste from the waste pickers. After them come the small and large kabadiwalas who typically own stores to sort out waste. Separated waste is then sent to recycling units that deal with specific materials like plastic, metal, paper etc.

The waste collectors or *kabadiwalas*, as they are locally known, help in diverting waste from entering the landfill. At the landfill itself, there are waste pickers, oftentimes children, who look for valuable and reusable materials that can be resold. These communities have historically been marginalised in Indian society and still lack health and state benefits despite their exposure to toxic waste.

*Kabadivala, or Kabadi meaning "junk or scrap dealer", is a term in used commonly in Hindi to refer to a person who deals with used household objects.

A waste collector or *Kabadiwala*. Source: CSE for Down to Earth, 09 August 2017

The Journey of Household Waste

Another level of segregation takes place at neighbourhood bins by individual waste pickers

Household trash

Unsegregated waste

Segregated waste like plastic, metal, paper

Household trash bin or Street dumping

- Individual waste generator
- Waste pickers

- Waste is not segregated into wet and dry waste
- Materials like plastic and food waste mixed
- 40-50% waste is organic waste

Neighbourhood bin

- Waste pickers
- Waste Pickers who find valuable material to be resold

- Unhygienic
- Foul Smell in locality
- Dogs and cows look for food amidst all the plastic
- Some recyclable waste gets unusable as it gets soiled
- Waste workers work with bare hands and are prone to health risks

Transport Truck

- Waste transporter
- Waste pickers who pack the trucks without proper equipment

- Foul Smell
- CO_2 emissions from truck
- Loading the waste trucks with bare hands exposes waste workers to health risks

Landfill

- Waste transporter
- Waste scavengers
- Communities living close by

- Overflowing Landfills
- Mixed Waste
- Health risks for communities living close by
- Leachate soup from Landfills contains battery acid, mercury and other poisons
- Contaminates Groundwater
- Only 10% should reach the landfill but due to lack of segregation at source a lot more reaches the landfill

Waste pickers

- Cycle Kabadis

- Foul Smell
- CO_2 emissions from truck
- Loading the waste trucks with bare hands exposes waste workers to health risks

Waste Picker

- Consumers who sell to the dealer
- Cycle kabadis and bigger kabadis

- Waste dealer has to go door to door
- No benefits from the state
- Daily wage workers - income depends on amount of waste collected

Cycle Kabadis

- Waste picker
- Small to large kabadis
- Waste generators

- Gets many different kinds of waste
- Has to sort everything by hand
- Income is better than that of a small waste dealer but their income also depends on amount of waste collected
- Daily wage workers

Small to Large Kabadis

- Cycle Kababdis
- Waste pickers
- Waste generators

- Waste needs to be properly segregated
- Part of the informal sector. Lack of job security

Factory/Recycling unit

- Larger Kabadis who sends material collected
- Employees working in the factory

- Bad working conditions
- Cramped spaces
- Worker Safety and Health Compromised
- Factories and centers also contaminate water bodies so recycling has limitations

Market Products

- Seller at Market
- Consumers

- Some materials that may be recyclable don't end up being used as they get soiled and enter the landfill

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Legend:

○ Touchpoints

● Key Players

● Problem areas

Kabadivala, or Kabadi meaning "junk or scrap dealer", is a term in Hindustani used commonly to refer to a person who deals with used household objects.

The Informal Economy

The Indian economy comprises the formal or organised sector and the informal or unorganised sector. To put it simply, the formal sector is all jobs that are jobs that are secure with regular wages, defined working hours and are taxable. Some examples of these are government jobs, banks, corporations and private institutions. The informal sector comprises the jobs that are not secure and without regular income. This includes daily wage workers like street vendors, vegetable sellers, waste pickers etc. In India, close to 81% of all employed persons in India make a living by working in the informal sector, with only 6.5% in the formal sector and 0.8% in the household sector ('Nearly 81% of the Employed in India Are in the Informal Sector: ILO' 2018). In Delhi close to 150,000 waste pickers who are a part of the informal sector recycle at least 2000 tons of paper, plastic, metals and glass daily ('Wastepickers: Delhi's Forgotten Environmentalists?' 2018). Officially Delhi generates 8,360 tonnes per day (tpd) of municipal solid waste (Some sources claim it to be 8,500 tpd) ('Wastepickers: Delhi's Forgotten Environmentalists?' 2018). In the informal sector, these waste pickers face challenges of low wages, unstable employment, migration and a lack of job security. In Delhi, these waste pickers, oftentimes migrants from neighbouring states, come to the city in search of better job opportunities. The lockdown due to the coronavirus pandemic has added to the financial strain on the waste pickers and other workers in the informal sector. The pandemic led to one of the largest migrant crises the country has seen, with many migrant labourers leaving large cities as they are unable to sustain themselves without any aid from the government. In an interview with Ravi Shankar, a tea seller based in East Delhi, he says that he has been out of money for the past three months, even unable to pay rent for his flat. Originally from Bihar, a state in north India, he came to Delhi 18 years ago to provide a better life for his family.

Along with financial strain, the informal sector workers are exposed to infectious diseases. Lack of health insurance, labour laws, maternity leave, sick leave, along with high risk jobs like scavenging, waste picking amongst others, puts them at risk of health issues. With deeply entrenched inequalities in the Indian system, these workers also face societal pressures and discrimination. In a lot of cases, these workers also come from marginalised and underprivileged sections of society. In the case of manual scavenging and ragpicking, caste continues to play an integral role. Women too form a large part of the informal sector, mostly represented in lower income jobs. Societal structures like the lack of access to education, lack of autonomy, and a lack of financial independence, force women to take up these jobs. Oftentimes, they are even unpaid for their labour and are highly prone to health risks. More than 60% of the informal women workers in India reported physical weakness and more than 50% *Beediworkers** manufacturers of hand rolled cigarettes suffered from throat burning and coughing(Yasmin et al. 2010).

With a multitude of problems faced by waste pickers and other informal workers, it is important to take into consideration their socioeconomic place and how they can be given more agency, and be involved as key players within the system of waste management.

Beedis are hand-rolled cigarettes made of unprocessed tobacco wrapped in leaves. Beedworkers refers to the people who are employed in this industry.

Tea sellers preparing chai (tea) in their chai stalls. Source: Showkat Shafi, The chai walas of India , Aljazeera, 28th October 2018

Women selling fish in a market in India. Source: Photo by Ishay Botbol from Pexels

social environmental and economic approaches

After getting a better understanding of the waste management system in India, along with the key players, I move on to explore different schools of thought. Thinking about the 3 E's of sustainability — economy, ecology, and equity, I look at how existing literature can help me develop methods to inform my own research. I borrow from various schools of thought like circular economy, participatory design and material ecology.

Circular Economy:

The idea of a circular economy has been around since the late 1970's and has gained momentum in recent times due to the inevitable reality of the climate crisis. In the standardised language of the European Commission, "a circular economy is explained as an economy where the value of products, materials and resources is maintained in the economy for as long as possible, and the generation of waste minimised" (Cardoso 2018). In his book 'The Circular Economy - a user's guide', Walter R Stahel says that the difference between a circular economy and a linear economy is that the former strives towards waste prevention, whereas the latter towards waste management. Preventing waste from ending up in the landfill, minimising our dependence on virgin resources can boost economic growth. The United Nations Environmental Plan (UNEP) calculated that in 2050 the global economy would benefit from more effective resource use by $2 trillion a year ('What Are the Economic Benefits of the Circular Economy?' n.d.). In a circular economy, this seems plausible through effective resource management .The Ellen McArthur Foundation is one of the leading not-for-profit institutions that works with cities, governments, institutions, companies, policy makers, citizens, circular designers, and academics in building circular economy initiatives. One of their initiatives, the New Plastics Economy has more than 450 organisations as part of a collaborative process to address plastic waste and its impact at the production level. The work submitted by designers, engineers and innovators includes projects such as compostable bio plastics, seaweed packaging and rethinking supermarket systems. Facilitating big corporations and institutions to understand their responsibilities towards the environment, helping them transition from a linear to a circular system might be able to benefit the environment as well as economic growth.

Evoware edible packaging: Source: Material District.

Participatory Design

Participatory Design or co-design practices have been widely used in recent times in the areas such as user experience research. The practice of Participatory Design first emerged in Scandinavia in the 1970's and was influenced by the democratisation of working life. These projects were conducted by the trade unions or jointly by the trade unions and working life researchers (van der Velden and Mörtberg 2014).

"Participatory Design (PD) is a collection of design practices for involving the future users of the design as co-designers in the design process. PD's methodology is based on the genuine decision-making power of the co-designers and the incorporation of their values in the design process and its outcome, which is often a high-fidelity prototype for a product or service, or a new way to organise a work practice or to design a space" (van der Velden and Mörtberg 2014)

With participation and democratisation at the heart of Participatory Design practices, it aims to bridge the gap between designers and users by involving users as "co-designers". Mutual learning through the use of tools and techniques are a key factor in Participatory Design. Some examples of these tools and techniques are probes, storyboards, scenarios, mock ups, workshops and walk-throughs. These tools help different stakeholders come together and build an integrated value system in the design process. However, the principles of democracy and participation need to be explored at a local context level. In multicultural and diverse settings with embedded societal hierarchy, the practice of democracy might not work as intended. It is important to think through these differences and adjust them to settings that might work better. For example, a Participatory Design project in Namibia shows that participation is not necessarily associated with democracy (Winschiers-Theophilus, Bidwell, and Blake 2012): "In a hierarchical society lower ranking members are not expected to publicly and openly express opinions, although they are not formally prohibited from doing so. This might seem unjust and counterproductive to participation, when participation is associated with egalitarianism or democracy" (p.165).

While working in the context of India, these power dynamics and hierarchies need to be taken into account while designing an intervention.

Material Ecology:

There has been a growing interest in the discourse around bio-materials. There are many new advances at the intersection of materials, technology, craft and redefining systems. Neri Oxman, an architect, designer and inventor who is a Professor of Media Arts and Sciences at the MIT Media Lab coined the term "material ecology" to explain her process of bringing together materials science, digital fabrication technologies, and organic design to produce techniques and objects informed by the structural, systemic, and aesthetic wisdom of nature (United States Architecture News 2020). Material ecology advocates that material and form cannot be seen separate from one another and that they are intertwined.

According to Oxman, modern design and production has strayed away from this principle and moved towards the compartmentalization of form making which is an independent process that ignores the material form. Oxman defines Material Ecology as "an emerging field in design denoting informed relations between products, buildings, systems, and their environment (Oxman et al. 2015).

The growing field of Material Ecology plays an important role in understanding the future of how our built world is constructed. It speculates on the idea of combining natural organisms with the advance in technology. In the project Silk Pavilion by Neri Oxman and the Mediated Matter Group, steel structures, along with fabrics and a bit of kinetic manipulation, a group of 17,532 silkworms are the builders of a 6 foot tall and 5 foot wide pavilion. Another project, Aguahoja, uses a robotically fabricated structure composed of the most abundantly available bio-polymers in our environment - cellulose, chitosan and pectin.

One of the main features of Aguahoja is that the material modulates when exposed to environmental parameters like heat and humidity. Derived from organic matter, printed by a robot, and shaped by water, Aguahoja points towards a future where the grown and the made unite. It embodies the Material Ecology design approach to material formation and decay by design, as well as the realization of the ancient biblical verse "from dust to dust"-from water to water (The Mediated Matter group n.d.)

Aguahoja Structure. Source: Mediated Matter

Aguahoja Artifacts. Source: Mediated Matter

Key Takeaways:

- Walter R Stahel talks about waste prevention as a cultural issue in many societies. In India, the waste management system is one that is complex, unjust and complicated to unravel. Waste management and prevention has structural inequalities in who does these jobs and who produces this waste. While looking at circular solutions, it is important to understand the current system of waste and how it affects communities that surround it.
- Participatory Design looks at how design interventions should include users as co-designers of any system. For designing novel waste systems, it is important to understand who the stakeholders are, what their motivations and challenges are and to bring them to the forefront of the design intervention. For any system to work, it should be inclusive of the needs of the end users.
- Neri Oxman talks about craft and how material and form are intertwined. While looking at food waste as a material, I would like to implement the idea of how its properties affect the end product and develop a solution according to its properties.

understanding the status quo

Daily Dump

An important case study that works in a similar context in India, Daily Dump is a design led project that aims to change our mindset about waste, marginal livelihoods and the environmental impact of our waste.

Started in the city of Bangalore, India, Daily Dump created a range of products, services, and educational materials to enable individuals to manage their organic waste by composting. They have been successful in creating a decentralised system by fitting it to the context of novel solutions in India and locally sourcing their materials.

Facing the immense scale and complexity of the municipal solid waste problems in urban India, The Daily Dump has created a number of easy to implement, individually achievable solutions that coordinate towards the goal of reducing waste volumes and toxicity (Boyer and Cook 2012).

As of May 2018, the Daily dump has 49,295 customers and has saved 42,068 kgs of organic waste from entering the landfill. With a focus on design and providing alternative solutions, Daily Dump looks at systems as a whole by ensuring citizen participation at all levels.

They offer products for many kinds of users from small individual composters, composters for a family to community sized composters.

By sourcing materials locally and working with artisans making traditional terracotta earthenware, Daily Dump incorporated a short looped cycle with local suppliers and consumers. Through prototyping and testing, incorporating participatory design methods like interviewing stakeholders through various touch-points and user observations, Daily Dump was successful in creating user-friendly products and services, helping individuals realise their role and contribution to waste production and management.

Another important factor in their success story is realising the context they are working in and bringing local solutions to local problems. By incorporating educational materials as a part of their product range, they made sure their products and usage are understood by their target users.

Source: Daily Dump, accessed on 27 June 2020

Chintan

Chintan is an environmental research and action group in Delhi that works in reducing waste consumption, managing waste and working with waste pickers across the city with the aim of transforming them from scavengers to managers. They manage around 30 tons of solid and electronic waste everyday through doorstep collection, segregation, recycling and composting.

'Chintan reduces waste and consumption, manages solid and electronic waste and advocates around materials, waste and consumption. It uses waste as a tool to fight poverty, child labour gender based violence and exclusion and climate change, while creating green livelihoods. Chintan pushes back and combats unsustainable consumption.('What We Do | Chintan' n.d.).'

Along with providing support and advocacy for waste pickers, Chintan also shares resources, videos and other informational material on how to manage waste for citizens in Delhi.

According to them, proper waste management can have significant impacts on the environment. Waste is often just materials misplaced and extracting materials from waste can save metals from being mined or pulp for paper from being imported ('Wastepickers: Delhi's Forgotten Environmentalists?' 2018.) .

They speak about how waste-pickers contribute to cleaning up the city but are not compensated for it. 'In Delhi, 150,000 such persons recycle at least 2000 tons of paper, plastic, metals and glass daily. A Chintan study shows this group saves 3.6 more times greenhouse gases in Delhi alone, compared to any other waste project in India receiving carbon credits. Unfortunately, they are treated like the waste they handle, stigmatized and brutalized by society. Their health suffers and they suffer bites, allergies and humiliation by the municipal authorities ('Wastepickers: Delhi's Forgotten Environmentalists?' 2018).

Moving forward, they advocate for recognition of waste pickers and fair compensation. They believe that cities can be made cleaner and waste pickers can help municipalities become more environmentally friendly and provide economic benefits by extracting materials. They believe a win-win situation can be achieved for all and are working towards that goal.

Chintan providing waste pickers training on how to compost will enable decentralized waste treatment. Image Source: Wastepickers: Delhi's Forgotten Environmentalists? (2018), Chintan Environmental Research and Action Group


Information posters developed by Chintan Environmental Research and Action Group

Participatory City

Participatory city is a foundation based out of Barking and Dagenham, a neighbourhood in London who work towards creating more inclusive neighbourhood spaces by involving the community in developing their surroundings. One key initiative called Every One Every Day looks at how practical projects taken up by individuals in the neighbourhood can make life better for all. The Every One Every Day initiative is dedicated to making practical participation fully inclusive ('Every One Every Day' n.d.). They have created a set of principles which are outlined below:
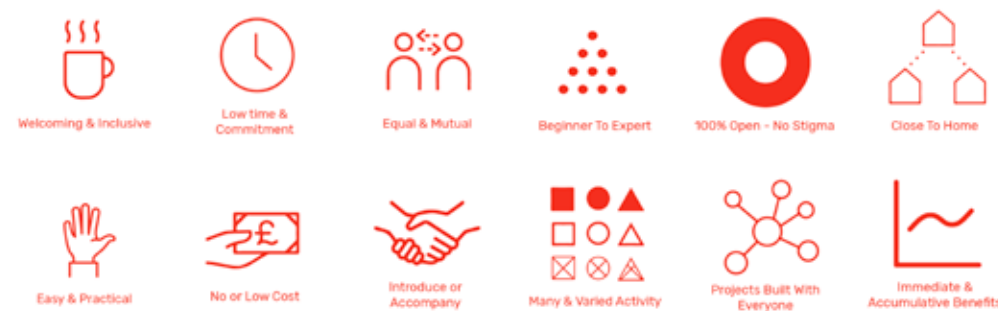
Design principles of the Every one Every day project. Image Source: Participatory City

Principles like No or Low Cost, Equal and Mutual, Projects Built with Everyone and Beginner to Expert are important for my own design intervention. These principles bring in elements of Participatory Design, by including communities and ensuring they work in settings that don't have access to many resources.

The Every One Every Day project aims to build a large network of local citizens and businesses across Barking and Dagenham and invite them to participate in a variety of projects. These projects include sharing knowledge, spaces and resources for families to work and play together, for bulk cooking, food growing, tree planting, for trading, making and repairing, and for growing community businesses ('Every One Every Day' n.d.).

The Every One Every Day project provides the infrastructure and resources to the community for their initiatives to take place. Another key aspect they work with is to measure all the benefits and opportunities from the activities and ensure it is available to the public. They believe that this information is as important for the residents and community as it is for their founders. This helps me understand how communities can become the major stakeholders of a design intervention.

Examples from a few projects developed under the Every One Every Day project. Image source: Participatory City

Centre for Community Knowledge, Ambedkar University, Delhi

Housed within Ambedkar University in Delhi is the Centre for Community Knowledge (CCK). CCK is an interdisciplinary research centre engaged in expanding and including new sources, practices and discourse in accommodating for our knowledge diversity ('Centre for Community Knowledge (CCK)' n.d.). The CCK acts as a research and documentation centre, involving students, the university and the community as a way to diversify its knowledge base. It aims to bring community knowledge into the academic mainstream and reexamine what is considered as "knowledge". An example of one of their projects is the Delhi Citizen Memory Project, which brings together students, faculty and local partners for researching and documenting the history and diversity of the residents of the expanding mega city, Delhi.('Centre for Community Knowledge (CCK)' n.d.).

The centre aims to research and document lived experiences, oral and practice-based traditions and knowledge, to bring to light voices from marginalised communities that might otherwise be lost. This is important for my own design intervention which aims to work with the waste-pickers who also represent these marginalised communities.

Examples of stories collected by CCK. Image Source: Instagram page of Centre for Community Knowledge, Ambedkar University

What can Design Do?

While there needs to be a larger systemic and infrastructural change to deal with waste, there are many individuals and smaller organisations who are contributing to the discourse and raising awareness about sustainable alternatives.

Circular Home Lab

The Circular Home Lab is a team of two who offer virtual workshops in experimenting with the materiality of food waste to a large audience across continents. In an interview with Paula Nerlich, the co-founder of Circular Home Lab, she talks about the vision for their initiative which revolves around making circular material experiments accessible and approachable to a larger audience. By providing workshops that are online, with waste produced in their homes, The Circular Home Lab is able to reach a large audience base. Their aim is to get as many people as possible to see industrial food production as a viable resource for materials and to add to the growing discourse that rethinks waste as a resource for the development of new materials and products.
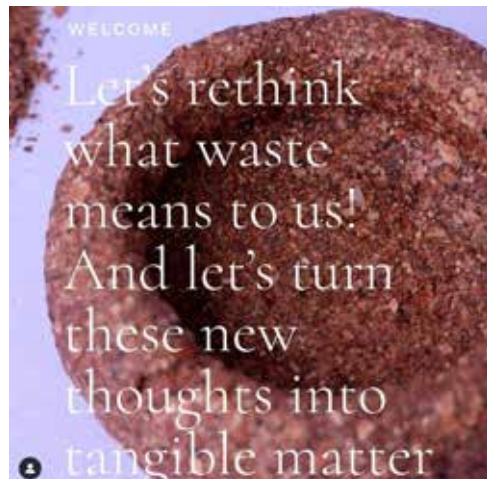
Along with virtual workshops, the Circular Home Lab works with business teams in thinking about circular design, developing customised workshops for academic institutions as well as sharing their work and knowledge through conferences. By doing so, their goal is to broaden the horizons of sustainable visions for the future.

Air-Ink, a project that began in Massachusetts Institute of Technology's Media Lab, uses air-pollution to develop usable products. India is home to some of the most polluted cities in the world including its national capital Delhi, which tops that list. Air-Ink became a pioneer in using air based pollutants to make art equipment. Their vision is to collect pollution particles in a way that doesn't reach our lungs or waste streams. The process of creating Air Ink carefully ensures that the end product is safe-to-use("AIR-INKTM" n.d.).

The Tea Recipe by Jiwei Zhou is a project undertaken as her Bachelor Thesis at Tongji University, Shanghai, China. The project deals with waste found in a tea farm in Yibin during the summer and autumn months due to the lower quality of the harvest. Zhou's project uses this waste by turning it into a valuable product. She worked with 3 kinds of teas and 6 kinds of natural adhesives to create a clay-like working material. Zhou created a series of disposable products like cups, and an aroma lamp which retained the smell of dried tea. According to Zhou's material work with tea, the biomaterial she created was soft like clay when wet and hard like wood when dry. You can therefore sculpt it and dry it through a natural dehydration process. After it has dried, you can use a CNC machine on it. Some of the material properties she discovered were - hard, porous, water absorbing, aromatic.

Virtual workshops; material examples and ingredients for making circular materials. Image source: Circular Home Lab

Example of grafitti made with Air-Ink. Image source: Air-Ink

Material Experiments by Jiwei Zhou. Source: Jiwei Zhou, accessed on 10 April 2020

Key takeaways:

- Daily Dump helped me understand that it is important to fit solutions to the context you are working within and the importance of local supply chain systems. Since the project works in a similar context in India, it helped me gauge problems and complexities within the system and work with them, instead of against it.
- Chintan works directly with waste pickers and advocates solutions for the inequalities linked to their socio-economic status. Their work helps me understand the problems surrounding waste management in Delhi and India and what needs to be done to ensure that waste pickers are seen as environmental protectors and significant contributors to society.
- Organisations and institutions like Participatory City and Centre for Community Knowledge are great examples of how communities in urban areas can be involved in the development of their neighbourhoods. Using Participatory Design and recognising communities are knowledge holders is essential for a system centred around people.
- Projects like Circular Home Lab, Air-Ink and The Tea Recipe help me understand how design can facilitate novel systems and utilise what is already around us instead of producing more. Design has and continues to feed consumerist tendencies, leading to an excess of everything and in turn creating more harm than good. It is important for me to re-evaluate the materials we use, the systems they are a part of and who they are designed for.
-

research question

preliminary work

Food waste is a global problem leading to several environmental and societal problems. While the discourse around novel solutions and the role of design has been increasing, it is imperative to take a holistic and detailed view of how and for whom these solutions can be further developed.

Waste management is an administrative and systematic issue and tends to leave out many stakeholders in the process. In Delhi, sanitation and waste pickers, rag pickers and kabadiwalas (waste and scrap dealers) are big contributors in ensuring waste does not reach the landfill. But are left out of any decision making roles. Participatory Design and community driven practices can help bring these stakeholders' voices to the forefront.

While design often adds to consumerist tendencies, I want to see if design can enable communities to come together, learn and build a space that fosters experimentation, knowledge sharing.

Through the course of my thesis, I would like to focus more on the idea of waste diversion through community driven practices, applying the principles of the circular economy and exploring potential learning spaces so that communities can learn from each other, while keeping in mind the socio-cultural context. This brings me to my research question of :

How can food waste in New Delhi be seen as a valuable material resource to install a circular system within community driven learning spaces?

Interview with waste pickers - Sheila and Anita didi*

As a starting point in understanding the role of sanitation workers in India, I decided to talk to a few people from my neighbourhood in Delhi. I come from Mayur Vihar, East Delhi. My gated complex, called Purvasha Apartments, has around 300 households, with approximately three to four people per household. The sanitation workers are employed by the complex to maintain and take care of the complex. These workers are daily wage workers, who are in charge of handling trash, cleaning the roads, and maintaining the hygiene in the complex.

I spoke to Sheila and Anita didi, who have been working in the complex for approximately 30 years. During my interview with them I tried to understand what their role looks like, what problems and challenges they face and what changes they would like to see in their work and employment.

Didi in Hindi, translates to sister. It's a common way of addressing women older to you in Hindi.


Anita didi

Sheila didi

A few key points from my interview with them have been summarised below:

- They handle unsegregated household waste in Purvasha apartments. They collect this trash from each block and segregate it in a cart under each block. They take out valuable trash materials like plastic, metal, paper, and glass. These materials are sold to waste collectors called Kabadiwalas, who further sell it to bigger waste dealers until it finally reaches the recycling center.
- According to them, last year the administration at Purvasha tried to tell the households to sort out their trash into wet and dry waste so that valuable dry waste can be easily extracted and wet waste can be handled properly. However, in reality, this did not work.
- According to Sheila and Anita didi, this is because people are lazy and believe that it's not their job. "Who would want to do this job? No one. People are lazy and want it done by someone else" - Anita.
- They speak about health and safety. They are not even given basic safety equipment by their employers, the housing society. They don't receive any benefits like health insurance from the government since they are employed privately by the housing society and are daily wage workers. During the beginning of the coronavirus pandemic, they were given masks and gloves but that stopped after a few months.
- They often fall sick because of rotting trash. Sheila didi talks about how sometimes people leave their homes with trash rotting for days. When they come back home, they put this trash in a plastic bag and hand it over to her. Since she does not know what's in the bag, she opens it and the smells make her sick, giving her a cough and headache.
- Since they are daily wage workers, they are wholly dependent on the kindness of their employees to give them sick leaves without a pay cut. If they don't come into work, they don't get paid. If they don't get paid, they cannot take care of basic needs like food, health and education for their children.
- They talk about how they are not given any respect by their employers and the households they work for. They speak about how they are not even greeted by the household members on the street. Anita and Sheila didi greet them with a simple hello or good morning, and many times the members don't greet them back. They wonder why this is, why it's so hard for people to even greet them with a smile.
- When asked about what they want from their employers or the government, the key point they raise is financial security and insurance. From the households they work for, Sheila and Anita didi speak about spreading awareness on waste segregation. They hope that individual households segregate trash before handing it to them so that it is easier to extract valuable materials like paper, metal and plastic.
- When we speak about handling wet waste, they talk about composting as a good way to make sure it helps to fertilise the soil as well as making new products. They speak about ways in which their mothers, and people from the village use resources around them like mud and paper to create objects that can be used in the house such as pots for storing grains.

Working with food waste as a material

All plant based food waste consists of cellulose which is one of the most inexhaustible renewable polymers found across the globe. Cellulose based materials are not a new phenomena. They have been used across cultures in applications like paper, cosmetics, printing, leather and packaging. While petrochemical plastic based materials have their advantages: they are flexible, water resistant, hygienic, low cost and lightweight, they are non-renewable and do not degrade, posing a major threat to environmental degradation. According to a study published in the journal Science Advances, of the 8.3 billion metric tons of plastic that has been produced, 6.3 billion metric tons has become waste. Of that, only nine percent has been recycled. The vast majority—79 percent—is accumulating in landfills or sloughing off in the natural environment as litter (Society 2019). There has been a growing interest in experimenting and developing cellulose based material as a potential replacement for petrochemical plastics. There have also been advances in making some of these processes open source and accessible to anyone interested in the field. Open source libraries like Materiom, which documents circular material recipes from the community, help in understanding the process of developing these materials that may otherwise be intimidating. My material experiments focus on the potentialities of food waste as a material and exploring ways in which it can become a viable product.
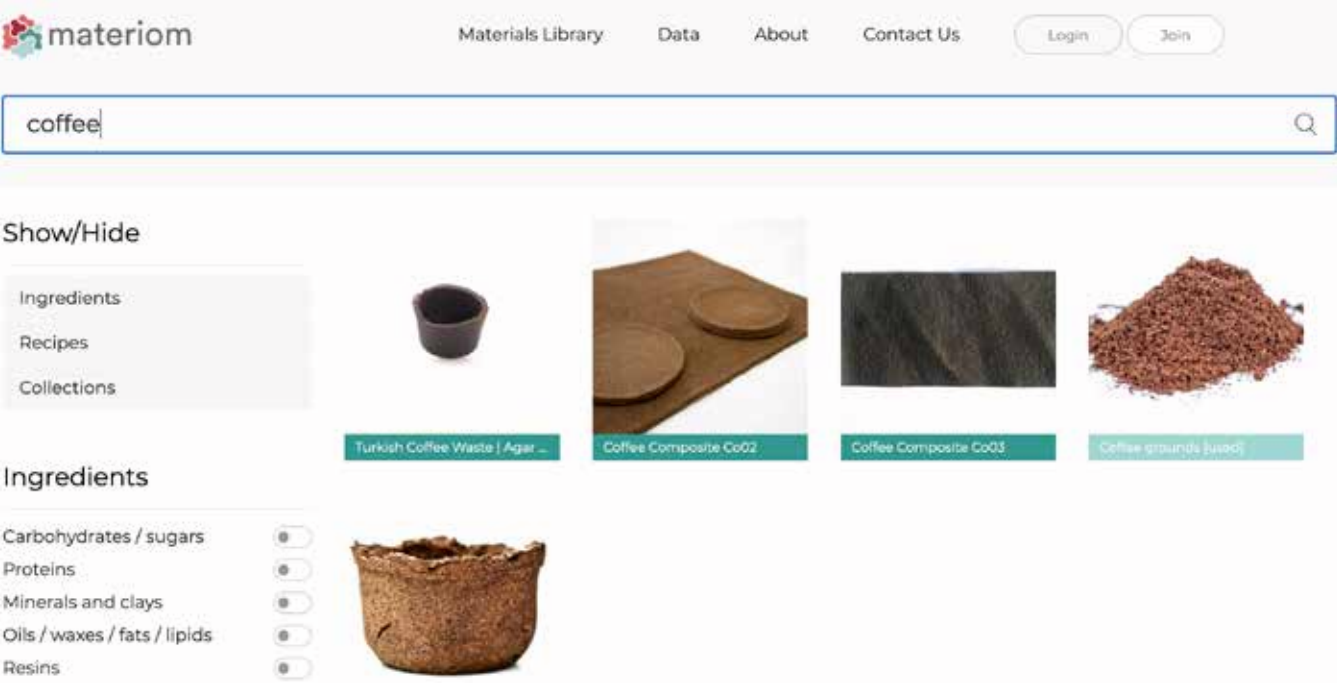
An example of different kinds of coffee recipes found on Materiom. Image source: Materiom

Focusing on Tea Waste

To specify my area of focus from the broader lens of food waste, I decided to narrow it down to tea waste. Firstly, food waste is hard to handle as it can easily rot when disposed of. Focusing on certain waste streams can help in extracting valuable waste and using it as a material. I come from India where tea is an integral part of everyday life. A by-product of British colonialism, it holds significant cultural, social and economic value to the country. India is the second largest supplier of tea to Germany, second only to China and is one of the largest global suppliers of tea. According to the Tea Board of India, over 80% of tea produced in the country is domestically consumed(Market 2019). While tea is a common household commodity, the presence of small roadside tea stalls is common across the country. These tea stalls are open throughout the day and see a wide range of customers, from labourers, government employees, students and office dwellers. The consumption of tea in these chai (tea) shops produces huge amounts of waste.

Understanding Tea Production

India is one of the largest producers of tea and is a high value crop, both domestically and internationally. Tea production in India has been around for around 200 years and was introduced in India by the British. Tea production requires very specific climatic conditions with high humidity and heavy rainfall along with being a labour intensive crop.

In September 2019 I visited Mann Tea Estate in Palampur, Himachal Pradesh to understand their tea production process and understand if there was waste in the production stage. At the estate they grow Orthodox tea (a method of tea production) with tea pluckers harvesting around 20kg per person per day during harvesting season. Women are the main labourers in these gardens, often underpaid and dealing with poor living conditions.

While there is leftover waste, tea that does not make the first quality mark is turned into tea dust, a lower grade of tea that is resold specifically in the Middle East market. Leftover waste like stems are stored and sold once a year to pharmaceutical companies.

Key Learnings:
• While there are problems of tea waste, a lot of the leftover stock at Mann Tea Estate is resold and used.
• There has been a decline in production in the recent years leading to less tea waste production
• Procuring tea waste at the production level can be tricky as you need to be authorised by the Tea Board of India

These factors led me to rethink my thesis approach and focus on tea waste at the consumption stage as that too, is prevalent in the country. For the purpose of experimentation with post consumption tea waste, I would be able to use tea waste produced by me, as a regular consumer of tea.

Mann Tea Estate, Himachal Praadesh, India

Estate workers pluck around 20kg per day during peak harvest season

Sorting of different kinds of tea at the estate

Exploring Tea as a Material

Ideation

To get an initial idea of the properties of tea and understanding it as a material, I started experimenting and brainstorming on ways it has been and can be used. I started by using household tea waste, dried and stored it to see how long it could last. With a personal interest in ceramics and pottery, I also tried to incorporate it into clay and understand the combination of the two. Another experiment I tried was to use tea as the main raw material with natural binding agents like glycerin and cornstarch.

While my experimentation and understanding of the material is still at a nascent stage, it helped me gain a better knowledge of the material and envision possible use cases.

Properties	Possible uses	Kind of tea waste	Access and Workability
Tannins	Dying/extracting pigments	Production & Consumption tea waste	Yes
Cellulose	Materials and by-products	Production & Consumption tea waste	Yes
Absorbent	Neutralises bad odours	Production & Consumption tea waste	Yes
Absorbent	Removing pollutants Treating water	Production Waste	No

Raw Material Production

The first step in working with the material was producing the raw material itself. This started with cooking, drying and storing tea waste to see how long it can potentially last without going bad. The longest I have managed to store tea waste is 4.5 months and it has remained in good condition. The most important part is to make sure it is completely dry before storing it.

Fresh wet tea waste

Dried tea waste after 24 hours

Dried tea waste

Crushed and dried tea waste

Exploring tea as a bio-material

Tea waste and clay

Tea waste, potato starch and glycerin

Tea waste, rice starch, vinegar and glycerin

Tea waste, rice starch and glycerin

Tea waste, rice starch and glycerin

Tea waste, potato starch and glycerin + embriodery

Tea waste, sodium alginate, urea and soda ash

Tea waste, rice starch, vinegar and glycerin

Tea waste, rice starch and sodium alginate

Tea waste, rice starch and glycerin + stitching

Tea waste, sodium alginate and glycerin

Tea waste, sodium alginate, urea and soda ash + lino prints

Cooking the Tea Material

Measuring the ingredients like tea waste, rice starch, glycerin and vinegar

Weighing and mixing the materials

Weighing and mixing the materials

The mixture before cooking

Cooking the ingredients

Moulding and waiting for it to air dry

Ingredients for tea waste bio-materials

Experiments with creating tea tiles and tea leather like materials

The texture of tea leather

The tactility of the tea tiles

identifying problem areas and opportunities

Problem areas

Waste is a deep rooted societal issue which needs structural changes in the system to have a larger impact. People's behaviours and understanding of waste management and of waste pickers need to be questioned in order to bring about positive change.

Waste segregation at source is important to ensure that the maximum extraction of usable waste can be obtained. This is a major issue as waste segregation is not a common practice in Indian households.

Food waste is hard to manage and handle as it can get mouldy and rot. While waste segregation at source is important, different food waste streams also need to be thought of as separate systems. To extract food waste like tea and coffee to make materials, they need to be obtained at the source where they are produced like cafes and tea stalls. Systems need to be designed to focus on these specific waste streams for maximum efficiency.

There are potential uses and cases for food waste based biomaterials but they require in-depth research, testing and experimentation.

While participatory design practices are important, it also needs to take into account the power dynamics and hierarchical structures that play a huge role in Indian society.

Opportunities

Waste is a deeper societal issue. We can begin by understanding how waste is treated and what it looks like as a resource. Awareness and education are a starting point to bring about change.

Developing systems of waste collection and focusing on smaller, local waste streams can help develop a prototype that can then be scaled up.

Bringing together local communities to exchange knowledge may help break barriers between societal stereotypes. Developing practices that are focused in knowledge sharing, empathy and understanding can aid bringing communities closer together.

goals & design principles

The aim of my thesis is to understand ways in which abundant materials around us can be reused and intertwined with the systems around us. With a keen interest in creating a closed-loop cycle, the aim of this thesis is to understand the potential of the resources we would otherwise waste to create new materials and objects.

Following Neri Oxman's principle of looking at material and form intertwined with one another, I would like to utilise my role as a designer to understand how materials and crafts depend on one another and to find novel ways of using food as the main material.

Along with material explorations, this thesis also aims to find solutions based on the context of community driven learning spaces. By using KISD as my testing ground, I aim to understand how these circular systems can be set up in learning spaces. Through the lens of an Indian context and keeping the stakeholders in mind, I want to speculate on my learnings from my practical knowledge to imagine how it works in New Delhi.

This proposal lays the groundwork for my final thesis with a few principles to keep in mind:

- The end product/system/service should be easy to reproduce and work in contexts which don't have access to costly equipment and resources.
- It should fit the local context and keep in mind the stakeholders at each stage. The solution must be inclusive and developed through participation.
- Knowledge sharing and experimentation should be a major part of this thesis. Material ecology is a new field for me as a designer and in order to add to the discourse, documenting and sharing information would play an important role for the growth of this project.

research question in perspective

While I spent a majority of my research focusing on India and I would have liked to develop the practical part of my project in New Delhi, the coronavirus pandemic was a significant factor in creating a new set of challenges and hindrances. The pandemic was and continues to be one of the most devastating health crises of our time and has affected lives across the globe. India was severely affected by the pandemic. Due to the lack of proper health infrastructure, size of the population and poor governance, the country has been one of the hardest to be hit globally. In India, from 3 January 2020 to 5 July 2021, there have been 30,458,251 confirmed cases of COVID-19 with 400,312 deaths, reported to WHO ('India: WHO Coronavirus Disease (COVID-19) Dashboard With Vaccination Data' n.d.). Currently, India is the second most affected country after the USA.

The pandemic was devastating for the entire country but has longer lasting impacts on communities from lower socio-economic backgrounds. The informal sector was impacted because of the constant lockdowns and lack of financial security. The pandemic led to one of the largest migrant crises in recent history and the country is struggling to cope with the pandemic on all fronts: medical, social and economical.

The pandemic also led me to rethink how I want to approach the practice based part of my thesis project. While honoring the work and research I put in, I decided the best way to take this forward was to co-develop the practice based part with a fellow masters student and friend Matthew de Kretser.

Matthew's thesis background works around developing learning spaces and environmental literacy and my thesis focuses on biomaterials and participatory design. We brought together our two theses, to take on the larger task of building a circular materials space, while still retaining our original research areas and contexts.

To answer my research question: <u>How can food waste in New Delhi be seen as a valuable material resource to install a circular system within community driven learning spaces?</u> Matthew and I developed a supporting question which works within the framework of our co-authored thesis: <u>How can we facilitate communities to set up circular systems within places of learning that encourage experimentation and knowledge sharing?</u>

These two research questions compliment each other and work in collaboration to come together in Part 3 of this thesis.

PART 2

the playground

developing a circular materials lab

Co-authored by Sukanya Deepak & Matthew de Kretser

PART 1

Sukanya's research question

How can food waste in New Delhi be seen as a valuable material resource to install a circular system within community driven learning spaces?

Matt's research question

How to engage children in explorative, accessible play as a way for them to build social and emotional skills and environmental literacy?

Supporting Research Question

How can we facilitate communities to set up circular systems within places of learning that encourage experimentation and knowledge sharing?

PART 2

The Playground: Developing a circular materials lab at KISD

PART 3

Imagining community driven circular spaces for food waste in New Delhi

Imagining circular spaces for plastic waste in Johannesburg

The case for circularity

MANIFESTO

The Playground is a space for all. It connects students, professors and members of the wider community around a shared vision of a circular future.

We believe Makerspaces are inherently beneficial spaces; communal areas where people can come together and engage in hobbies, crafts, learning and sharing, creating and experimenting. It is something that is desperately needed in a society that is becoming more distant from one another and hands-on skills are dwindling. That being said, Makerspaces are also somewhat exclusionary. They are often not open to members of the general public (often housed in universities or large companies). They contain cutting edge technology, which, although allows for quick and easy prototyping, also has steep learning curves and often requires assistance from qualified technicians. Because the equipment is often only found in this space, it also means that the process of making and creating is limited to this space.

The Playground takes this model of a Makerspace and expands it, democratises it. There are several core tenets that we identified to help guide our process and practice. It is a circular system. Waste is collected, sorted and used as ingredients for material experiments. The waste that cannot be used further is either composted or recycled. All these processes take place within a short supply chain, closing the loop as early as possible.

It is deliberately low-tech, most of the equipment in the space is basic, most likely found in a common kitchen. The idea behind this is to encourage as many people as possible, from as many backgrounds as possible, to come into the space and feel comfortable working there. Once people have come into the space, engaged with the processes and experimented with different materials, they can go home and continue experimenting. The act of creation should not be limited by access to equipment.

The Playground is only possible through community-driven efforts. Knowledge sharing is at the centre of what we do. There is no hierarchy in the space and peer-to-peer learning takes place at every stage, from the coworking space to the self-organised workshops to the community meetings. The knowledge created within the space is open-source. This allows those who are new to the space to learn from previous failures and successes, encouraging them to experiment further.

This space is adaptable. There is no one perfect system. What works in one place may not work in another, for a myriad of reasons. The Playground is merely a framework, an example of what is possible. Each new space will be built from the ground-up, adapting to the local context as needed.

Lastly, this space is dedicated to creating, failing, experimenting, discovering and having fun. It is a rebuttal to the deeply entrenched view of what education is and a suggestion for what it could be. So go play!

circular
low-tech
community driven
knowledge sharing
adaptable
fun

How did we get here?

We came upon the idea to start the Playground rather fortuitously. A few months ago we were both working on our individual theses: Sukanya looking at food waste and Matt at single-use plastics. During a talk with our supervisor, Prof. Müller-Russo, Sukanya mentioned that she would like to set up a community space back in Delhi where people could come and learn new skills. Prof. Müller-Russo proceeded to ask that if Sukanya wanted to do this, then why wasn't she? Sukanya wasn't sure what to say. Matt had been wanting to do something similar for a while as well and was glad that the question wasn't directed at him. After the call, we spoke to each other about this idea to see if there was anything there. Why weren't we doing this? The excuses we had were mainly that it just seemed too hard to do, a difficult undertaking with many different aspects and players and things that could go wrong. But, the more we spoke about it the more we realised how aligned our goals were, so we decided to give it a try. Trying it now made sense. We had the support structures of the university, a community of students we could ask to get involved and very little financial risk. The worst thing that could happen was that we made a terrible project, and we both decided that we could live with it if that was the outcome.

And so, after a round of brainstorming names, The Playground was born. We had very little idea of what we were getting into, and if we had known, we think it might have discouraged us to even try. A seemingly endless amount of administrative work, failed experiments and material tests hours before a workshop, trying to organise different teams of people to get work done, almost-fires (don't worry everything is fine) all while trying to work on individual theses as well. That being said, after a tumultuous 2020 where neither of us particularly enjoyed what we were doing with regard to our studies, these past 5 months have been an exceptionally transformative experience for both of us. We have failed together and been annoyed with one another, but we have also picked each other up and motivated each other throughout the process. This was definitely not a task for one person, and I think if either of us had gone it alone it would have failed long ago.

As of writing we have carried out several material workshops with over 40 KISD students, we have set up a framework for a material library and co-working space at KISD with the potential for it to become its own student-led AG, we have added some colour and life to the courtyard and we have proven that students want to be working with sustainable and circular materials, if only they are given the opportunity. We have also learned what not to do (a lot). But most importantly, at least for us, is that we have had more fun than we thought is allowed when doing a masters' thesis. And so to end, a message for any students reading this: do something that you want to do, do it with someone else if you want to - there is no rule saying that you need to suffer through your thesis.

user research

User Research and Problem Definition

———●———————————————●———————————————●———
Research Gap   Expert Interviews   Co-creation

Ideation

———●———————●———————●———————●———
Initial ideas and   Storyboarding the   Identifying the   Mapping the system
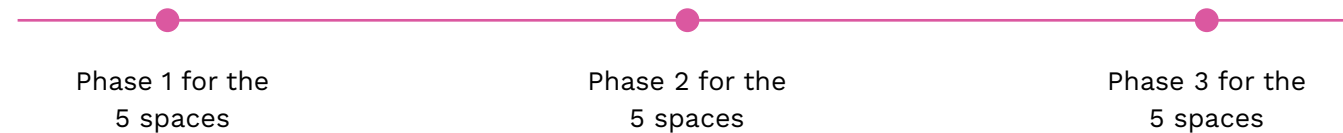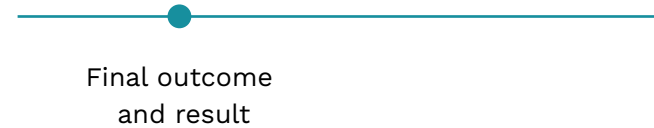planning   system   5 Spaces

Iterative Protoyping

———●———————————————●———————————————●———
Phase 1 for the   Phase 2 for the   Phase 3 for the
5 spaces   5 spaces   5 spaces
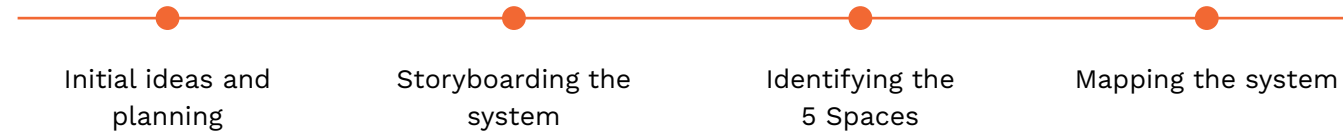
Refinement

———●———————
Final outcome
and result

Research Gap

———

Infrastructure
Opportunities
Documentation
Hands-on experience
Linear system

We are experiencing the greatest threat we have ever faced. The climate crisis is upon us and there is no denying that designers have played an active role in it.

There needs to be a collective shift, both as a society but also in our role as designers. We are at a point of inflection, where we can either carry on as is, pretend that everything is fine and accept the inevitable, apocalyptic consequences. Or we can take active steps in mitigating this disaster. Until very recently, the concept of a circular economy was a fringe thought experiment. Now it is being spoken about through all aspects of society, one of which is design. The current, linear model of extraction, refinement, production, consumption and disposal has come under harsh criticism for its short-sightedness and recklessness.

A circular system, put simply, seeks to close this cycle, viewing waste as a valuable raw material that can be processed again and again. Materiality is at the heart of this concept, and over the last few years there has been great interest in developing sustainable, circular and bio materials to replace the current "throw away" materials. KISD is a good example of this process taking place, with more and more students basing their work around sustainability and materiality. However, information in this area is still relatively hard to come by, with many students spending much of their time just trying to figure out the basics. We have dedicated spaces for woodworking, metalworking, ceramics, textiles and more, and while all of these involve working with materials and having knowledge about them, the materiality is often only a means to an end; the finished product is the most important aspect. We believe that there is an inherent need at KISD, as well as more broadly, for a space dedicated to materiality - the study of materials, their life cycles, their properties, their impact on the environment and more.

From our experience at KISD, there are often only one or two projects per semester that deal specifically on materiality and circularity. This means that a very small number of students can take part in this important area of study. Despite a growing interest in this field over the last few years, it is not reflected in the projects offered at KISD, with many students left to explore their interests through self-initiated projects, their intermediates, or their final thesis. However, it is also quite a daunting area to explore, with complex methods, specialist equipment and ingredients and requiring a large working space. This means that when students aren't offered the opportunity to engage in this area, they are unlikely to initiate it themselves.

Those students who have taken up the challenge, and centred their projects around circular and sustainable materials, often spend a large percentage of their project on the initial experiments - trying to figure out how to work with the material. And while this is, of course, an important step in any design process, it makes no sense that generation after generation of students should make the exact same mistakes and experience the same failures for such a long period of their limited time before they feel comfortable working with the materials.

There have been many amazing projects to date that have dealt with circular and sustainable materials, but once they are over there is a limited documentation of it. Even thesis works, which are available on the KISDarchive, are often lost and it is often hard to find information on projects that have dealt with a particular material. This lack of knowledge sharing means that valuable research and information is lost. Students then spend a lot of time conducting initial experiments, when instead they could gain familiarity with the material much quicker and spend a larger amount of their time conducting further experiments, thus building on past students' work as opposed to replicating it.

Over the past year, there has been little opportunity for students to take part in hands-on experiments. While these are unprecedented times, and it was not possible for students to come in and use the workshops, it also brought to light the reliance on these workshops for making to take place. Creation should not be limited by place, and it has been sad to see how many students at a design school have struggled to maintain a creative practice of some kind, especially one that involves hands-on making.

We have noticed that KISD operates on a mostly linear system. Not only with regard to materials as discussed above, but also as a whole. A circular system should be connected throughout, where the output of one aspect acts as input for another, thus closing the loop. The coffee shop at KISD, the Gute Stube, produces a large amount of coffee waste every day which is thrown away with general waste. Arbeitsgemeinschaften (AGs), which form the backbone of KISD and are student-run, often work in parallel with one another when there are many possibilities to integrate their work. Circularity is a rather vague term, and the goal of becoming fully circular is almost impossible. However, through small, carefully thought out interventions, a space such as KISD could take large strides toward becoming more circular.

Expert Interviews

—

Big Circle Studios
Circular Home Lab
BIOLAB Kassel

Once we had identified these gaps, we started envisioning what a potential intervention could look like. Both of us had been curious about circular systems and bio-materials before starting this project and thus had a list of several organisations, institutions and individuals that we could draw on for inspiration and knowledge. We ended up speaking to people from three different design practices. They gave us good feedback, interesting insights and useful ideas that we took forward through the rest of our process. The remainder of this section will summarise these interviews.

We first spoke to Big Circle Studios, a Johannesburg based "studio and lab that is firmly rooted in the practices of circular economies, radical indigenism, speculative research, and circular design"('Big Circle Studios' n.d.). They have hosted several workshops with members of the public, engaging in object making with different materials ranging from single-use plastic to biocomposites. We spoke to them before we hosted our first workshop, and because this was a new experience for both of us, we were not sure what to expect. Big Circle Studios provided us with good insights and best practices for running material workshops. In preparation for workshops, it was important to get confirmation from all those participating. They had an instance where only half the number of participants showed up on the day, which is demoralising when so much preparatory work has gone into it. This informed how we would get confirmation from participants going forward and it led to a very high participant turnout, with only one person missing one of the workshops.

We were nervous about the beginning of each workshop, not sure how to start it off, introduce the subject and get people comfortable in the space. Big Circle Studios' response to this was that it was important for the participants to understand why they were there and how this workshop fit into a larger narrative. They asked each participant to bring an object with them, and at the start of the workshop would give each person a chance to explain what they brought, what material it was made of, and what the life-cycle of that material was. This opened up interesting discussions and encouraged people to think about the whole system of that material, from its origins to its future. While we did not incorporate this practice into our workshops, it gave us direction as to how to start the workshops, including ice breakers to make people feel comfortable in the space, what we are planning to do with this project, as well as an introduction to the material being used in the workshop and how the participants will interact with it. For our last workshop, we had a small collection of the materials we had already worked with on display in the workshop space. This allowed participants to look at the materials and interact with them, leading to questions and comments about the different materials. Going forward, as the Material Library grows, we would like this to be a more prominent part of the workshop session, incorporating more of the practice of Big Circle Studios.

The last piece of advice for the workshops was that participants should be able to take home something from the workshop. While this was already something we thought would be important, the talk with Big Circle Studios confirmed this. We made sure that each workshop was designed in such a way that at the end of it participants would be able to take home whatever it is they had made. We found this important for two reasons. Firstly, as the workshop was hands-on and centred around making, it only makes sense that whatever was made then has function outside of the workshop and participants can keep their creation. Secondly, and perhaps more significant, is that the participants now have a physical documentation of their experience with this material. They can look at it, pick it up and interact with it, allowing them to engage more consistently with the material and consciously or subconsciously think of new ways in which this material can be used, hopefully leading to further experimentation.

As we spoke to Big Circle Studios near the beginning of our process, they also gave us advice on setting up the space in terms of what equipment is needed. Small things like mixing bowls, sieves and disinfectant were among some of the items listed, and ones that proved incredibly helpful throughout the workshops as well as our own practice.
At about the midway point of our project, we spoke to Circular Home Lab.

Circular Home Lab describe themselves as "a duo hosting virtual workshops, inviting you to explore the circular materiality of turning food waste into home products."('About Us' Circular Home Lab.) They have taken the pandemic as an opportunity to offer online workshops, allowing people to experiment with materials using only ingredients and equipment found at home. This resonated with us as it incorporated several of our principles including circular, low-tech and accessible. We had also considered running virtual workshops, but fortunately were able to offer small, in-person workshops at KISD. Nonetheless, it was insightful to speak to Circular Home Lab about their experience running workshops. In particular, we were at a point in our project where we were not sure how to improve on the workshops. We were getting feedback from participants, but it was all rather generic and did not inform us on how to iterate the workshops. We also wanted to start evaluating our work, seeing what impact we were having and what changes we could make.

While Circular Home Lab did not focus intently on feedback and evaluation, they did offer direction as to how we could go about doing this. We went back to our original goals for the project, what we wanted to achieve, and from there drew up questions that directly spoke to these goals. The feedback we received from participants after that was much more directed and useful and helped us to evaluate our process.

Website landing page, studio and worshop from Big Circle Studios

Website landing page, workshop poster and ingredients from Circular Home Lab

The last team we spoke to was BIOLAB Kassel. They were the practice that had the most in common with our project: they are a self-started, student-led initiative within the Kunsthochschule Kassel, they work extensively with bio-materials and they organise workshops and seminars for students at the university. We spoke to BIOLAB Kassel near the end of our project. We started with general questions about their experience in setting up the space. It was encouraging to hear that a lot of the aspects we struggled with were also things that they struggled with. Funding was a common point, and although they have now secured a generous amount of funding to allow them to operate and even pay members for their time, it was a long road of filling out multiple applications to get to that point. One key takeaway from this was that they had begun working with other faculties within the university, such as microbiology. These scientific departments are experienced at applying for funding. This is something that we would like to look at more closely going forward, with potential collaborations with many different departments at TH Köln.

They have organised several lectures and seminars with students across different topics of bio-materials. They invited professionals and experts in to talk about these topics and the response from the students was incredibly positive. While we want our space to be student-driven with knowledge sharing amongst peers, there is also great value in bringing in experts in certain topics to discuss their work and experiences. They have also conducted a few field trips with students to other organisations and institutions working in circular and sustainable materials. This is a good way to expose curious students to what is already being done in this field as well as to build relationships with these institutions for possible future collaboration.

All of this knowledge was really helpful in picturing a future vision of The Playground, and led us onto the topic of continued engagement. This is one of the things we have struggled with the most throughout the project, and has fed our fears of the project dying out once we leave KISD. BIOLAB Kassel are in a similar position, with their two founders graduating as of writing and leaving the space. They unfortunately did not have an answer for us, as they were also still trying to figure out how to pass the project on for new students to look after. Their advice to us was to try and secure funding, make sure the space is being used as much as possible, whether it is through workshops, meetings or projects and most importantly, to get the support of the academic institution. It sounds like they have had a real uphill battle with this last point, as their university did not see the need for such a space. While there is always room for improvement at KISD, we are fortunate to be working within a university that is supportive of student-led initiatives and the concept of sustainability. It is this, along with the positive feedback received from fellow students, that give us hope that this project will endure for future students to use this space and benefit from it.

BIOLAB

Arbeiten, Gestalten und Forschen zwischen Design, Kunst und Biologie

Images of materials and experiments from BIOLAB Kassel's website

Co-creation

It was important for us from the start of this project that it was co-created as much as possible with as many different people as possible. From the research we did, the interviews we conducted and the general experience of setting up spaces such as we were trying to do, there is wide-spread consensus about two things. The community needs to be involved and care enough about the project that they want to see it succeed, and there always needs to be at least one person that is responsible for the space, making sure engagement is maintained. We will come back to our long-term goals near the end, but one of them was that we wanted this project to continue running, in some way, after we had left. We were aware of how challenging this was and thus from the outset tried to make it not "our" project, but a project for KISD students, current and future.

Staff
This process started out with speaking to several different staff members. This was for many different reasons but involved permissions, logistical and administrative organisation, funding, and general advice. The first person we approached was our supervisor, Prof. Müller-Russo. This project can be attributed to her encouragement and so she was on board from the beginning. She gave us permission to use her project room as a testing space and has guided us throughout this entire project. For all the interventions that took place in the courtyard, we spoke to the Hausmeister, Herr Rosellen. For the most part he had no problem with our proposed plans, only denying the request of creating structures on the street lamps for fear of safety. We spoke to Johanna Mehl, who is the Master Programme Assistant for the MA course and has been a shining beacon of knowledge and advice throughout our studies. A few years ago she had helped set up the screenprinting studio, another student run space at KISD, and thus we were eager to understand her role in it. She gave us advice on starting the space, applying for funding and maintaining the space long-term.

Once the actual work had begun, and we started planning workshops, we needed to determine whether it was even possible to conduct workshops at KISD given the coronavirus pandemic and restrictions that were put in place. Initially, we had wanted to make the workshops and space available to all members of the community (and this is still a goal of the project going forward), but it was very evident that only KISD students would be able to enter the university during this time. After speaking with Prof. Gais, the director of KISD, about the possibility of conducting in-person workshops, we were very relieved to hear that we were allowed a maximum of 8 people in the room. The organisation of the workshops proved to be quite logistically challenging, requiring permissions to use the room and participant permissions before each workshop. This was carried out with the help of Prof. Gais and Frau Lindner, the secretary at KISD.

We knew the survival of this project would be greatly increased if there was some credibility and support behind it. We thought the best way this could be achieved was either by creating an Arbeitsgemeinschaften (AG) or Working Group, which are largely student-run initiatives taking place across different aspects of student life (coffee shops to event organisation to curriculum planning) or by establishing a new lab, similar to the wood workshop or prototyping lab. Our initial idea was to approach an already existing AG, the Gute Stube, and involve them in some way. This was mainly coordinated with students, but the space is supervised by Prof. Großhans and we met with him on a few occasions to discuss the possibility of this collaboration, as well as the potential of setting up a new AG for The Playground.

Students
Working with our fellow students was a process that we practiced from the very beginning of this project up until (and hopefully after) the conclusion of it. Our first idea was to speak to MA students within the thematic cluster of Material Systems and Lab Culture. The purpose of these meetings was to determine what kind of space students wanted or needed, what equipment would improve the space and how they might participate in the space going forward. This had varying levels of success. Most of the students showed great initial interest at the beginning and gave helpful suggestions, but only some of them participated further in the project. This was something we experienced continuously throughout this project and will speak more about in the reflections of this project.

We attended the meeting for self-initiated projects (SIP) and proposed our project there. Firstly to seek out people who wanted to get involved in co-creating the space, but also to offer the opportunity for students to conduct their own projects within the co-working space. From this meeting we partnered with two KISD students, Ophelia Fischer and Moritz Plöns, who were interested in setting up a material archive at KISD. We had had that thought at the back of our minds, but didn't think we would have the capacity to do it in such a short time and so were delighted to be able to work with them to develop that idea further.

As already mentioned, we collaborated with the Gute Stube throughout this project. Five students who were part of the Gute Stube helped us design and build objects in the courtyard, as well as plant and look after the garden. We attempted to co-create throughout the process, getting their insights into what they would like to build in the courtyard as well as the design and materiality of these objects. We also had to organise time schedules in order to track their hours and make sure the plants were always cared for.

Because this was a project in community involvement, there were many instances of collaboration and communication. We organised workshops with other students, both as participants and facilitators, we hosted meetings with other students for them to share their work and we engaged with people at KISD while we were going about our work who were curious about our project.

ideation

Initial Ideas and Planning

After identifying our research gap and co-creating with various members of the KISD community, we began thinking about how this intervention would take place, who would be responsible for it, where it could find a home within the structures of KISD and what would happen in this space. We began with the idea of creating low-tech Makerspaces that would encourage students to rethink their relationships with waste and enable a community to develop around it. We identified a few touchpoints for our intervention to take place - the courtyard for waste collection, composting and a garden, a room which will act as a co-working space and within existing communal spaces like the GuteStube.

We began thinking about the principles we had in mind from our manifesto and how we could incorporate that into a circular system. We started co-creating the space with other students based on their needs and brainstorming workshop ideas that are low-tech and can be done at home. We planned and designed the co-working space and courtyard, and began procuring equipment, tools and building materials. We storyboarded how the materials from the courtyard would enter the co-working space with workshops on how to use the waste materials to transform them into usable products.

We started building our community by using KISD spaces, an online platform for all KISD students to get other students involved and have an online presence. We hosted regular calls to get students to speak about their work, let them know our plans, and asked them for their feedback and thoughts.

While we began doing all the work and planning for it, we also thought about how all of this comes together as a system. We zoomed out, looked at the larger picture and saw how all these different components we were working on needed each other to sustain the feedback loops between them.

We identified 5 spaces that are needed to make a circular system work. Going back to our principle of adaptability, we ensured that these spaces could commonly be found in most contexts, in some form and adjusted to the needs of the context of where it is being set up.
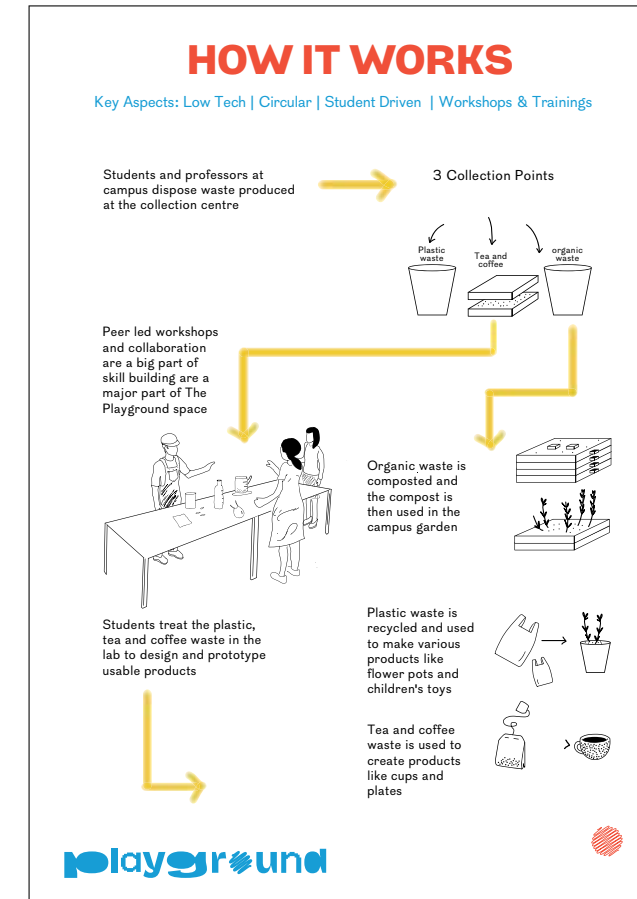
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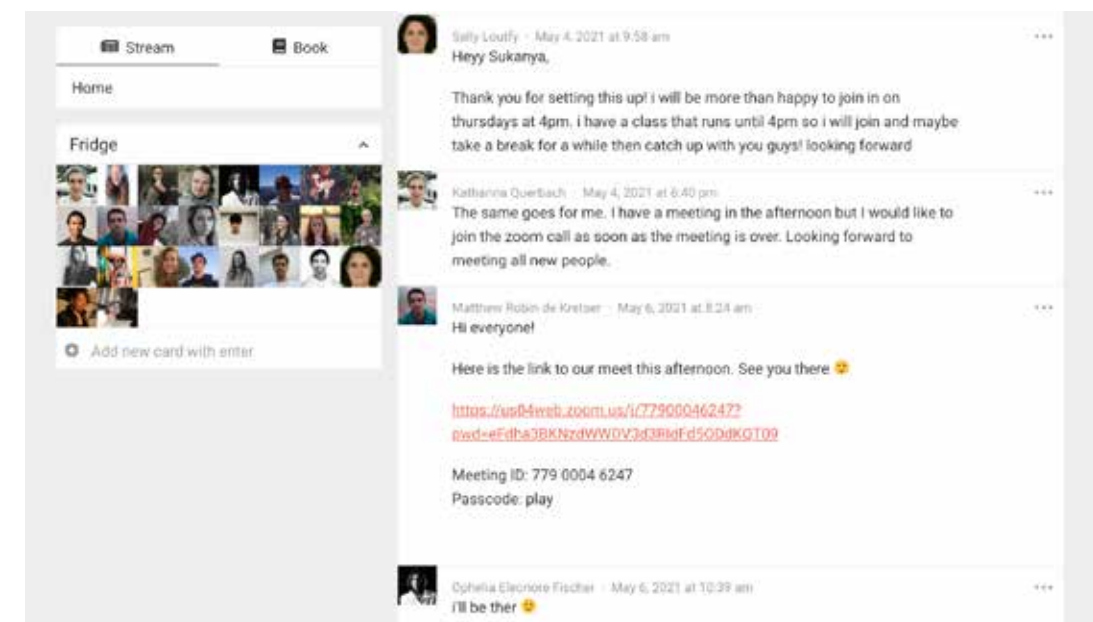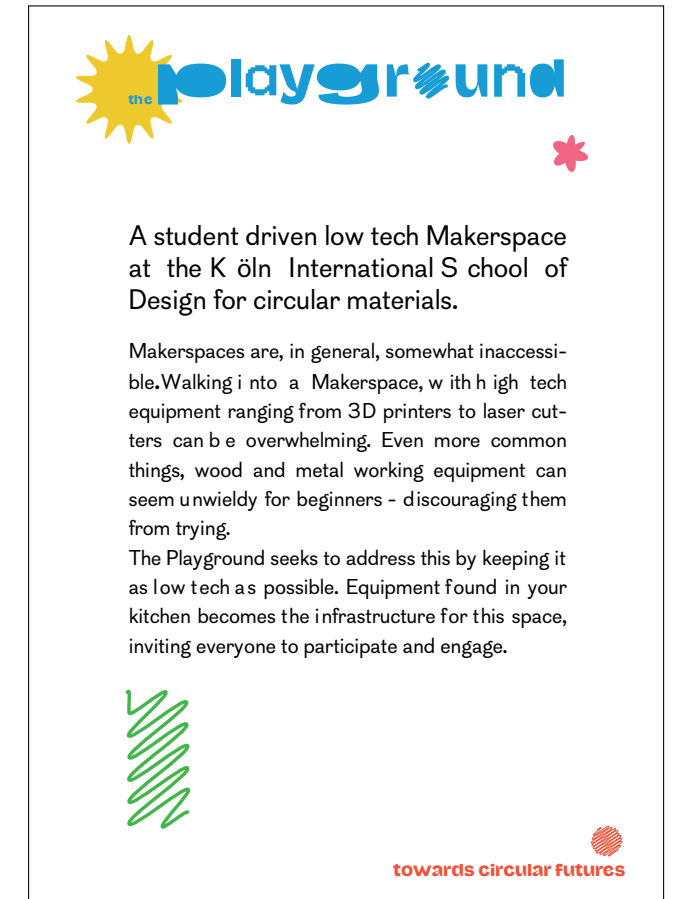
Having a common space where the community can interact and engage with each other

The 5 identified spaces are:

Kitchen

A key component of setting up a circular materials lab is having a space to provide the necessary tools and infrastructure. A space where the community can come together, work, experiment and learn from one another. This space is the Kitchen, named purposefully to convey the idea that it should work as a familiar space with tools and equipment that are not intimidating. Keeping in line with the principles of low-tech and community driven, the Kitchen is an easy to use space for people interested in experimenting with circular materials. In terms of resources, the space requires basic kitchen equipment like a stove, fridge, oven, scale, storage space, utensils and protective equipment. It also requires people to be responsible and maintain the space.

Workshops

To keep the system circular not just in terms of materials but also with the passing down of knowledge, the Workshops are where collaboration, learning and experimentation take place. The idea behind workshops is that community members teach each other skills, pass on their knowledge and train one another. Workshops enable the community to grow and gain knowledge of working with circular materials. The Workshops can take place in the Kitchen which has the infrasture, equipment and tools needed for most workshops. Beginning the first set of workshops might require experts to come in and train community members, who can then take the knowledge forward and train other members. The hope is that these workshops work as an endless loop of knowledge creation and sharing, training the next set of members to conduct workshops.

Courtyard

Setting up a circular materials space with a focus on waste requires a communal space for collection to take place. The Courtyard acts as a space where there are waste collection points along with composting facilities for organic waste. It's a place for the community to build a green space for themselves, with plants and vegetables and a place to relax and unwind. This space becomes a key touchpoint which is not only open to members of The Playground, but also to the larger community. It's a space to bring in civic engagement and spread awareness about circular systems. To build this space, you need volunteers or members to help with making planters, compost structures, gardening and maintaining the plants. This is a space which needs a lot of care and regular maintenance.

Community

Since this intervention relies mainly on people, building a community is an integral part of The Playground system. While there may be people who organise the space, equipment and tools, you need a larger community to keep the space up and running. Having a space, either digital or physical, for the community to come together and engage with one another is important. This will lead to new ideas, interventions and keep the momentum going in the circular materials space. People are at the heart of this circular materials space.

Materials Library

A key part to document the growth of the materials space and to encourage learning, a Materials Library is an important step. While setting up a Material Library is a larger task, beginning with documenting recipes that can be accessed by community members, having a small display for the community to come interact with the materials is essential. This can be as low-tech as having a small recipe book and a shelf on display with material names and authors. In this space too, you need people to constantly update and archive materials. The Material Library can also be a space where experiments from the workshops can be documented. In turn, the workshops can also benefit from the Material Library in providing existing recipes and ideas.

material library

maintains and takes care of the material archive

kitchen

contributes to the recipes in the archive

provides contacts and resources for the workshops

provides produce for the kitchen and the community

collaborates and plans for work in the courtyard

community

main point of contact for all communication and collaboration

provides infrastructure for the workshops to take place

workshops

courtyard

The Playground Map: The interaction between the 5 spaces

	KITCHEN	WORKSHOPS	COURTYARD	COMMUNITY	MATERIAL LIBRARY
User Journey	Users join the Playground community → They use the space for material experiments ↓ They regularly use the space for experiments ← They try out a recipe from the Material Library or attend a workshop ↓ Their work is added to the Material library → New members use their work to begin their own journey	Users see a post on the digital Playground community → They sign up for the workshops and prepare for it ↓ They Learn new skills on working with circular materials ← They attend the workshop ↓ They continue working with circular materials → They soon are able to conduct their own workshop	They visit the Courtyard as a communal space → They drop off their plastic waste and compost food waste ↓ They regularly water and harvest the produce ← They take maintain the vegetables in the garden ↓ They take some harvest back home	Users who are interested in the Playground join the digital space → They sign up to join different parts of the Playground ↓ They communicate with other members through in online spaces ← They help maintain the different spaces and keep it up-to-date ↓ They meet and interact regularly in physical spaces → They exchange ideas and come up with new plans for the Playground	Users learn about the library in the online community or see it in the Kitchen → They use the archive for recipes and experiments ↓ They continue working with circular materials ← They try out the recipe from the archive or attend the workshop ↓ They submit their own recipes to the material library → Other members see their recipes and use it
Other Playground Touchpoints	Community Workshops Material Library	Community Kitchen Material Library	Community Kitchen	Kitchen	Kitchen Workshops Community
Backstage activities	• Regular updates about the Kitchen space to the larger community • Maintainence of the Kitchen space: cleaning and organising • Making sure safety regulations are followed • Help organise workshops • Help maintain the physical Material Library	• Plan and organise workshops • Get the space and equipment ready • Help facilitate and moderate workshops • Document the workshop - photos, recipes, feedback	• Regular maintainence of the garden- watering, harvesting, composting • Building structures like planters, composters and communal seating • Ensuring waste is properly segregated and handled	• Updating the members with latest information and keeping everyone in the loop • Maintaining and moderating the online community space • Organising meet ups, calls and work- shops	• Updating and maintaining the physical and digital Material Library • Keeping it up-to-date with latest recipes • Document recipes from the Workshops and provide the Workshops with recipes
User Gains	• Have a workspace for working with circular materials. • Collobaration with other students • Learning from other student projects.	• Learning new skills • Networking and collaborating • Getting a hands on experience	• Having access to a green space • Learning gardening skills and how to care for plants and vegetables • Learning about waste segregation and handling waste • Contributing to making the Playground a circular system	• Networking and meeting other people interested in circular materials • Sharing your work and interest with others	• Learning new recipes and methods of working with circular materials • Showcasing their work in the library • Having access to an open source library and learning about different materials
Supporting Processes	Community Financial Aid Workshops	Community Financial Aid Kitchen Material Library	Community Financial Aid Kitchen	Financial Aid Kitchen Workshops Material Library Courtyard	Kitchen Workshops

The Playground
System Map

Kitchen: A co-working space for circular materials

Workshops: Learning how to work with different circular materials

Courtyard: An outside green space and waste collection center

Community: The people who are involved in this system

Material Library: A space to document all the circular materials

Financial Aid: Support and funding from the institution/community

iterative prototyping

Neither of us had much experience with this kind of work going into the project, and to be honest we had little idea of what we were getting ourselves into. This naivety allowed us to dream about an ideal space, without fear of it failing. That did mean, however, that we failed. A lot. Most of this project was about us trying things, realising they didn't work, going back and discovering why they failed, and then trying again. We were fortunately in a position where a failure didn't risk us ending the project (like in many real-life scenarios) and thus we had the freedom to experiment - university really is a great place!

This next section is a documentation of that process, divided into the 5 different spaces for ease of navigation and different phases to show the development of each space.

Kitchen

Phase 1

Using Room 226 as our prototype, we began to envision how the space could look. We created an equipment list that we shared with other students in order to see what equipment and materials they would need. We also started a costs list in order to keep track of how much the equipment and materials would cost. After doing research and speaking to people who had set up similar spaces, we cleared out the room and rearranged it in a way we thought would be user-friendly. The general setup was to have two tables against the walls with all of the equipment needed for practical experiments and then two tables in the middle where people could sit, work on laptops or meet. We installed a large shelf in order to store all of the materials and ingredients. Lastly, there was a table where we displayed our material experiments and work. This was meant to be used as reference and motivation for us, but also for other people to see what we were doing and ask questions about it.

Clearing up previous projects from Room 226; building up a shelf for storage; initial setup of the coworking space

Phase 2

We realised that setting up a co-working space would be difficult during a pandemic with restrictions on people meeting. We were unable to test out a functional co-working space with many people using the equipment and conducting material experiments at the same time. With this in mind, we decided to focus our attention on how to secure funding for a potential future space. Along with that, we were in conversation with professors on how the space could be made into a new AG. As of writing, there is a strong possibility of securing funding as well as a long-term goal of having a permanent space.

Phase 3

The Kitchen culminated in us setting up a final prototype of what the space could look like in Room 218. This included info points describing how to use the space, preparation areas for material experiments, different stations for different equipment, a central co-working area and a display of past material experiments that students can interact with and learn from.

An excel sheet logging materials, equipment and their costs, co-created with other students

The final Kitchen prototype in Room 218: following a recipe at the preparation station; teamwork makes the dream work; getting acquainted with the space through the info points

Workshops

Phase 1

Our workshops started with us brainstorming what kind of workshops we could host. We came up with an extensive list, but eventually decided to focus on one workshop each: Sukanya would host a food waste workshop and Matt would host a plastic waste workshop. We hosted the first workshop on 14 May and it taught participants to make printing pastes out of food waste. This was by far the most challenging workshop, simply because neither of us had had experience facilitating workshops. Logistically it was challenging. We had put up a post on KISDspaces, the university communication channel that we would be hosting this workshop, with a maximum of 6 participants (Sukanya was hosting the workshop and Matt was assisting and documenting which brought the total to 8). We were unprepared for the amount of responses we received and struggled to reply to everyone. We were unsure of what permissions we needed and were scrambling until the day before to make sure it could go ahead. We had not finalised the recipe or process and spent 2 full days experimenting to get it right. We finally got it right on Thursday evening, giving us just enough time to do a practice run on Friday morning before the workshop took place on Friday afternoon. We had planned for the workshop to be 2 hours long, but it ended up running almost 3 hours. All of that being said, the workshop went surprisingly well, with the participants enjoying the experience and producing interesting outcomes. The second workshop, held a week later, was already much less stressful and although we also ran into a few problems, it ran quite smoothly.

Organising the first workshop: a few failed experiments and a kettle casualty

First workshop on deriving printing pastes from food waste: extracting dye from used coffee grounds; finished printing pastes next to their raw ingredients; straining dye made with orange peels

Phase 2

As can be seen from the above, there were many lessons we took away from these first worksahops. The first was a way of coordinating with students that wanted to join the workshop. We created a Google Sheet with all of the upcoming workshops with dates and asked participants to fill in their name under the workshops they would like to attend. This greatly simplified the process of contacting participants and getting permissions. We noticed that we did not have enough equipment for all the participants of the workshop. This meant that students had to wait to use some of the items, making the workshop last longer. We acquired more equipment in order to cater to this need. The recipes and methods we were using were not polished. Participants had to try several different iterations of the recipe before getting the desired end result. This was not a huge problem, as participants also enjoyed the process of troubleshooting and trying different methods, however it did mean that the workshops ran longer than we had planned, and that some people had to leave the workshops early. We tested and retested each of the recipes and methods to make sure they were clear and accurate. We realised that the workshops went longer than expected, for the reasons stated above but also because when a group of people are trying something for the first time there will be unexpected delays. We therefore extended the length of the workshops by half an hour, which made the experience much more relaxed. Lastly, we reevaluated the feedback forms that we handed out to participants. While our first feedback forms were helpful in gaining a general sense of how participants found the workshops, we wanted more direct feedback in order to prepare better workshops as well as other activities throughout the 5 spaces. We focused on what information we wanted from participants, based on our goals for the project, and crafted specific questions around that. After implementing all of these changes, we found that the next iteration of workshops was far more stress free and enjoyable.

The second round of workshops where participants used recipe cards and feedback forms

Phase 3

We were happy with the work we had conducted thus far, the workshops getting better each time. This was the point where we tested out the knowledge sharing concept even more when we asked other students to facilitate workshops. The final three workshops were hosted by other students. Moritz Plöns on mycelium, Lea Klein and Lara Carbonaro on kombucha and Lina Uelledall on single-use plastic. Our role in these workshops went from that of ffacilitation to that of assistance and documentation. The students told us what they wanted to do in the workshop, what they needed and how long it would take. Over several co-creation sessions, we helped them realise this into a 2 and a half hour workshop with 6 participants. We then attended the workshops purely in a capacity to document the process. All three of the workshops went exceptionally well, and gave us confidence that this structure of students teaching students could continue long-term at KISD. free and enjoyable.

Participants interacting with kombucha leather samples; jars of kombucha at the end of the workshop

Introducing the topic of mycelium; making mycelium; interacting with a recipe card and plastic samples; jewellery made from single-use plastic

Courtyard

Phase 1

The beginning of the Courtyard as a space was to identify what it needed to integrate with the other spaces. We decided that there should be collection bins for plastic waste and food waste, with the potential to collect other waste streams if the need arose. There needed to be a way of composting the food waste that wasn't used in the Kitchen or during workshops and there should be a small garden where the compost could be used. In phase 1 we put out a collection bin for plastic waste and one for food waste. After a few weeks we realised the bins were not working as they were supposed to and so took them away. This was because not a lot of people were coming into KISD at that stage and so there was very little waste. Also, we perhaps did not label the bins clearly enough. In the plastic bin we found several cigarette butts, screws and other objects that did not belong there.

We planted seeds for herbs and vegetables and grew them on the window ledge outside of our project room. We also built a worm bin to help with composting and one planter to start putting plants in. These were successful and will hopefully remain in the courtyard for some time to come.

The potential space identified in the KISD courtyard

Clearing out the space; constructing the worm bin; collection bins and worm bin in place; growing seedlings on the window bank

Phase 2

We realised that communication is a key element, and that if we wanted people to use the space, they needed to know how to do so. Knowing that we wouldn't always be around to explain everything to people, we designed info points that informed people on how to use the collection bins and worm bin and how to look after the plants.

As already mentioned, we collaborated with 5 members from the Gute Stube in order to build up the courtyard space. After having several co-creation sessions with them about what they wanted to build and how they would go about doing it, we allowed them to continue without getting too involved. This was hard for us as we had an idea of what we wanted the space to look like. However, we also wanted other people to contribute to the space as much as possible so that it was not viewed as our project once we had left. The team built three outside benches with small planters and planted several plants.

Planting a tomato plant; arranging the bench planters; feeding the worms

The planters filled with plants; a butterfly enjoying said plants

Phase 3

One major lesson we learned through this period was that working with other people is difficult. Even more so when you are doing this project as your final thesis with a tight deadline and they are doing it because it sounded fun, with very low stakes. We had expected more to be done in the courtyard, including building a dehydrator, better waste collection bins and more planters, as well as more dedication to looking after the plants. However, this was a necessary reality check and it helped us manage our expectations going forward. The last phase of the Courtyard was to paint the objects we had built. While we wanted it to be a shared, community session, we took the initiative, gathering the supplies, creating the designs and organising a date and time. Along with Sukanya and Matt, 5 other KISD students came in on a Saturday morning to paint. This turned out to be a really productive and enjoyable session, reiterating the point that as much as we wanted to allow people to go off and create whatever they wanted, there needed to be some sort of organisation and direction to get things done.

Painting day at KISD

Watering the plants; info points on how to care for the plants; explaining the worm bin to a student

Community

Phase 1

In order to have a well functioning, community driven space, there needs to be a way of engaging said community. We brainstormed a few different approaches. The most basic one, especially during a pandemic, was having some kind of online presence. We decided to use the already existing KISDspaces as our platform, as our community was made up only of KISD students. We created our own page called The Playground, posted about it and asked people to join. We then maintained most of our communications through this channel.

We also started weekly calls. We had a few different reasons for this. Firstly, due to the lockdown, regular exchanges about work and projects were not happening, and students could not easily get feedback from one another. Secondly, we wanted to update students who were involved in our project about our progress and lastly to get input and feedback from students going forward. The first couple of meetings were attended by 3 or 4 people. They were very unstructured and most of the time was taken up by us explaining what we were trying to do with the project.

Phase 2

We learned from the first calls that we needed some sort of structure or agenda. While we wanted the space to be open so that everyone could share their work or thoughts, we realised that we had to direct the conversation most of the time. This led us to rebrand these calls as Material Meets. The call was split up into two parts, the first was centred around a particular material, usually connected to the workshop that was being conducted that week. The second part was open for anyone to add their personal projects, talk about them and get feedback. This was done through a collaborative Google Slide that anyone could edit. As an example, a few days after the mycelium workshop hosted by Moritz, we had a meeting around the theme of mycelium. We invited two past KISDies as well as current KISDies to come and share the work they did on mycelium. This gave the first part of the meeting structure, with a detailed look into mycelium, the process of working with it and some of the potentials of the material. The second part then opened up into questions and discussions around the material. It was a successful meeting attended by 10 people.


Starting a Playground community on KISD spaces for everyone to interact and share ideas

Material Meets calls where students showed their work using the collaborative slides

Phase 3

Continued engagement was something that was always present in our minds as we came to the end of this project. We had built a small community, but knew that we needed to hand over this project to other people for it to continue. During the last week of our project, we invited 7 people who were involved in the project to discuss whether they would be interested in taking the project forward. One of these students, Till Beyer, has initiated his own project to create recycled tiles to serve as a decorative piece on the counter of the Gute Stube.
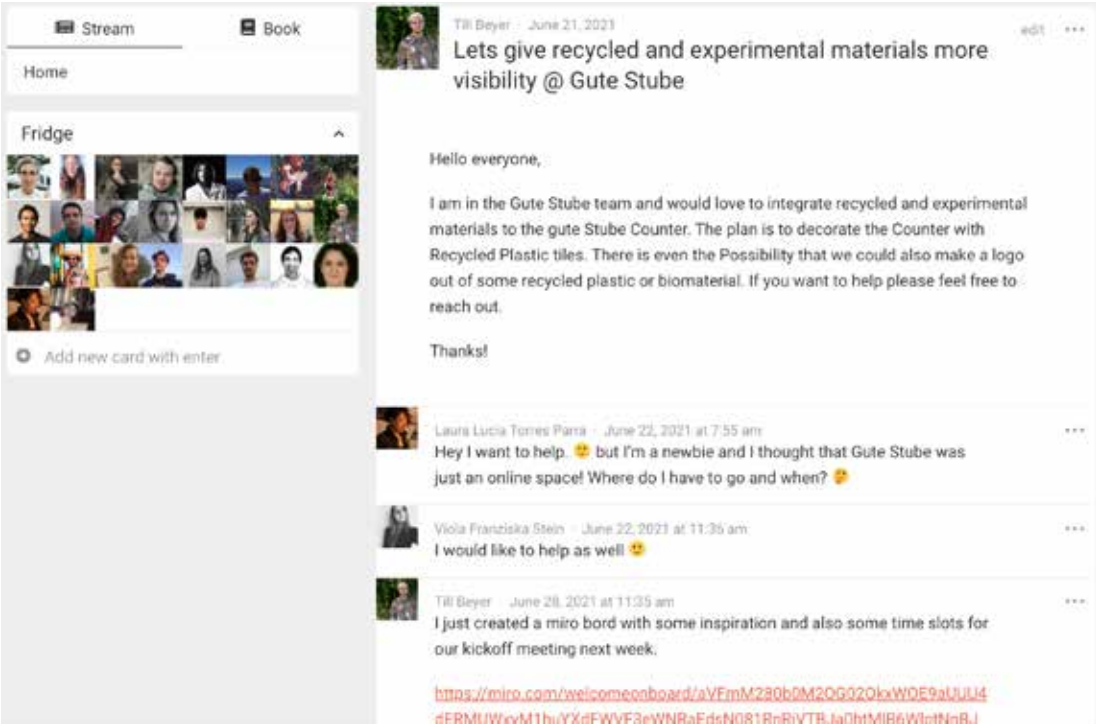
Till Beyer's self initiated project post with the Playground community
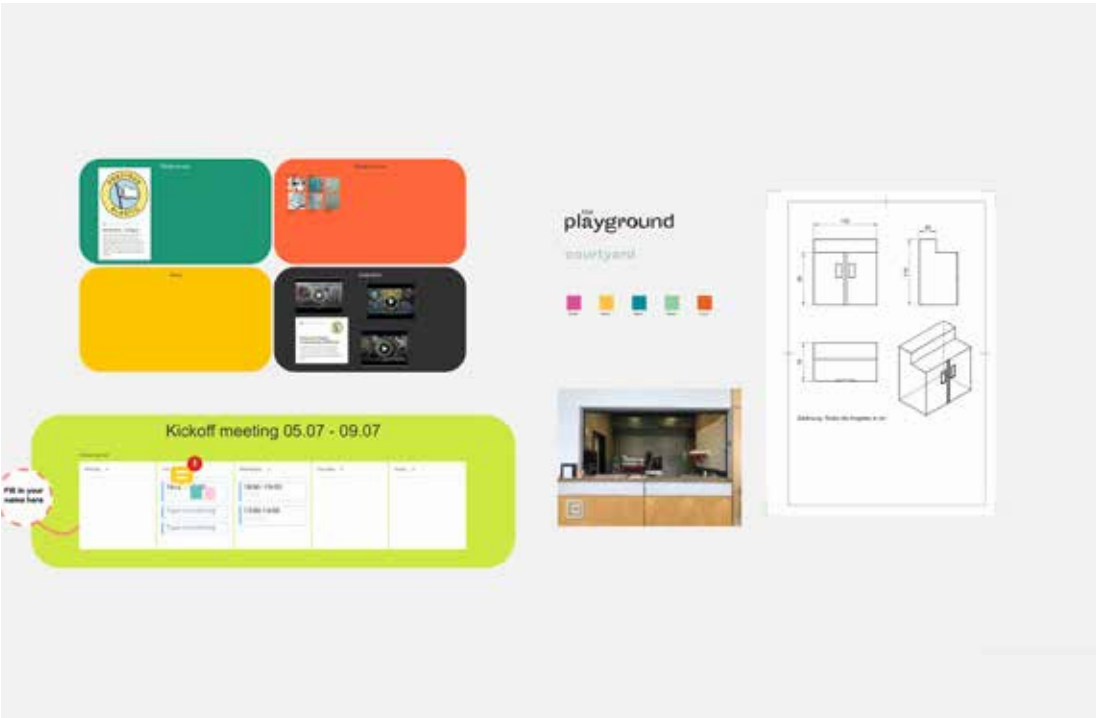
A collaborative miro board for ideation during the project call. Image credit: Till Beyer

Material Library

Phase 1

We started working on the Material Library in collaboration with Ophelia and Moritz. The first step was to discuss what form we wanted it to take. An online archive would be the easiest, not only to maintain but also because obtaining and looking after physical material samples requires more work. In the end we decided that we wanted to have both a physical and online library of materials. This would allow students to always have access to the materials as well as how to make them, and also to visit KISD and interact with the physical materials. We looked at already existing material archives from places such as Materiom, Material Connexion and universities such as Aalto's ChemArts publication.
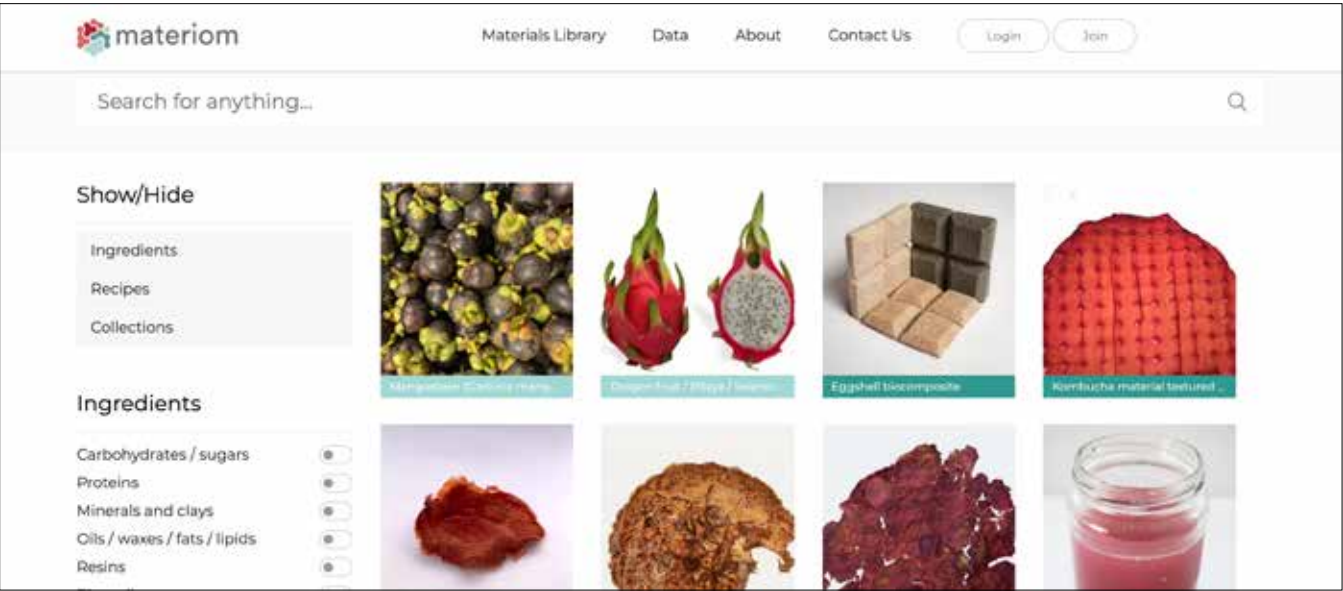
Materiom's open source material library. Image source: materiom.org
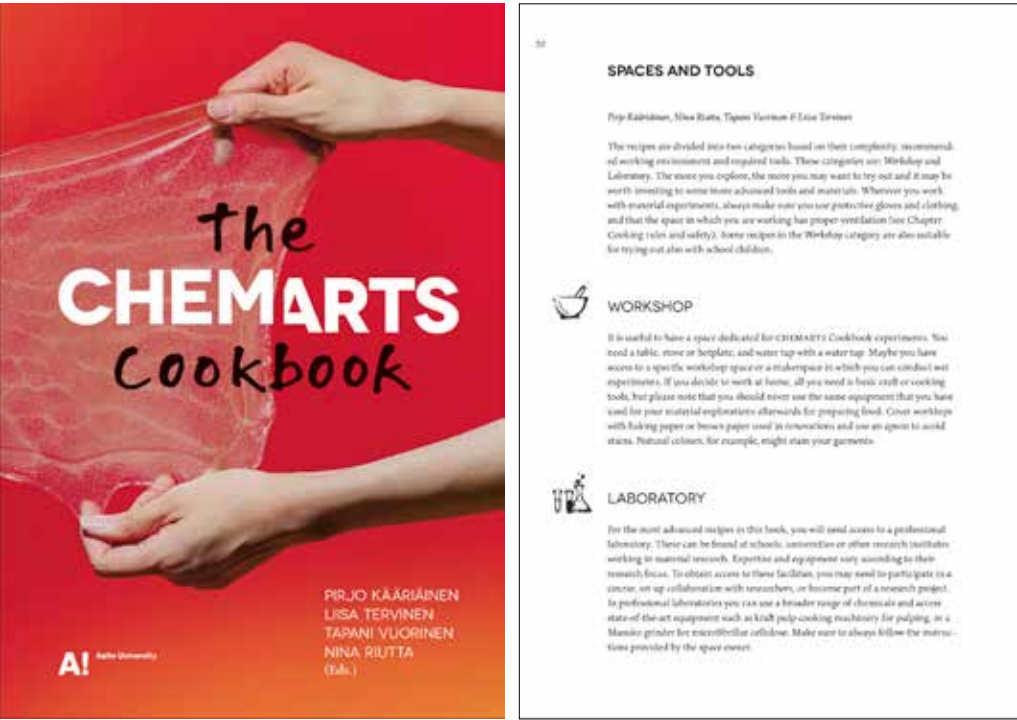
The Chemarts Cookbook. Image source: The Chemarts Cookbook, Aalto University

A questionnaire to catalogue material properties. Developed by Moritz Plöns and Ophelia Fischer.

Phase 2

After going more into detail, we realised that setting up a fully functioning Material Library, even with support, was out of the scope for this project. We shifted to creating the framework for a Material Library and testing the viability of it. We wanted to catalogue the materials by their properties and include the ingredients and process of making each one. Moritz and Ophelia created a questionnaire that could be filled out by anyone who wanted to submit a material into the archive. This included information about the material properties such as its appearance, strength and density, as well as an ingredients list and a step-by-step method. We tested this questionnaire at the end of the mycelium workshop, getting feedback from all participants in order to fill it out. We developed a wireframe of the online Material Library, mapping out how it would be displayed, what information would be included and that it could be filtered by different material properties.
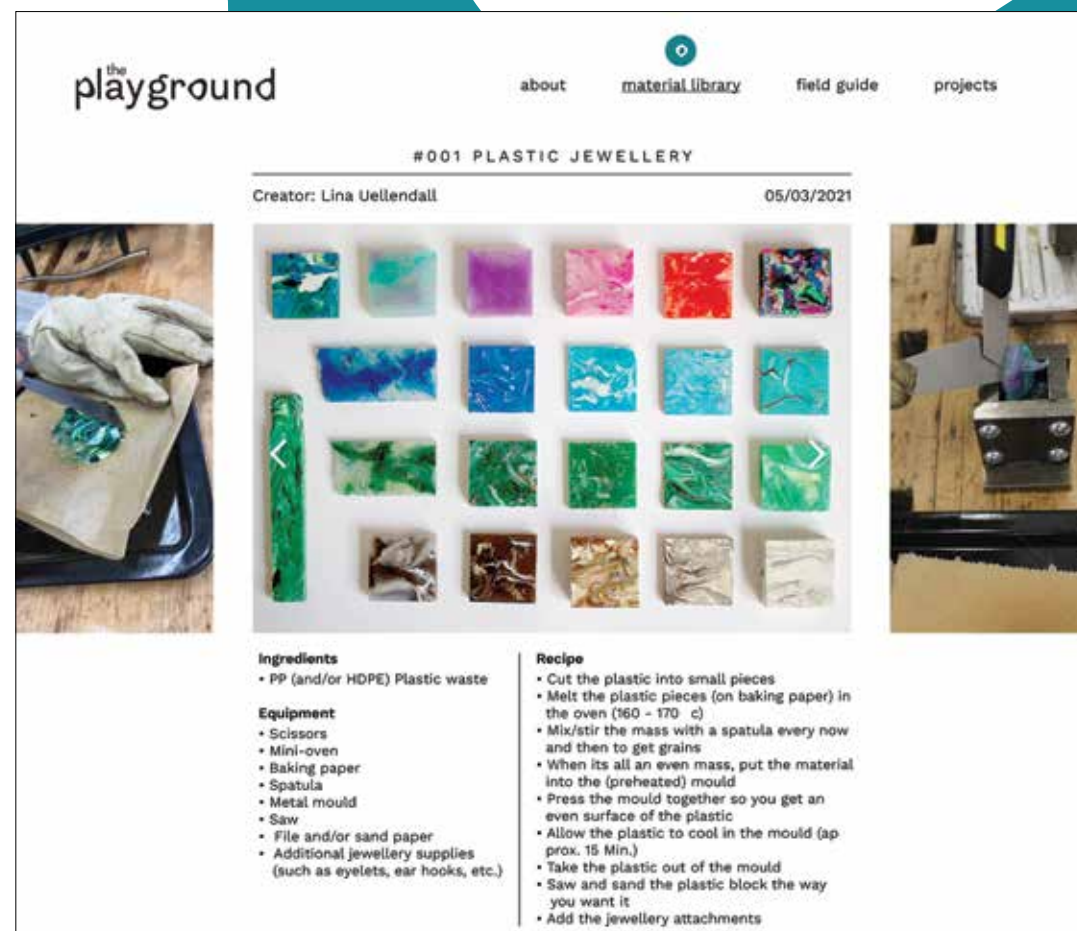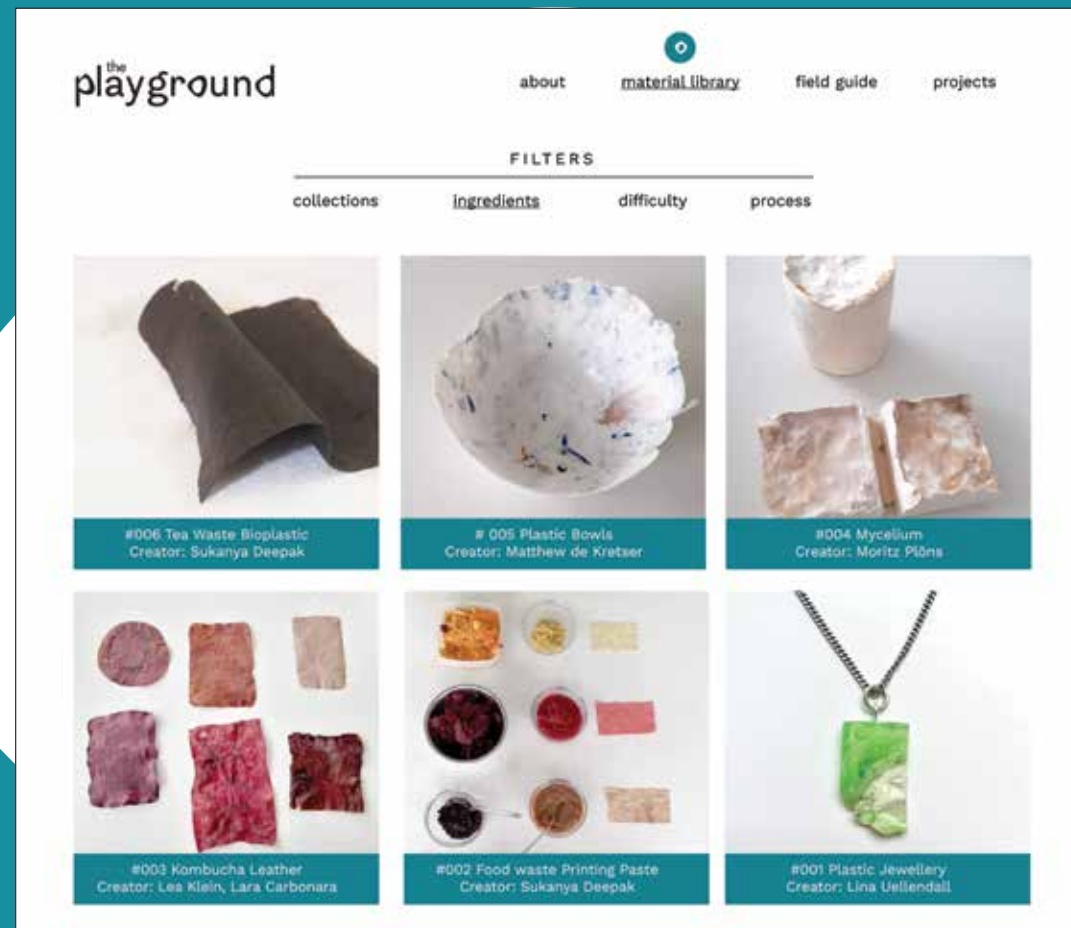
Phase 3

We set up a physical Material Library in Room 218, in conjunction with our final Kitchen prototype. The materials we displayed were the ones that were made during the workshops and in our own practices during this project. We created a website that housed the online Material Library. This was made up of the materials developed in the workshops as well as past projects at KISD. Going forward, we would like to distribute the questionnaire to other KISD students, for them to submit their own recipes into the archive. The goal being that it is an ever expanding body of student work, and a reference for current and future KISD students to learn and be inspired by one another.

Student interacting with the physical material library in room 218 at KISD

Recipes submitted by KISD students in the Material Library; full page of one of the recipes

Visual identity

Phase 1

Because we were working across 5 different spaces with many levels of communication, it was important that we also developed a clear visual language that made all of the elements recognisable as one cohesive project. We first gathered visual inspiration and created moodboards of potential directions. We knew we wanted something colourful, playful (obviously) and a bit weird. From there we created an initial title look as well as a poster for our first workshop.

Initial moodboards of different projects that represent our visual aesthetics

Initial ideas and trying out different ways of playing with the 'O'.

Poster for our first workshop with the initial visual identity elements

Phase 2

We were not entirely satisfied with this first attempt, one of the main problems being that it looked too corporate and stylised. We decided to embrace our low-tech principle and conducted a few analogue creation sessions with paper and coloured markers. This helped free us up to experiment a bit more and produce more organic shapes. We used the "o" as our graphic element because this represented the circularity of the space, and tried to depict the material and organic nature of our space. We then extended this visual to other parts of the design. The result of this was a more put together title.

Because we named our project The Playground, we were aware that there may be some confusion as to what the space actually was. We workshopped a tagline to make sure that the essence of what we were trying to achieve was communicated: exploring the materiality of circular futures.

Analogue creation session

Final logo and tagline

the
playground

exploring the materiality of circular futures

Colours and shapes

#fec152   #89cda7   #f26833   #db59a0   #178f9e

Fonts

Heading: Cotham sans

Raccoons stealing bananas from the old woman.

Body: Work sans

In the middle of the apocalypse appeared a small mushroom. It had a bright scarlet hue giving it an air of mystery. When you look closer, you see not just the scarlet hue, but the full spectrum of god's colours. Unbeknownst to the raccoons, the mushroom had magical powers. The mushrooms could enchant anyone, from a small child to an old woman. One brave raccoon stepped forward and took a bite. Not knowing what would happen next, the other raccoons waited anxiously in anticipation. A few tense minutes past before the raccoon slowly, and dramatically, transformed into the old woman it had stolen bananas from earlier.

Final visual identity elements

Example of photographic treatment as a part of the visual identity

Phase 3

After meeting with Prof. Gais and Prof. Müller-Russo, we made a few changes to our visuals. We took the concept of the organic "o" in the title and extended it to create several abstract, organic shapes to represent the material experimentation happening in the space. We decided on 5 fun, vibrant colours to represent each of the 5 spaces. We also wanted to communicate this sense of low-tech that we strived for and so decided to add pictures as black and white cut-outs. Knowing that we would continue to work on the visuals indefinitely if given the chance, we decided to stick with what we had and extend this language to all of our communication channels. This included info points in the Kitchen and Courtyard and posters for Workshops and Material Meets. The last branding we did was to paint the objects that were built in the courtyard with our colours and visuals, adding a bit of life to the space.

field guide

Why a Field Guide?

As a way to consolidate all of our learnings and findings from the past 4 months, we decided to develop a Field Guide that aims to support future endeavours that want to start their own circular materials lab. Coming back to our principles of open source, adaptability and knowledge sharing, it only made sense that we share with the community all that we have learnt.

We wanted to ensure that this monumental task, which seemed very daunting at first, with many various components and logistical challenges, was made a little bit easier for anyone who wanted to set up their own space.

What's in the Guide?

The Field Guide is based on the 5 spaces of the Playground: Kitchen, Workshops, Courtyard, Community and Material Library. Each section of the guide consists of easy to understand steps, a main tool for the reader, some supporting tools along with case study examples to help them visualise how each space comes together.

The Field Guide begins with our Manifesto. The Manifesto is meant to center the reader into understanding what to expect from this guide along with our hopes and ambitions.The introductory part of the guide helps the reader ideate and brainstorm their own Playground system. It takes them through the 5 spaces, how they interact with each other, helping them envision their own Playground system. The next part dives into the 5 spaces, leading the reader into the journey of setting up each space along with a main tool, supporting tools and case study examples. The end part of the Field Guide focuses on how the Playground system can be adapted to different contexts, what the challenges and opportunities are, along with examples of potential set-ups in Johannesburg and New Delhi. This part is essential for the reader to understand different ways the same system can work, how it can be adapted and the flexibility of the Playground system. The Field Guide also gives the reader a consolidated list of further resources. It documents people, organisations and institutions that work with bio-materials and circular systems and who are working towards sustainable futures.

Using the tools from the Field Guide to plan your own circular materials lab

The main takeaway from the field guide are 6 tools to help the reader develop their own Playground. These tools are not exhaustive or intensive. We have purposely tried to keep them as basic as possible, so that people from different contexts can use them, alter them to their needs and adjust them to their settings.

Tool 1, Manifesto Writing: A tool to help users map out what their goals and values are. This tool provides the users with a structure to write their own manifesto and get started with their own circular materials space.

Tool 2, Design your Kitchen: A fun collaging tool, the Design your Kitchen tool is meant to be a blank canvas to get users to visualise the space they want with suggestions of their basic equipment. The tool provides cut outs of a few basic kitchen equipment like a stove, shelves, bowls, refrigerator and encourages users to draw or add infrastructure like tables, windows, chairs etc. Users can draw, collage, write and use this tool to imagine their ideal space.

Tool 3, Plan your own Workshop: This tool is meant to help the users design, plan and organise their workshops. It provides them with a structure to map out everything they need to do in order to get prepared for their workshops. It helps them not down details like equipment needed, breaking down their workshop flow, where it will take place, and a to-do-list to get them started.

Tool 4, Design your Courtyard: Similar to the Kitchen tool, the Design your Courtyard tool is meant for users to visualise their own open courtyard space. The tool provides the users with basic courtyard equipment like collection bins, compost structures and planters. It nudges them to visualise their courtyard space while being adaptable to their own needs and resources.

Different sections of the Field Guide

Tool 5, Communication Ideation Map: Developing a communication strategy is a tough process. The Communication Ideation Map is meant to help users think about their target audience, channels of communication and probing them to design a quick and dirty prototype of their poster.

Tool 6, Recipe cards: The Recipe Cards tool is meant to help users give a structure for material documentation. Having a standardised format for documentation is an essential tool that can help them build a library in the future. As a first step of building the Material Library, this tool is meant to gather all recipes in one place.

These tools are a starting point for anyone who wants to start their own circular materials space. We have designed the tools to be easy to use, with room for flexibility. While designing these tools we also kept in mind to keep them less resource intensive with 6 sheets of paper that can be printed in black and white. Different contexts have their own set of challenges and opportunities and these tools are only a means to help people get started. This Field Guide is meant to act as your support system, guiding the way but not deciding it, helping you in each step and a place to come back to when in doubt.

Developing the Field Guide at KISD

The realisation of this project took place at the Köln International School of Design, TH Köln. We decided to use the infrastructure, community and support at our school to develop a circular materials lab system which can be adapted to different systems. With our principles of low-tech, community driven, knowledge sharing, adaptability and having fun, we built a system which takes into account the context of KISD and collaborates with existing systems.

The 5 spaces in the context of KISD work in the following way:

Kitchen: Along with support from KISD professors and staff, we organised all 8 workshops in room 218 at KISD which was big enough to keep it in check with the coronavirus pandemic regulations. We had around 8 people in total for each workshop in a well spaced out, airy room, with work stations spread across the room. The workshops became a way for us to imagine how a co-working space might function, how much equipment is needed and how to manage people in one space. We realised that infrastructure like a sink, big windows, and sunlight were essential to developing a co-working space for bio-materials.

Workshops: In total, we organised 8 workshops of which 5 were led by Matthew and Sukanya, and the other 3 by fellow KISD students. The workshops themselves had a lot of invisible work that went behind them. Planning, getting permissions, organising equipment along with rehearsing the workshops to ensure everything went smoothly was essential. As we went from one workshop to the next, we learnt how to improve the experience for the participants, how to make it easier to understand and most importantly, how to manage time better. For workshops to take place at KISD, there needs to be a team of at least 2 people who plan and organise the workshops. KISD offers the space and environment to experiment and learn from your peers and that's the essence we wanted to carry forward with the workshops.

Courtyard: To ensure a system that is integrated with the systems at KISD, we partnered with the Gute Stube, the coffee shop and communal space at KISD. We worked with a few students from the Gute Stube team to help us build a community space and planters for the courtyard at KISD. We wanted to make sure that this project and space was not just ours, but also belonged to other students at KISD. Our hope with this partnership and collaboration is that going forward, the courtyard will become an extension of the Gute Stube and the Playground, with students responsible for the space and plants.

Community: At the beginning of this project we realised that while there are students at KISD who are interested in circular materials and have worked with them, there is a lack of space and community where all of this comes together. Our aim with this thesis was to bridge this gap, bring students together and talk about their own work and other work around circular materials. We created a community on KISD spaces, an existing platform for students at KISD to communicate and stay up-to-date. We shared relevant information on upcoming workshops, events and projects. We also organised regular calls called Material Meets, where we discussed updates from the workshops, people shared their work and other projects around circular and bio-materials. Similar to the workshops, to keep up this continued engagement, this online space and regular meetings need to be organised and moderated.

Material Library: The task of building a Material Library is a long process which was not a part that we focused on developing to a large extent. For this part too, we partnered with two other KISD students, Ophelia and Moritz, who helped us envision a potential Material Library at KISD. Through the course of this project, along with Opehlia and Moritz, we looked into different existing formats of open source libraries, developed a survey for cataloguing material experiments and material properties and researched about possible formats we can have for the Material Library. We ideated about integrating into KISD spaces as a digital archive versus having it on an existing open source library. In the end, we developed a tool to catalogue material experiments so that we have standardised information that can potentially be implemented into a digital Material Library.

Our experience of developing this field guide and testing it at KISD was challenging due to several reasons which we will talk about in the next section, but we managed thanks to the support from the professors and staff. The coronavirus pandemic posed many logistical challenges but we managed to work our way not just around it but with it. At KISD, we hope this project and the effort that everyone has put forth doesn't stop here.

reflections

Impact Analysis

People
Over the course of this project, we collaborated with many people across several different levels. We conducted 8 workshops, 5 facilitated by us, 3 by other students. In total, 48 people attended these workshops. While we originally started these workshops as a way for students to learn about circular materials and for knowledge sharing to occur amongst peers, we found there were other unintended positive outcomes. Firstly, because of the coronavirus pandemic, many new students have only been to KISD once or twice, some have never been on campus at all. Many of the participants at the workshops fell into this category and they were excited to finally come into KISD and work. Many of the participants did not know each other before the workshops, and because a lot of the work involved working in pairs or groups, students had the opportunity to meet new people around a common interest (something that has been exceedingly difficult during the lockdown restrictions). Lastly, participants were just excited to do something hands-on. While we had purposefully planned the workshops to be as hands-on as possible, we didn't realise just how important it was, especially for students at a design school, to finally do something physical after a year of online classes and screen-based projects.

The Material Meets was also a place where students could meet new people and engage in discussions around circular materials, something that is not readily available elsewhere in the university. Over 5 meetings, we discussed, among other things, plastic, food waste and mycelium, with a total of 21 people participating. We worked with 5 people from the Gute Stube team to work on the Courtyard. We worked with 2 people intermittently throughout the project on the Material Library. We were interviewed by the Online AG around the theme of sustainability. We organised a painting day with 5 other people on a Saturday morning.

These are not radical numbers and we didn't redefine community involvement, but with the time available to us, the resources and experience we had, and conducting it all during a global pandemic, we are proud of our achievement and impact on the KISD community. We can already see some of the foundations we laid being taken up by other students, which has made all of this work worth it.

Workshops	Material meets	Gute Stube collaboration	MaterialLibrary
48 people	21 people	5 people	2 people

Costs

One of the fears we had going into this project was that it would end up being very costly, and we wouldn't be able to do the things we wanted without funding. It of course helped that we wanted to do everything as low-tech and sustainably as possible, and that we already had access to equipment, but we surprised even ourselves at how much we managed to do on such a limited budget. Our main expenses in the end were purchasing materials for the Courtyard and ingredients for the Workshops.

Emissions

This project can't be considered a circular system unless we identify the impact we had on diverting waste from landfill and considering the emissions we produced and saved. Unfortunately, we did not conduct a detailed, scientific analysis of all of this, since we had neither the time nor the expertise. However, in terms of diverting waste from landfill, our workshops on food waste and plastic waste worked exclusively with waste. While it is difficult to say what percentage would have ended up going to landfill and what would have been recycled or composted if our interventions did not take place, we can say that almost all of the waste materials that we did collect were used in the material experiments. Those that we did not use were either recycled (plastic) or composted in the vermiculture bin (food waste).

The Courtyard has the potential to offset a lot of emissions. Food waste that goes to landfill breaks down anaerobically, producing methane which is far more potent greenhouse gas than CO_2. Even in a best case scenario where landfill gas emitted is captured and and used to generate electricity, food waste that is sent to landfill produces 3 times for CO_2 equivalents than food waste that is composted (Sansom and Vergara 2020). This is not even taking into account the transport emissions of the landfill trucks. Growing food locally also saves emissions. While the garden space in the Courtyard is still small, growing tomatoes, peppers and herbs, it cuts food miles (the distance food travels from producer to consumer) to zero. Gardening has also been proven to improve physical and mental wellbeing, and in a high stress environment such as a university, everyone could benefit from getting involved in some gardening (Thompson 2018).

Challenges

We encountered many challenges throughout this project. Some of them were relatively minor, some of them shaped large parts of this work. For the sake of keeping it as concise as possible, we will look at the four main challenges we faced throughout this project.

The first, and probably biggest challenge, was working with other people. This was of course a major part of the project, seeing that it was a community-driven project based on knowledge sharing and participation. We quickly noticed how difficult it was to coordinate efforts with other people. This was for a couple of reasons. Firstly, this project is our baby. And regardless of how involved people want to be, we will always care more about it and be more motivated to do the work. We also had higher stakes in this project. We completed it as part of our final master's thesis, and while we were also concerned about the longevity of it after we were gone, we needed the project to go well in order to finish this degree. Lastly, this project has been the sole focus of our work for the last 4 months. Other people had their own things going on. Everyone else who was involved in this project was only there for a fraction of that time. Even for the people who were most involved, this project was nowhere near the top of their priorities. Although we realised all of this quite early on, it took us some time to adjust to it and work within those limitations. We became more managerial; if we wanted to get something done, it was not enough to allow people to decide when and how to do it. We created more concrete designs and timetables with specific deliverables. This was quite a challenging obstacle for us to overcome, worried that we were becoming too dictatorial and telling people what to do rather than allowing them to do what they wanted. But we also realised that putting trust in people to deliver all of the things we needed, in the time frame we had, was simply not realistic. Structure is integral for a project like this to succeed, and as much as we want to believe that community engagement and co-creation happen on their own, this just simply isn't the case (at least not at the start of the whole process).

The second problem we faced was that of continued engagement. How can we create a system where people keep engaging with the space and move the project forward? We hosted regular workshops and regular meetings, allowing many opportunities for different people to become involved in the space and for people already involved to stay engaged. There were a few people that stayed involved with the project throughout the whole process, and we are thankful that they were there and hope they got something out of this. For most people however, a workshop was seen as a separate, stand-alone event that they attended and then carried on with their lives. As an example, after the successful mycelium meeting that was mentioned earlier, we organised one on kombucha two weeks later. No one came. We were disappointed to say the least. We tried not to take it personally, the semester was coming to an end and many people had deadlines.

But it did put into perspective just how difficult it is to create a community that continues to be engaged. We think the pandemic also played into this, that if people were able to come into KISD and interact with one another a more tightly knit community may have been formed, as opposed to only meeting over Zoom calls. The start of any project like this is also the hardest in terms of continued engagement. The longer a project continues, the more momentum and credibility it has. More people know about it and there are more opportunities to get involved. Of course this also needs active planning and organisation, but maturity of community spaces definitely helps with continued engagement.

Planning the workshops and meetings was exhausting. Neither of us were prepared for this and it made it that much harder, especially the first half of the project. Organising the workshop, designing the poster, getting the room access, confirmation from the participants and permissions, cleaning up afterwards, going through the feedback forms. There were so many backstage activities that it was honestly an organisational nightmare at times. The fact that we were trying to collaborate with many different groups did not lighten our workload as we thought it would. There were some days when we would have 3 or 4 meetings in a row, mixed in with trying to plan a workshop or build something for the Courtyard. We were close to burning out a few times, and if this project lasted much longer we would have had to seriously reconsider the work we were putting in. Luckily we had each other as a support system; this project definitely wouldn't have been realiseable individually. And hopefully going forward things will become a bit easier, with the basic structures already in place.

The last major challenge we faced was that of longevity. As already stated, we want this project to continue in some form after we have left. We have already established that there needs to be at least one person responsible for the space, making sure that projects go forward. We do not expect this to happen in the same intensity as we carried it out, for reasons that were made clear in the previous paragraph. But it is important that people are continually engaging the community, it could be one workshop during the semester, or an introductory day incorporated into the KISD essentials week at the start of the semester. In any case, this is a challenge we still haven't solved, but will continue to try find a way.

Future goals for KISD

While we spent the last 4 months working, developing and prototyping the Playground system at KISD, we were not able to achieve all that we set out to do. While we learnt a lot and worked on starting this journey at KISD, we have many hopes, ambitions and plans on how to take this forward. We discovered systems that can work with one another, how communities can be built and the work that it takes. At KISD, we see the future of the Playground taking many possible routes.

Arbeitsgemeinschaft (AG)/ Working Group: KISD has many AG's, run by students under the mentorship of a Professor. Since the Playground is meant to be a student driven space, we believe that if it is formalised under the structure of KISD as an AG, it could have a better chance at being a sustainable system. While there are many students who are interested in working with circular materials, they are busy with other projects and work. Having an AG through which students can get credit points will incentivise students to take part in the Playground.

Collaboration: As already mentioned, we partnered with the Gute Stube to build up a communal space in the courtyard. We would love for this collaboration to continue into the future, with more and more KISDies becoming involved in the outside space. However, it also requires a lot of maintenance. The garden needs to be watered and cared for, the collection bins need to be emptied and sorted and the worms need to be fed. There are also long holiday breaks at the university when there are very few people on campus, making it hard for something like a garden to continually flourish. While we would like the space to stay as it is, we also like the idea of new students coming each semester and reimagining the space. "A garden is not an object but a process" – Ian Hamilton Finlay

Permanent Space: The space where we developed and prototyped the Playground was in room 226 is Prof. Müller-Russo's project room. While she supported us through our project by letting us use her space, this is not a sustainable place. Firstly, the space has many shortcomings with ventilation, the lack of a sink - which is important for working with circular materials and other safety issues. Secondly, students cannot get access to this room if they are not directly working under Prof. Müller-Russo. To run a circular materials lab, it is essential to have a space for students to be able to access infrastructure and resources for experimentation to take place.

Funding: To be able to maintain a permanent space with all the essential infrastructure and equipment, financial aid is essential. While developing the Playground, along with Prof. Müller-Russo, we applied for funding to ensure that moving on, students who want to work with circular materials can do so easily. We have secured this funding, and although we are a bit disappointed that it came a few days before we had to hand in this thesis, it also gave us hope that the ideas we started in this project now have a greater chance of being carried forward with new students. Ideally, the lab would be able to get

recurring funding each semester, along with a tutor who can be financially compensated. While this may be logistically hard to do, we hope that the importance and necessity of such a space justifies this.

Lab with tutors: Having a circular materials lab with equipment and infrastructure also means that there needs to be someone responsible for the lab. This structure exists within KISD where labs have students as tutors and they are compensated for it financially. This structure could also work well for the Playground where a student is responsible for maintaining the space and organising it with financial compensation as a great motivator.
Our role going forward: While we designed the Playground system to be self-sustaining at KISD by involving students and staff during the process, it needs to be supported in the beginning. Like any community oriented project, a handover with onboarding and training is essential. While we may not officially be students at KISD anymore, we see ourselves coming back to facilitate the next generation of team Playground in setting up a kitchen, maintaining the courtyard, conducting workshops and other organisational tasks.

Future goals for The Playground

From March 2021 until July 2021, we worked together on developing the Playground system at KISD. For both of us, the goal was to use this as our testing ground, developing a system that works at KISD but also in other contexts. We wanted to ensure that we fulfill all the principles we set out to achieve in our manifesto - circular, low-tech, community driven, knowledge sharing, adaptable and fun. We achieved these in most ways and learnt a tremendous amount by testing out all parts of the Playground to a certain extent and learning from mistakes, challenges and failures. The Playground is meant to work as an adaptable system. While what we developed at KISD fits into the context and framework of the school, we also wanted to speculate how it works in our own individual contexts. The goal is that this circular lab system can be taken to different contexts, in collaboration with people from those contexts and adapted to fit their needs. In the next part of this thesis, Part 3, we will explore how the Playground system works in New Delhi for Sukanya and Johannesburg for Matthew.

PART 3

circular systems
in New Delhi

imagining The Playground
in New Delhi

understanding challenges in adaptability

This thesis began with exploring waste systems, focusing on food waste and trying to understand how it affects the communities that surround it. My initial research and experimentation focused on giving me a foundation to discover ways in which food waste can be used as a material, what those material properties are and unravelling the complex waste management system in India. The practice-based part of my thesis, which was based in Köln, helped me understand how communities can be built around circular systems and develop a framework that can be carried forward. In part 3 of this thesis, I go back to New Delhi, with my findings from part 1 and my experience from part 2 and I look at what the challenges, opportunities and future prospects of this circular materials lab are.

The Playground system was developed in Köln, Germany along with Matthew de Kretser. While our aim was to develop a low-tech, adaptable system, which we achieved to a certain degree, there are many challenges in working with waste in India as identified in part 1 of this thesis. To get a better understanding of how this system can work, what needs to be adapted and what the potential for this project is in New Delhi, I spoke with Surojit Sarkar from the Centre for Community Knowledge (CCK). The feedback from my interview with Surojit has been summarised below:

- Waste streams in Delhi are very specific and they need to be dealt with in different ways. There are different waste workers for each kind of waste and to tackle the problem of waste management, food waste should be seen as a separate issue. The Playground system can then be adapted to specific waste streams.
- Since waste picking is a caste based profession, it needs to work with unions and groups who are already working towards advocacy for waste pickers.
- The Playground structure developed in part 2 can play a vital role in bringing different groups of people together. These can be sanitation workers unions, urban farming groups, NGOs working with waste and resident welfare associations (RWAs).
- According to Surojit, a key aspect is to visualise the system of waste streams in Delhi and to map it out. While Delhi has the capacity to manage 70% of waste generated, less than half of it is properly managed and recycled. Talking to different groups of people and stakeholders from private and governmental organisations can help map this system and bring structural change in areas like policy making.

Key points for developing the Playground in New Delhi

speculating the playground in New Delhi

Building from the key points listed in the previous section, I imagine how the Playground system can potentially work within my housing complex in New Delhi. To bring together my interviews with waste pickers from part 1 of my research along with my experience of building the Playground at KISD, I speculate how this system can work in the place I grew up in.

A proposal of how the Playground system can be applied is given below:

Where?
Purvasha Apartments, my housing complex with around 1000 residents in East Delhi.

Who is involved?
- Waste pickers employed in Purvasha apartments along with organisations who work with the Chintan Environmental Research and Action Group.
- Resident Welfare associations who employ the waste workers
- Residents who are the waste generators at Purvasha apartments

Working with organisations
While designing an intervention to tackle all the societal issues is one that is tricky to deal with, partnering with an organisation that works on the ground with waste workers is important. Chintan Environmental Research and Action Group is one such organisation that has a strong foothold in Delhi and works towards environmental justice and systemic change.

Localised Solutions
In a report by Chintan, they speak about different ways of engaging waste pickers to help combat Delhi's pollution problem. According to them, one such solution is working with Resident Welfare Associations and other waste generators like restaurants and hotels. Encouraging them to compost wet waste within 2 kms of their location can help divert the wet waste from ending up in the already overflowing landfills in Delhi.

Education about waste segregation
The concept of waste segregation at the household level is not common practice in India. While there have been many efforts by the government and other organisations like the Daily Dump, the majority of waste generators in India do not segregate their waste. Segregation at source is essential for extracting valuable materials for reuse. Designing effective communication strategies can help in changing attitudes and mindsets of waste generators.

A community only for waste pickers
The idea for the Playground system was to bring different communities together to learn about circular materials. However, in New Delhi, where waste segregation is a caste based profession, it may be more fruitful to build a community of waste pickers who are in charge of managing waste. Also, waste pickers are already a diverse group of people - from scavengers to bigger waste collectors. Building a community of these different kinds of waste pickers and developing a system around them is essential.

How would this work?

First meeting between the waste pickers, Purvasha RWA members and organisations like Chintan Environmental Research and Action Group

Chintan does the inital planning about roles, responsibilites and goals

Seperate bins for segregration at Purvasha apartments

Residents use the different bins in their households to ensure segregation at source

waste is collected and stored in a dedicated space within the apartment complex

waste workers further sort out the trash in the waste storage room

they extract valuable resources like paper, plastic and metal

They connect with other waste pickers in the neighbourhood and sell them trash collected

The community recycling and craft centre is a place where waste workers, residents and employees come together to make valuable products from waste.

waste workers and other employees like domestic staff teach each other skills of how to make waste into materials

waste workers teach each other and interested residents how to compost and handle waste

Food waste is composted, plastic is sold to recycling companies and larger waste pickers. Plastic can also be transformed into products and paper is recycled through workshops and teaching each other skills.

Organisations like Chintan, Purvasha RWA members along with the waste pickers have regular meetings for feedback and analysis

Chintan staff evaluates the outcomes and documents the work done by the waste pickers

A small shop within the apartment complex, for residents to buy back the material they helped segregate and for waste pickers and craftsmen to earn an additional income.

waste pickers   Chintan Staff   Rresident Welfare Association (RWAs)

How does this fit to the Playground framework?

The Playground system developed in part 2 of this thesis aims to be low-tech and adaptable to different local contexts. The system gives a framework to set up the 5 spaces in contexts that are entirely different. Within the context of setting up circular systems within Purvasha apartments in east Delhi, the 5 spaces would consist of:

Kitchen
More as a recycling centre, the Kitchen space would be a place for the waste pickers to segregate waste and have an allotted place in the apartment complex to work. There are potential rooms and places within the apartment that can house a room for waste segregation. The kitchen can also work as a space where other employees like the domestic workers can teach skills they know. In the next page is an example of baskets made from plastic by a domestic worker, Sumathi.

Workshops
Organisations like Chintan would conduct regular training of waste pickers in these housing complexes on how to manage waste, build a space for them to share ideas with each other and train them on communicating waste segregation practices with the residents. Waste pickers can share ideas and learnings in these workshop spaces.

Courtyard
Similar to the Kitchen, the courtyard can be an allotted space for composting the wet waste collected and a space for the waste pickers to relax in. The courtyard can also act as a space where waste pickers engage with the residents and exchange new ideas.

Community
While the RWAs, waste pickers and residents work together, in building this space, it is essential that the space is run and managed by the waste pickers. The main stakeholders in this community are the waste pickers who engage with each other and learn from one another. They are part of a larger group like Chintan who work towards their advocacy and safeguarding their rights.

Material Library
The Material Library can act as a space to document the work done by the waste pickers. This can be situated within the Kitchen. The Material Library can also house a small shop for the residents of the housing complex to buy back the waste materials they segregated in the form of a product, similar to the baskets created by Sumathi.

A space for waste segregation in Purvasha apartments.

The RWA office where meetings between stakeholders can take place

A room within the apartment complex called the "recreation room" which can house the Kitchen, Workshops and Material Library

Green spaces for composting

An example of products made with plastic by Sumathi, a domestic staff at Purvasha apartments

conclusion

limitations

The Playground system developed in part 2 of this thesis is meant to be interpreted in different ways, in different contexts. Imagining how this system works in my neighbourhood in Delhi helped me understand the ways in which circular material lab systems like The Playground can be set up in different contexts. This is a challenging but achievable goal. By maintaining the principles of <u>low-tech, circular, knowledge sharing, community driven and adaptable,</u> it can be applied to different contexts. It is imperative that The Playground system is embedded within the local context. Participatory Design is key to ensuring that the communities are gatekeepers of this intervention. They must hold the decision making power and in spaces like in India, deep rooted societal injustices need to be taken into account. This means constant questioning and reflecting, bringing in representation to ensure all voices are heard. The Playground framework allows it to be adapted and changed to fit the needs of the community.

It is merely an anchor - guiding the way but not deciding it.

While I mostly achieved what I set out to answer during my thesis, I am aware that this thesis comes with it's limitations. This thesis does not end with a final answer or solution but merely presents ways of looking forward, of imagining circular materials labs and most importantly, building a community around it.

Access was a significant limitation during my thesis. The coronavirus pandemic posed challenges in conducting research and developing my project in Delhi. Therefore, my sample size of interviews and user research was limited to people whom I had already established contact with in the past along with the community at KISD in part 2.

Lack of prior experience was another factor that contributed to this project being a prototype and learning everything from scratch. While this was the reason I began this project, to learn about fields I have always been interested in, it did mean that I failed many times and learnt from those failures. This is specifically true with bio-materials design and my experiments on working with tea as a material. I tried many different methods, different ingredients and while it worked sometimes, it often failed.

Working in different contexts and cultures was important for my thesis, but this also meant that I was constantly juggling between completely different systems and realities and trying to get an overview of both. I am happy I did this, but this meant that I did not have the time or capacity to develop the Playground system to its full potential.

next steps

Moving forward with my learnings in part 1 and building on from the experience in part 2, the next steps for The Playground in New Delhi would be to apply the system within my housing complex. I would work together with waste pickers in Purvasha apartments, along with the Resident Welfare Association and residents to develop a circular space.

The main goal is to advocate for the rights of waste pickers in my housing complex, like Sheila and Anita didi, who I spoke with in part 1 of this thesis. To make this happen, I would partner with an organisation like Chintan Environmental Research and Action Group who work towards sustainable and equitable growth for all.

The larger goal for this project is to bring more resident welfare associations (RWAs) to incorporate this system and create small, localised, circular systems to work towards a more sustainable Delhi.

end thoughts

This thesis project is one that is very close to my heart and has been a rollercoaster of emotions. From working outside my comfort zone, in a country that is not my home to finding my support system by collaborating with Matthew, who is a very dear friend. During this thesis, I bring together a few of the things I am passionate about - understanding waste systems, sustainable design alternatives and involving communities. I have thoroughly enjoyed myself, learnt from failure, grown from it - both as a designer and as a person and most importantly, begun to understand the kind of designer I want to be. I have always struggled with understanding what kind of designer I am. I question the practice of design often, as I believe one should, and also question my role within this entire industry. While I am still trying to figure out what kind of designer I am, this thesis has allowed me to dream of the kind of designer I want to be. I want to be attached, engaged and fully involved in communities and environments that surround me. To be able to provide structures that enable people to question, talk, and provide hope.

This thesis has brought me a step closer to this goal and I cherish it with all my heart.

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