A Systemic Design approach to Waste Segregation

supporting NGO's in encouraging Waste
Segregation in Indian Households

A graduation project by

Jennifer Viola Rocha

A System Design Approach to Waste Segregation

supporting NGO's in encouraging Waste
Segregation in Indian Households

Author

Jennifer Viola Rocha

Masters Thesis

Msc. Design for Interaction
Faculty of Industrial Design Engineering
Delft University of Technology

Supervisory Team

Chair
Prof. dr. Jan Schoormans

Mentor
Dr. ir. Jan Carel Diehl

19 March, 2019

TUDelft

Delft University of Technology

Executive Summary

The issue of Solid waste management (SWM) in India has gained prominence in the past few years due to the rising mountains of unmanageable garbage on the outskirts of cities, which is causing health and environmental problems to all.

To better manage the situation the municipalities and NGO's that work with solid waste management have turned to the people to segregate their waste at home. The concept of waste segregation is fairly new in India hence, the government and NGO's have been spreading awareness through different mediums with regard to the issue. Now, people are slowly beginning to understand and open up to the concept that waste segregation can help eleviate the SWM crisis at household level. But, there is a discrepancy between their thought and action.

By collaborating with Waste Warriors (SWM NGO in the city of Dehradun) and through field research (context mapping sessions and interviews) it was found that there were 5 barriers that were preventing people from adopting waste segregation into their lives - (1) Education and Awareness; (2) Current Attitude and Behaviour; (3) Sense of Responsibility; (4) Infrastructure; (5) Strategy.
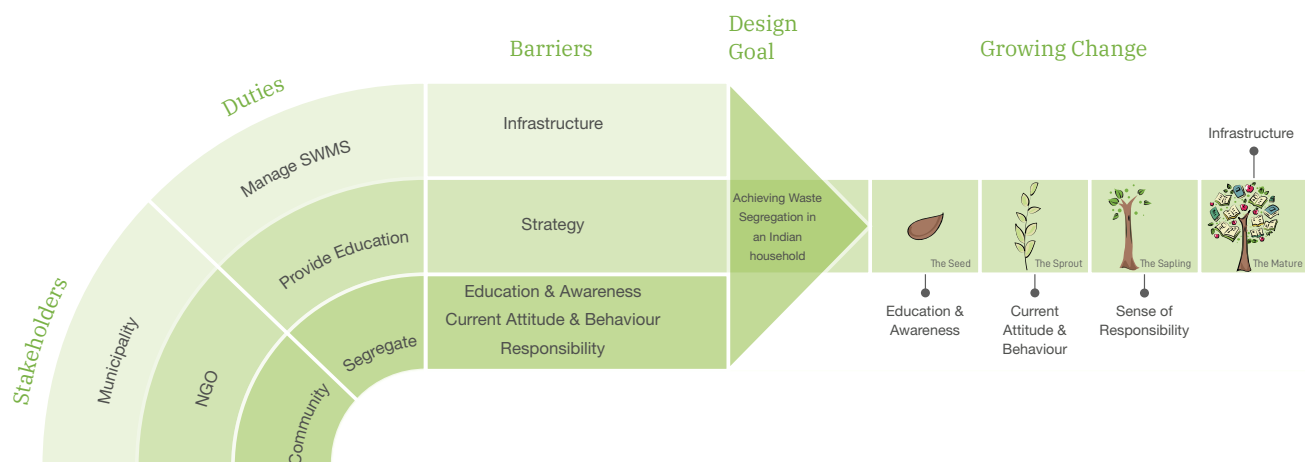
From research, it was established that waste segregation was a complex problem, with many stakeholders who each had different opinions, problems, actions etc.

Hence, to resolve this problem a Systemic Design Approach (combination of systems thinking and design thinking) was used to understand all the elements of the waste segregation system and how there were interconnected to each other.

It was recognised that people were the core of the waste segregation system and lowering their barriers (Education and awareness, current attitude and behaviour and sense of responsibility) would have positive and progressive effect on the system. The main stakeholder that could help lower the barriers for the people were the NGO (Waste Warriors) but before doing so there was a need to lower their own barrier first- strategy.

This led to the creation of a long-term plan for the organisation to achieve waste segregation in Indian households, taking into consideration all other stakeholders and their barriers. Then, the community level barriers (education and awareness, current Attitude and behaviour) were studied through on-field research and literature review which led 2 one design intervention for each. For education and awareness - an educatioinal presentation; current attitude and behaviour - a pilot program to help the NGO understand how psychology can motivate community members to segregate their waste.

Finally, a toolkit consisting of many elements was proposed (poster, manual, presentation). Each imparting knowledge on how to achieve waste segregation in Indian households.

The Phases of Growing Change

Acknowledgements

Table of Content

Table of Content

Table of Content

Getting Inspired

This chapter describes the passion of one man to make his hometown, Dehradun, the cleanest city in India through solid waste management and how it motivated me to do my bit for my country.

01

1.1 One man's dream

Mahatma Gandhi once said "Be the change you want to see", but for Captain Neeraj Chauhan being the change was not enough. He dreamed of seeing his home, Dehradun, become the cleanest city in India before the country's 75th Independence day on 15th August 2022 and to achieve that dream he would need to change others as well.

Captain Neeraj watched his home town go through rapid changes resulting in a degrading landscape. With the ever increasing population, pollution, health problems, and urbanization he knew that for future generations to survive, environmental sustainability was crucial and he realized the "urgency of bringing solid waste management issues to the administration and mobilizing meaningful actions."

Like Captain Neeraj, many citizens in Dehradun have aspirations and goals to make India a better, cleaner and environmentally sustainable country, but many of them face challenges when it comes to educating people around them. Captain Neeraj wondered how Solid Waste Management (SWM) had been so impactful in the developed world, whereas in India it has not really gained traction. Inefficient governing systems, lack of resources, education, disparity in income etc. have led to the inefficient management of solid waste. Also, people were not willing to change their behaviour and attitude towards segregation of waste, and convincing them was proving to be a challenge for the captain.

Capt. Neeraj kept asking himself – What can I do to help people understand the importance of solid waste management?

Figure 1 - Captain Neeraj Chauhan's facebook post on Waste Warriors website

This was when Waste Warriors, an NGO based out of Dehradun came to his locality for a workshop and education session on SWM. They spoke to him about the work that they did i.e. spreading group and door-to-door awareness, clean-up drives etc. and how waste segregation can help elevate the SWM system problem at the household level. They also said how they needed abled citizens such as him to help them spread the message to make Dehradun beautiful again. Captain Neeraj realized Waste Warriors answered his question, and could help him fulfil his dream so he joined forces with them.

For a long time these problems remained hidden, but today thanks to the efforts of NGOs like Waste Warriors and some passionate citizens like Capt Neeraj, these problems have come to light. The government, NGOs and several private organizations are advocating for effective Municipal Solid Waste Management (MSWM) not just at the policy level but also at the household level in the country.

Captain Neeraj Chauhan has now begun to take action independently both in his home and in his locality to spread the message of waste segregation. I was inspired by this story because Captain Neeraj and I both share the same dream and together with him I want to spread the message of waste segregation to all the people in India and become an agent of change that makes India pristine and beautiful like it used to be in the yesteryears.

This story also made me realize that by just giving people the right tools, we can motivate and help them take initiative and bring about change that could affect the face of a city.

Solid Waste Management in Indian

This Chapter explains the current Solid Waste Management situation in India and concludes with initiatives taken by the government to improve the system.

02

2.1 Municipal Solid Waste Generation in India

India has the second largest population in the world after China with approx. 1.3 billion people (Census, 2011), of which 68% live in rural areas while 32% live in urban areas (WorldBank, 2014). Rapid industrialisation, economic growth and population explosion has led to a large number of people migrating from villages to cities. This has increased the amount of Municipal Solid Waste (MSW) produced in cities due to the high number of residential (households) and floating populations (office, trade/commercial activities etc.) (Berneche, Salvadro, & Marıa, 2001) (Bhada-Tata & Hoornweg, 2011).

There is also a positive correlation between the GDP (Gross Domestic Product) and municipal waste generation (Rekacewicz, 2009). With people from the middle class (45% of the population) becoming wealthier and gaining better standards of living the amount of products consumed also has increased leading to more MSW generated per person (Board, 2010).

Besides the volume, another important aspect to waste is its composition. According to the Press Information Bureau, India generates 62 million tonnes of mixed waste per year, with a growth rate of 4%.

Figure 2 shows that nearly 50% is organic waste with the increasing volume of recyclable and biomedical and hazardous waste which is non-de-composable (Sankhe, et al., 2010). Also, durability of products and long life are no longer a priority (Clapp, 2002) which has led to increased non-de-composable waste.

Education is another factor that affects the waste generated. Most people in India are not aware of SWM practices (waste segregation) at the house-hold level which is why they mix their waste in one bin and then this is dumped in landfills or inciner-ated.

The quantity of solid waste generated in Indian cities has increased from 6 million tons in 1947 to 48 million tons in 1997 and is expected to increase to 300 million tons by 2047 (Chandra & Devi, 2009). Large metropolises such as Mumbai and Delhi alone generate approx. 8500 metric tonnes of waste per day.

With this increasing amount of waste being produced in cities the municipalities are struggling with managing the waste in a sanitary manner which has led to serious implications on people's well-being, environment and the economy.
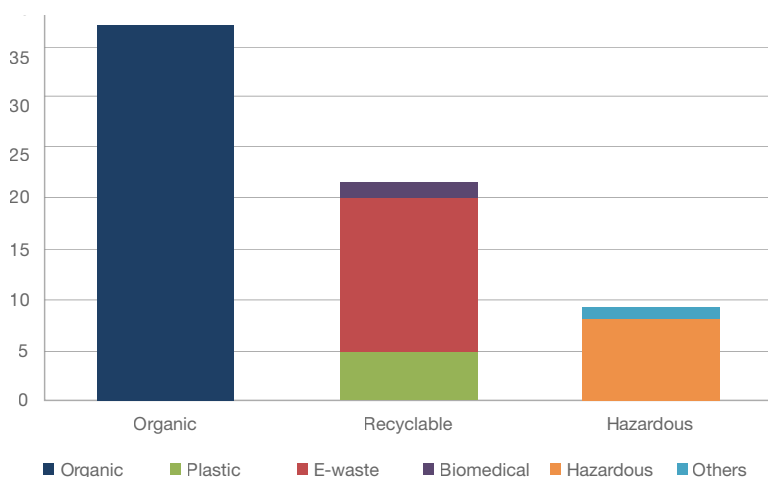
Figure 2 - Waste Composition of India, in Million Metric Tonnes per annum. Source: PIB 2016

2.2 Municipal Solid Waste Management System

Municipal waste is waste from households, office buildings, institutions and small businesses, street sweepings, dustbins etc. (OECD Environment Directorate , 2009).

According to the Ministry of Environment and Forests (MoEF) issued Management and Handling Rules in 2000, the municipalities are responsible for the Municipal solid waste management (MSWM) system in India. This includes segregated waste collection, transporting waste in covered vehicles, processing recyclables, separating domestic hazardous waste and disposing inert material into sanitary landfills. But, in most cities the MSWM system only consists of collection, transportation and disposal.
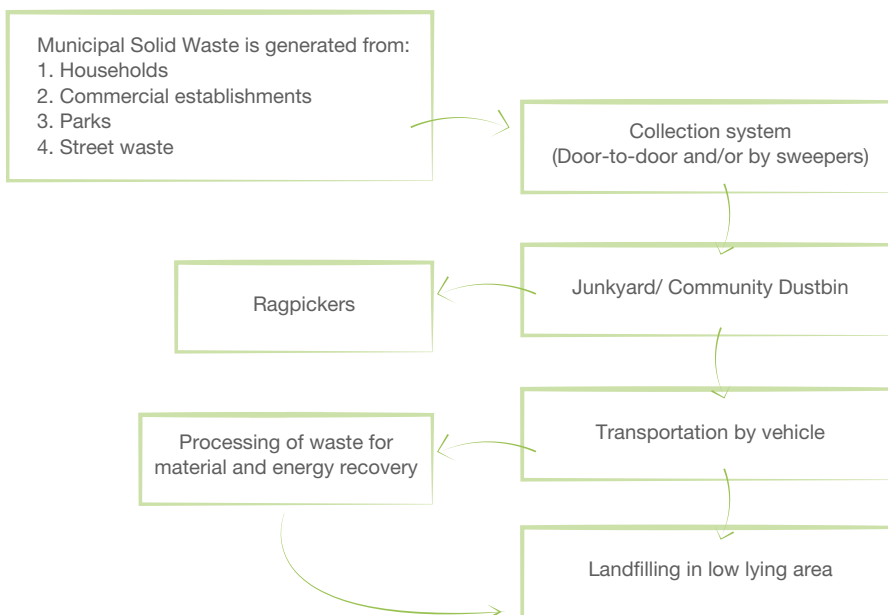
Figure 3: The flow chart of existing municipal solid waste management system in India (Singh et al. 2011a)

Storage and Collection

There is a scarcity of bins for MSW in most urban areas. Predominantly most cities have communal bins in which both decomposable and non-decomposable waste is mixed and disposed. These bins are placed along various points on roads and street corners for people to access, but they are neither properly designed nor located and maintained. Also, a number of unauthorised open collection spots exist in cities and they lead to poor sanitary conditions and create health hazards for populations nearby (Kumar, 2009).

For collecting waste, efforts to organise door-to-door collection have just begun in mega cities such as Delhi, Mumbai, Bangalore, Chennai and Hyderabad by municipalities. But, due to their lack of infrastructure, municipalities have employed private contractors to pick up and transport waste from communal bins and collection points to disposal sites. Some have also employed NGO's such as Waste Warriors to supervise activities related to waste segregation i.e. the collection of dry waste from sources (households, restaurants etc.) to depositing it at collection points (segregation and recycling centres).

Sweepers are an important component of the waste collection system. They are allotted a specific area (roads and street) which they manually sweep and that waste is deposited into nearby dustbins and collection points (Sharholy, 2008).

But a fraction of waste always remains uncollected on streets. Many studies show that collection efficiency is governed by 2 major factors – manpower availability and transport capacity. In India the average collection efficiency for MSW in Indian cities and states is about 70%, (Nema, 2004) (Siddiqui, Siddiqui, & Khan, 2006) (Rathi, 2006) as compared to almost 100% in developed countries.

Most cities are unable to provide waste collection services to all parts of the city especially in the overcrowded low-income settlements. They do not have these services because their settlements are illegal and they do not want to pay for the services. This leads to them throwing their waste around their homes hence, creating unhygienic living conditions for them.

Figure 4 - Road side garbage bin

Figure 5 - Sweepers sweeping the road litter to the side

Transport

When sanitation workers transport waste from the bins out of residential areas, they use a variety of vehicles such as open trucks, lorries etc. in which they manually load the waste without proper protective gear. The trucks are open body type which are usually kept uncovered leading to waste spilling onto streets resulting in unhygienic conditions. This waste which is collected from dustbins and collection points are directly transported to processing centres or disposal points.

Collection and transportation activities constitute approx. 80-95% of the total MSW system budget, therefore it is a key component in determining the economics of the MSWM system. Some municipalities transport waste using their own vehicles while others employ private contractors (Nema, 2004) (Siddiqui, Siddiqui, & Khan, 2006) (Ghose, Dikshit, & Sharma, 2006) (Bhide & Shekdar, 1998).

Waste Disposal and Treatment

Ideally, waste should be responsibly incinerated or undergo mechanical-biological treatment before being sent to a landfill. But, in India more than 90% of MSW is directly disposed of unsafely - either burnt in an uncontrollable manner or dumped in landfills (Narayana, 2008).

MSW in many cities is mainly openly dumped in places far away from the cities into landfills. In cities such as Delhi, the available land for disposal is very limited hence, waste is dumped on the outskirts of the city in low lying areas without following the principle of sanitary landfilling i.e. the compaction and levelling of waste followed by covering it with earth. Also, these areas do not have proper leachate collection systems, landfill gas monitoring and collection equipment (Bhide & Shekdar, 1998).

From research it appears that landfilling will continue to be the most widely adopted practice in India for the coming few years, but certain measures will need to be taken to ensure proper Sanitary Landfilling (Kansal, 2002) (Dayal, 1994).

Figure 6 - Waste collected in an open-body truck

Figure 7 - Waste pickers sorting through waste in a landfill

The Informal Sector

Other than the municipality, the informal sector provides an invaluable service when it comes to the MSWM system (Chintan, 2007). The informal sector is made up of urban poor (immigrants and marginalised people) in cities who do waste picking activities because it is the only earning opportunity available to many low skilled inhabitants. An estimate of two million waste-pickers exist in India today (Chaturvedi & Gidwani, 2010).

Waste picking is done for recycling of materials. Waste pickers collect and sort through various materials that have recyclable value and can be sold. Some collect mixed waste from resident's homes and sort the recyclables, others go through streets and dustbins, while some even collect recyclables from landfills and open dumps. This makes them highly vulnerable to health damages due to their shabby working conditions.

At the end of the day the waste-pickers sort the recyclables into different categories and sell them to small dealers. From there, the waste is transported to bigger dealers who are specialised in recycling one type of recyclable material and they sell it to the recycling industry (Agarwal, Singhmar, Kulshrestha, & Mittal, 2005).

The informal sector collection avoids environmental costs and reduces capacity problems at dumpsites (Sharholy, Ahmad, Mahmood, & Trivedi, 2005)

Figure 8 - Waste pickers separating waste into different categories

2.3 Impact of improper MSWM

The impact of India's waste dumping system on human health, environment and the socio-economic well-being of about two million waste-picker families is humungous. Improper solid waste management degrades quality of life, deteriorates public health and pollutes air, water and land resources.

Dumping of waste in landfills leads to chemicals leaching into the groundwater supply, surrounding land and water bodies. Using this polluted waste exposes individuals to disease organisms and contaminants.

Human faecal matter is also frequently found in municipal waste – this along with unmanaged decomposed garbage attracts insects and rodents which can spread diseases such as dengue fever, cholera and malaria.

Open burning of MSW in landfills and on streets emit pollutants into the lower atmosphere such as carbon monoxide sulphur dioxide etc. which are carcinogenic in nature and can be linked to causing asthma and heart attack.

Due to their monetary situation waste pickers have to scavenge through unhealthy and unhygienic conditions to recover recyclable items. Landfills consists of a lot of dangerous items such as broken glass, hypodermic needles and other healthcare waste, aerosol cans and chemicals from industries which may cause risks of injury or poisoning to the waste pickers (Davis & Cornwell, 2012).

Uncollected solid waste also degrades the urban environment with waste dumped on street corners, it discourages efforts to keep streets and open spaces clean. Plastic bags are an aesthetic nuisance and are also a cause of death for grazing animals who eat them (Tchobanoglous, Theisen, & Vigil).

2.4 Promoting Solid Waste Management

Promoting SWM at macro-level

Over the last decade, the Indian government and private organisations have taken a lot of initiatives to augment the country's solid waste management infrastructure and policies. The following are a few of the major initiatives.

Recently the Ministry of Environment and Forests (MoEF) issued the Municipal Solid Waste management Rules, 2016 that should be followed by all municipalities. It focuses on different SWM rules for different stakeholders, for example (1) at the household level, waste needs to be segregated at source into wet, dry and domestic hazardous waste. (2) Municipalities need to formalise the informal waste management sector (waste-pickers). (3) 'User fee' charges have been applied to bulk waste generators and 'Spot Fines' to those who are burning and littering public spaces and finally (4) FMCGs need to recover the non-biodegradable packaging waste generated by them. All the rules have been put into place to govern effective collection and disposal of MSW in India (Ministry of Environment, 2016).

Another initiative is the Swacch Bharat Mission (SBM) 2014 (Clean India Mission) initiated by Prime Minister – Narendra Modi, which is considered to be a paradigm shift in India's SWM movement. One of the objectives of SBM is to ensure door-to-door garbage collection and sanitary disposal of MSW in all 83000 wards (localities) in urban India. It also aims to provide SWM services to 80% of the urban population. Through programs, workshops, cleanliness drives, rallies, competitions, citizen communities etc. a large number of stakeholders have been sensitized towards the importance of SWM which has generated awareness and citizen participation (Ghosh, 2016).

In August 2018, the United Nations Development Program (UNDP) in collaboration with Hindustan Coca Cola Beverages Pvt. Ltd. (HCCBPL), initiated a "Plastic Recycling Management Program." Plastic is one of the most misused and mismanaged dry solid waste in the country. Out of the 25,940 tonnes of plastic waste produced in India everyday according to the Central Pollution Board, 94% is recyclable material such as PET and PVC. The initiative strives to minimise negative risks of plastic, by enhancing sustainable plastic waste management practices, through a socio-technical model segregation/collection/recycling). This new SWMS has been designed to formalize the processing of all plastic waste on a daily basis, using material recovery centres, managed through waste picker associations, NGOs, companies and is mainstream with the respective municipalities linked to authorized recyclers (UNDP, 2018). .

Figure 9 - Solid Waste Management Initiatives by the Indian government and other private organisations

Promoting SWM at micro-level

SWM at the micro-level is promoted in very innovative ways by the NGOs in India. Each NGO has their own goals and aspirations but all of them work towards the common vision of a Clean India. They reach out to different sections of the society so that each person is aware of their own role in the SWM system in the city.

The following are a few examples of the work NGOs are doing in India. (1) Helping communities manage their waste at source by teaching them the concept of the 3Rs (reduce, reuse, and recycle); (2) Educating children about waste, consumerism and the environment through innovative games and activity based curriculums; (3) Reusing waste to create high quality, useful products such as clothes, bags etc.; (4) Designing products that promote activities such as composting; (5) Working on environmental justice in partnership with people and groups from diverse sections of society; (6) Helping in the creation of autonomous groups such as self-employed waste pickers.

Figure 10 - Solid Waste Management NGO's in India

2.5 Conclusions

Due to urbanisation, growing population , industri-alisation etc. the current SWM system is struggling and has not been able to cope with the growing mounds of waste generated per person.

The poorly managed SWM system has led to a large amount of pollution due to burning and dumping waste in landfills which is degrading the environment and human health.

Over the last decade, the Indian government and NGO's have initiated a number of initiatives to increase the country's awareness and encourage community participation in waste segregation, reduction and recycling, along with augment-ing SWM infrastructure, systemic efficiency and funding. The government's efforts together with those of NGOs like Waste Warriors have just begun to slowly influence people.

There is still a long way to go to improve the SWM system and people's attitude towards SWM. Even today, only a portion of solid waste generated, is disposed of in a proper manner.

The Beginning

This Chapter is about my journey to Waste Warriors and finding the topic to my graduation project. It concludes with the aim of my project.

03

3.1 Meeting Waste Warriors

As soon as I began my graduation project, I knew that I wanted to work on something related to sustainability in India. India is my home and it needs to step into the circle of sustainable practices. The concept of sustainability is relatively new to India, most people do not even know what it is or why it is needed? Hence, I saw potential in exploring the subject.

I began to look for NGOs in India who were working on sustainability projects. I was looking at NGOs because I wanted to work on projects at a grass-root level. At this point I happened to stumble upon Waste Warriors, an NGO working on Solid Waste Management in India.

Going through their website I discovered that they were an organisation founded by Jodie Underhill who came to India as a tourist and then volunteered at the Tibetan Children's Village in Dharamshala (city in India). The garbage situation was something that bothered her every single day, hence, she decided to do something about it.

Figure 11 - Jodie Underhill at a street clean-up

With a dream of reaching all parts of India, Waste Warriors was formed in 2012 with the vision of –

(1) A clean India with systems that ensure that every citizen disposes of their waste correctly and feels a sense of civic responsibility and national pride regarding cleanliness.

(2) A healthier India with improved living standards and better quality of life where waste workers are valued and respected for their work.

Ever since 2012, Waste Warriors has grown into a full-fledged NGO, setting up offices in Dehradun, Dharamshala and Corbett (cities in India). They are a team of 40 highly motivated, lively people who want to bring about change in their surroundings. They are on a mission to -

(1) Be a catalyst for practical and community led SWM initiatives in rural and urban areas.

(2) Pioneer replicable models of research and education in the field, innovative practices and resource management in the field of SWM.

(3) To improve working conditions of waste workers and take positive steps towards integrating the unorganised waste sector into the formal SWM system whilst reducing the stigma attached to waste.

I was curious to know what kind of work they did and what projects they were working on, to understand how I could help them with my design skills. I found that they worked on projects that educated and raised awareness on the importance of SWM through consulting, presentations and guest speaking at schools and events. They also did transformation projects of public spaces, door to door waste collection and segregation services, composting, empowering waste workers and waste management at big events. I saw potential in the different work that they did and decided to contact them.

They were very interested in the work I was doing at TU Delft and were also looking for a designer to collaborate on some projects. I came to know that they were working on the "Plastic Recycling Management Program" set up by UNDP and Coca-Cola in collaboration with the municipality which got me extremely excited. I had a call with Mithinga – the Project Manager and we discussed potential projects I could work on.

Figure 12 - The Waste Warriors team

3.2 SWM at home

Waste Segregation

During our conversation she mentioned that a lot of the UNDP projects were based on 'waste segregation'. They already had a closed loop system in place where dry waste would be collected from different sources, which would then be sent to segregation centres set-up by the UNDP. At the centre their "green workers" would segregate the waste which would then be sent to recycling centres, where the materials would be used to create new products. But, at the household level, they were finding it very hard to encourage people to segregate their waste.

This problem was very people centred and had to deal with changing attitudes and behaviours of people in Indian households towards waste segregation. I found this subject very interesting because I would get to research the current trends of solid waste management at the household level and also work with behavioural psychology which I find as a very interesting subject. Hence, I got on board with Waste Warriors to use my design skills to tackle the challenge of Waste Segregation.

But, before diving into the problem there was a need to do some desk research to understand how people currently dealt with their waste.

Waste segregation means dividing waste into dry (inorganic), wet (organic) and hazardous waste. Dry waste includes – paper, glass, plastics, scrap metal, wood etc., these items can be recycled to make new products. Wet waste includes organic waste such as left-over food, peels from fruits and vegetables, cut flowers etc., these items can be composted to make fertiliser for plants. Hazardous waste includes – sanitary napkins, diapers, syringes, bulbs etc., these items cannot be recycled and therefore have to go into landfills.

The key to efficient SWM, is to ensure the proper segregation of waste at source i.e. separating waste into dry (inorganic), wet (organic) and hazardous waste (S. Kumar, 2017). The act of source segregation has been stipulated in the Municipal Solid Waste management Rules, 2016. Waste segregation before collection will reduce the amount of solid waste that needs to go to the landfill and facilitate recycling of materials and reduce the overall cost of waste disposal. Segregation at source also allows for the collection of clean and good quality dry waste for easy and efficient recycling and wet waste that helps create compost/ fertiliser for our surroundings.

Waste Segregation at home

For years, urban citizens in India have had only one trash bin. All their trash (wet, dry and hazardous) would go into the same bin which would then be disposed of by burning it in open air, dumping it into streets, public spaces or poor residential areas (slums) etc. or sent to landfills by municipality services. This habit exists to this day because they have been disposing their waste in this way for so long and it never was a problem. When asked about the reasons for their disposal pattern citizens usually state the inaccessibility of garbage bins and minimal solid waste collection services (R.K. Henry, 2006).

But now, due to the growing amount of trash being generated in India the government has begun to take many initiatives at the macro (Municipal Solid Waste Management Rules 2016) and micro level (NGOs). They are spreading awareness and sensitizing people towards the importance of SWM and waste segregation at home through workshops, cleanliness drives, rallies, hoardings and even television commercials. Setting up infrastructure for segregated waste collection services (door-to-door), management facilities (material recovery centres) etc. People are beginning to slowly understand – What is waste segregation? Why should it be done? How should it be done? Which were questions they had never thought of before.

Waste Warriors NGO have taken it upon themselves to give people answers to these questions. They approach different communities and give presentations, to inform and educate people about their role in the SWM system (waste segregation). To further, encourage and make it more convenient, the NGO even provides the community members with dry waste collection bags and a free dry waste collection service. But, the NGO has observed that people still do not segregate. They still dispose of their waste in the same way i.e. all trash in one bin.

3.3 Conclusion

Waste Warriors is an established NGO with a clear mission and vision for Dehradun. They have spread the word to thousands of people to segregate their waste through different types of activities, and have even made it convenient by providing a collection service. Segregation at source has also been mandated by law.

But still, most do not segregate their waste. Why have most people still not adopted waste segregation into their lives? This particular question needs to be answered through research.

3.4 Aim of the Project

"The waste problem is caused by human behaviour and therefore the solution lies in changing that behaviour"

(Milea, 2009)

Aim of the Project

to create a wholesome design intervention that achieves waste segregation in Indian households.

Aim of the Research

To investigate the current attitude and behaviour of Indian people towards waste segregation.

Research Questions

The following research questions need to be answered before designing an intervention.

1. What is the current perception of people towards waste and waste segregation?

This question helps uncover how people interacted with waste in their daily lives, their thoughts about its effects and their feelings towards the topic

2. What are the barriers standing in the way of waste segregation behaviour?

Finding the barriers would be beneficial for the design process so as to come up with appropriate solutions to overcome them.

Getting into the Context

This chapter is about the on-field research done in the context to understand the topic of waste segregation in Dehradun and to gain insight to the posed research questions.

04

4.1 Approaching the Research Questions

Using methods from the Delft Design Guide, field research was conducted in Dehradun to find answers to the research questions.

(1) Two context mapping workshops with children and their parents from a school (Purukul Youth Development School - PYDS)

(2) Interviews with experts (Waste Warriors) and citizens of a community to know about their experiences with waste segregation (practices, attitudes, behaviour etc.)

The following is the explanation of the research methods

Context Mapping

Context Mapping is an approach to design in which designers use people's everyday lives to inform and inspire themselves for ideation. It can be used to gather information about people's needs, routines, wishes, motivation, limitations and experiences that can be used in designing (E. Sanders).

Part of this information is what people can tell or what can be observed. While the other part is tacit knowledge and latent needs. Context mapping can help uncover the latter (tacit knowledge and latent needs) which is very hard to express in words or that lies in the subconscious. To do so context mapping consists of a number of techniques such as making collages, using probes, writing in booklets, workbooks, drawings, discussions etc. This leads to the collection of a large amount of rich qualitative knowledge about a topic.

Since 'perception' of waste and waste segregation is such an abstract concept, I thought Context Mapping could act like a trigger to stimulate their thought process and also allow them to freely express themselves.

Interviews

Interviews are one-on-one conversations with people with one person (interviewer) asking another person (interviewee) questions that leads to information that can be used by the interviewee and other audiences.

I used the methods of interviews because it allowed me to ask participants close-ended and open-ended questions about their personal experiences. From my experience I know that interviews are a great way to start open ended-conversations which leads to improvisation and allows an interviewer to discover new vital pieces of information. The method also allows the interviewer to observe the interviewees context and their reactions to questions in real-time which adds to the richness of the information.

Through my research and observations I realised that there were two main stakeholders when it came to waste segregation at the household level. (1) Waste Warriors, who were managing waste segregation activities at the community level and directly interacting with the citizens. (2) The citizens who were asked to carry out the act to waste segregation.

Since, the NGO and community members were experts of their own experiences, I decided to conduct 2 rounds of interviews, one with members from the NGOs and the other with citizens to understand the perspective of both stakeholders.

4.2 Context Mapping

The Set-Up

As mentioned above, Waste Warriors have been doing a lot of projects all over Dehradun to spread the message and initiate the act of Waste Segregation. A recent pilot project that they have launched is the "Plastic Gullak" pilot project. The aim of this project is to raise awareness on plastic solid waste and also channelize recyclable plastics from homes to schools to plastic segregation facilities setup by the UNDP. To facilitate this, the NGO has set up large bins on school premises which have been used to encourage students and their parents to segregate their waste at home.

I thought that this project would be a great starting point to begin my field research because the project was based around waste segregation in a family's home.

The NGO and the principal of PYDS were in constant communication with each other due to the pilot project and this helped me in setting up a context mapping session. The principal took on the responsibility of searching and convincing both students and their parents to participate in the workshop. The school was gracious enough to provide me with 5 families that segregated their waste at home and the workshop was conducted on the school campus.

The Sensitizing Process

A part of the process of Context mapping is sensitizing participants about the topic before the workshop, which in this case was waste and its segregation. In my project the sensitizing was done using a sensitizing booklet. It had 7 simple and fun activities that had to be done every day for one week. Its purpose was to trigger, encourage and motivate parents and children to think, reflect and explore aspects of their personal environment in their own time. This would prepare them to access their experience and express their thoughts on plastic waste and segregation during the workshop.

The following questions were present in the sensitizing booklet (Appendix A).

1. What are the different types of plastic items in your house?

2. Ask your mom/dad for what all things she/he uses plastic?

3. What are the good and bad things about plastic and plastic waste?

4. Draw the journey of a soft drink bottle

5. Write 3 questions that you do not know the answer to about plastic waste and find the answer using a computer.

6. Present an analysis of plastic waste through a collage

7. Write a newspaper article for the 'Times of India' on the plastic waste situation in India (for the parents)

The Context Mapping Workshop

Workshops were conducted with both students and their parents on two separate days in the morning. At the beginning of the workshop both parents and students were very shy and were showing me a lot of respect. But, from my studies I knew that I needed to make them feel comfortable to express themselves and I should blend into the group so that they would see me as a friend.

Hence, the session started with funny group ice-breakers which was then followed by the purpose of the session.

"Hello, my name is Jennifer and I am a Waste Warriors. The purpose of this workshop is that I need your help in understanding what you think of plastic waste in Dehradun and how you dispose of plastic waste in your homes. Can you please help me?"

To which all participants replied positively.

Workshop Activities

Activity 1 - Discussing the sensitizing booklet

Activity 2 - The Plastic City

Activity 3 - Discussion on Plastic waste segregation

Activity 4 – Make a collage

Activity 5 – Your journey to waste segregation

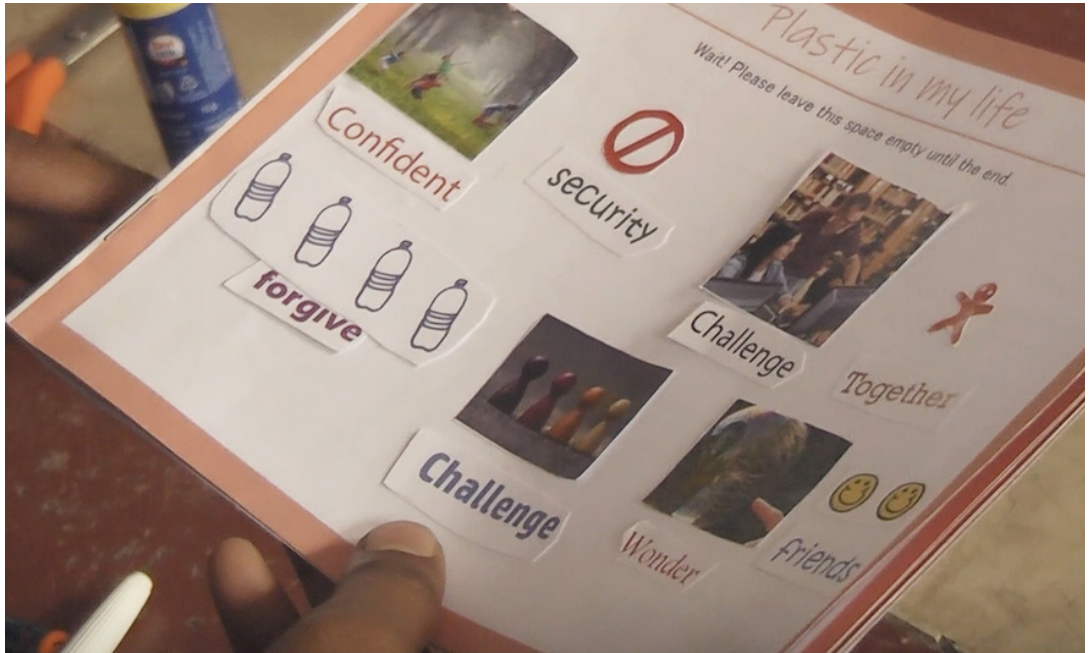Details of the workshop activities and observations can be found in Appendix B

Figure 13 - Discussing the Sensitizing booklet

Figure 14 - Students making the collage in the workshop

4.3 Interviews

NGO members

I got the opportunity to interview two NGO members from Waste Warriors in their office. The NGO constantly interacts with people from different types of communities on a daily basis and hence understands the perception of the people towards waste segregation. They provide presentations in different communities and have a dry waste pick-up service where they meet the people from the community every 15 days hence, they personally know the people who segregate in the community and have first-hand experience on reactions of people who do not segregate and the practical problems they face when they interact with people.

The following are a few important questions posed to the NGO (Appendix C)

1. Why do you think people do not segregate their waste?

2. How does your NGO work towards spread awareness in communities?

3. What is the ideal goal with respect to waste segregation?

Interview questions list can be found in Appendix

Segregating citizens

I was fortunately able to interview four women living in a particular locality where Waste Warriors had already given their presentation. They used the bags provided by the NGO and gave them their plastic waste whenever the NGO came for a pick-up. These women are active citizens who segregate their own waste and spread awareness amongst other community members.

Since, the women had been through the transition i.e. from a non-segregating citizen to one that segregates, I thought they were ideal candidates to interview because they would be able to give me insights about other community member's attitude towards waste segregation, the problems they had when they began to segregate and how they overcame them.

The following are a few important questions posed to the NGO (Appendix C)

1. Why do you think people do not segregate their waste?

2. Why did you begin to segregate your waste?

3. What are the problems you faced when you began to segregate your waste?

Interview questions list can be found in Appendix

4.4 Findings

Research Question 1

What is the current perception of people towards waste and waste segregation?

Method

The context mapping workshop and interviews provided rich information with regard to the topic. This information was audio and video recorded and was analysed by filtering and noting down the comments in relation to the research question.

Findings

People associate waste with being something 'dirty and smelly' which is currently thrown in street corners, burnt or sent to landfills. They are well aware of the fact that these kinds of actions (burning, landfills etc.) lead to the pollution of their surroundings, health problems to humans and animals and are an aesthetic nuisance because they can see it personally in their surroundings. This makes them feel sad and to some extent hopeless because they feel the issue is out of their hands.

But, now they are becoming aware of initiatives taken by the government to reduce plastic waste. They receive this information through the news, TV commercials on the Clean India Campaign carried out by the government and presentations given by Waste Warriors etc.

Some people have begun to segregate their waste. Initially they found it a little hard because it was not part of their routine but now they are used to it and find it an easy task to perform. They have also been spreading the message of waste segregation to a lot of their friends.

Through these initiative and awareness campaigns, people agree that waste segregation is the answer to the problem of the ill-effects of waste. But, according to Waste Warriors only 10% of the citizens they have reached out to segregate their waste, while the rest have still not adopted the practice. There is a discrepancy between one's values and behaviour. There seem to be some barriers standing in the way that are not allowing people to change their behaviour.

Research Question 2

What are the barriers standing in the way of waste segregation behaviour?

Method

The information from the context mapping and interviews was transcribed and the main quotes relating to problems that stand in the way of people segregating were noted down on cards. The cards were then clustered on the basis of their similarity which gave rise to 5 different reasons, why a person may not segregate their waste.

Findings

The main reasons why people do not segregate their waste are -

(1) Education and Awareness
(2) Current Attitude and Behaviour
(3) Sense of Responsibility
(4) Infrastructure
(5) Strategy

Education and Awareness

Generally a large number of people in India have not heard about waste segregation. It is a relatively new concept and not well understood by many. Explaining the concept of waste segregation and its need is a complex one for someone who has never heard of it before.

"I learned about waste segregation when my child came back from school after Waste Warriors gave their presentation"
Parent 1

Those who do understand waste segregation, lack the proper knowledge on the details such as - What are the types of waste? What goes into each type? How waste is this waste disposed? etc.

"It's because most people are not aware or have the knowledge about it....they do not understand its importance."
NGO member

"People are normally confused about what goes where"
NGO member

Hence, people's limited and unclear knowledge on waste segregation is creating confusion. This is leading to lack of interest and non-participation in the act of waste segregation.

"People think it's useless, because according to them it is all mixed, so they don't make the effort."
NGO member

Current Attitude and Behaviour

Through research it has been established that people mix all their waste into one bin and dispose of it in an inappropriate way. This is a habit or behaviour that they are used to and hence are unwilling to change. There are a number of psychological factors that drive this behaviour. The following are a few factors -

Habit and Convenience

People prefer not changing their current habits because according to them it creates inconvenience and takes a lot of effort. Hence, people try avoiding it by making excuses.

"Our friends say we have been doing it like this for so many years how else should we do it?"
Parent 3

"They are just lazy, and come up with a lot of excuses when we ask them why they did not put their plastic in their bags."
NGO member

Social Norms

If most people in a locality are not segregating their waste, people do not think it is necessary for them to do it either i.e. people take into consideration the opinions of others in the neighbourhood.

"They say other people are not doing it, why should I?"
NGO member

Sense of responsibility

People believe that segregating their own waste will have no impact on the already existing waste problem in India. They believe that waste related activities are not their responsibility but the governments and the informal sector.

"People think it's useless, because according to them it is all mixed, so they don't make the effort and they say it's not their responsibility, the government should take care of it"
NGO member

Social Pressure

Those who are considering changing their habits to segregate waste, tend to feel psychological pressure from the strong majority of people who think it is not worth it.

"When I began to segregate, I found it hard because other people said that it was a waste of time."
Woman 2

Lack of Penalities

There are currently no repercussions against those who do not segregate waste. Hence, people are not taking it seriously because it is not hurting them in any way.

"Fines should be imposed by the government then only people will listen."
NGO member

People tend to take care and responsibility of things that only belong to them e.g. their family. But, a resource such as the environment belongs to everyone, this leads to lack of ownership over the environment and hence the lack of responsibility to take care of it. This is why people do not engage in segregation.

4.5 Conclusion

Infrastructure

As mentioned in Chapter 1 the MSWM system is very poorly managed and has a lot of infrastructural constraints which leaves people to dispose of their waste in wrong ways.

"The truck comes to pick-up once in 2 week, sometimes it doesn't even come...dirt is falling out... don't want to go next to it."
Woman 1

"We cannot keep knocking their door, asking people to segregate, after some time we stop"
NGO member

Strategy

Oftentimes, NGOs and municipalities try to prompt the act of waste segregation through short term programs such as presentations, clean-up drives, educational activities etc. but, these short term programs are not creating the necessary impact needed to change a person's behaviour.

"We do different things to spread the message of waste segregation....murals, activities in schools, the plastic gullak, talks with experts ......"
NGO member

Most people agree that waste is an issue that needs urgent attention. People also think that waste segregation is a good solution to curb the problem at household level. After knowing this piece of information people are still not segregating.

Through my research I have found that waste segregation is a complex multi-dimensional, ambiguous societal system. It involves multiple moving , interconnected, and evolving elements such as diverse stakeholders who each have different opinions, duties, barriers, attitudes and behaviours towards the topic.

Hence, the waste segregation system needs to be understood with its many stakeholders, context and how everything is interconnected.

Systemic Design

This chapter identifies the design context, it's main stake-holders and their duties to get an overview of the waste segregation system at the household level and concludes with my design goal.

05

5.1 A Systemic Design Approach

Context and Main Stakeholders

Waste Segregation is a part of the MSWM system with many stakeholders such as - people, waste workers, NGO's, segregators, truck drivers, ragpickers, municipality etc. It also has many contexts such as - households, reataurants, events etc.

Hence, for the purpose of my project I had zoomed into waste segregation in homes of people who are part of a residential community. They had been given the presentation on waste segregation and are being provided with a free waste collection service by Waste Warriors.

In this context the main stakeholders were community members, Waste Warriors and the municipality.

Systemic Design Approach

Systemic Design is an approach that is used to solve complex problems such as waste segregation by synthesising 2 schools of thought - systems thinking and design thinking (Ryan A. J., 2014) .

Systems thinking is a way to approach, or think about, complex problems. It helps people see how different parts of the system interacts to form a whole, and how the whole interacts with the wider context (CoLab, 2016).

Design thinking is human centred design that generates interventions to address complex problems. It uses visual methods to understand users, challenge assumptions, redefine problems and create innovative solutions (products, services, experiences or systems) that can be iteratively prototyped and tested (CoLab, 2016).

In systemic design, systems thinking helps zoom out to get a broader picture of the context while design thinking helps to zoom in on leverage points for which tangible solutions and actions can be designed (Ryan, 2014). It integrates the mindsets and toolsets of systems thinking and design thinking to encourage innovative systems change.

Hence, I thought that systemic design could be a great tool to get a wholesome picture of the waste segregation system at the household level so as to find points to create design interventions that could change the waste segregation system for the better.

Stakeholders

From my desk research, context mapping workshops and interviews with different stakeholders (community members, NGO members) I was able to understand and analyse the overall waste segregation system at the household level in Dehradun.

From my analysis I understood that there were 3 key stakeholders that directly affected the functioning of the waste segregation system - the NGO, community members and municipality. I realised that all the stakeholders were inter-dependent on one another. A stakeholder map of the waste segregation system was developed along with the stakeholders and the duties of each.

(1) At the core were the community members because the act of waste segregation is expected from them.

(2) Outside the core were Waste Warriros who would interact with community members to encourage waste segregation while also interacting with the municipality to receive funds, infrastructure etc. to promote segregation in households.

(3) The outermost stakeholder was the municipality because they run the overall MSW system.

Due to this interdependency, each stakeholder needs to carry out their duties effectively so as to have a proper functioning waste segregation system.
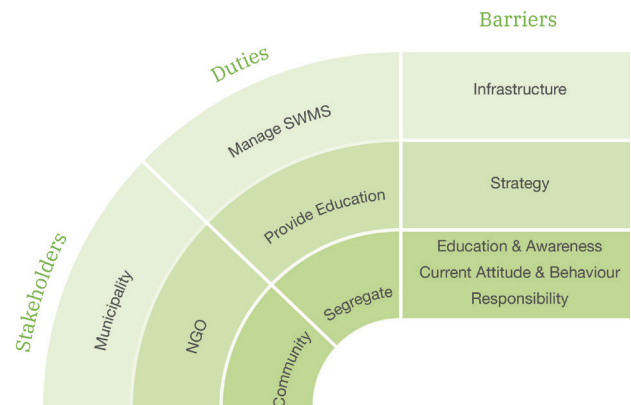

Figure 15 - Stakeholder map of the Waste segregation system.

Barriers

From research, the barriers standing in the way of each stakeholder were also identified. They were

(1) Lack of infrastructure at the municipality level
(2) Insufficient long term strategy at NGO level
(3) At community level - lack of education and awareness, current attitude and behaviour and sense of responsibility.

All these barriers at different stakeholder levels were leading to a non-segregating community.

5.2 Design Goal

Reflection

From the stakeholder map we observe that the community members are at the core of the system with 3 barriers – education and awareness, current attitude and behaviour and sense of responsibility.

Hence, I think lowering these barriers at the core is the foremost task. If everyone in the community begins to segregate their waste then it would affect all the other stakeholders in the system in a positive way, making it easier to achieve a fully functioning waste segregation system.

The main stakeholder that would have to work on lowering the barriers for the communities are the NGO. This is because they are experienced in spreading awareness (the first step to waste segregation), interact with the people on a daily basis and understand their needs and wants. In the waste segregation system they are the only ones capable enough to lower the barriers and hence achieve the systemic change.

The NGO are the main agents for bringing about change on the subject of waste segregation in Indian households. But, they need to be guided on how to overcome the barriers posed by the communities. Hence, my design goal is -

"To provide guidance to the NGO in achieving waste segregation in an Indian household."

We observe in the stakeholder map that the NGO needs to encourage waste segregation by overcoming the community barriers. But, we can also see that the NGO had a 'strategy' barrier of their own.

Hence, the NGO needed to be guided at 2 levels – at their organisational level and at the community level.

Providing Guidance

In this chapter the NGO is introduced to a new-long term strategy which encapsulates all stakeholders. This is followed by on-field and literature research on encouraging community members to segregate.

06

6.1 Guidance at Organisational level

Currently the NGO has a very short-term rigid strategy which focuses on just spreading awareness through a presentation and collecting dry waste from segregating community members in localities which has not been impactful in encouraging people to segregate their waste.

The NGO is the middle-man between the community members and the municipality, hence only they have the capability of influencing both stakeholders to bring about change in the waste segregation system. Since, bringing about change is a long-term affair they need to have a flexible but robust, long-term strategy that takes into consideration the other stakeholders and their barriers. Different barriers will have to be crossed at different points in time depending on it's priority and the stakeholder.

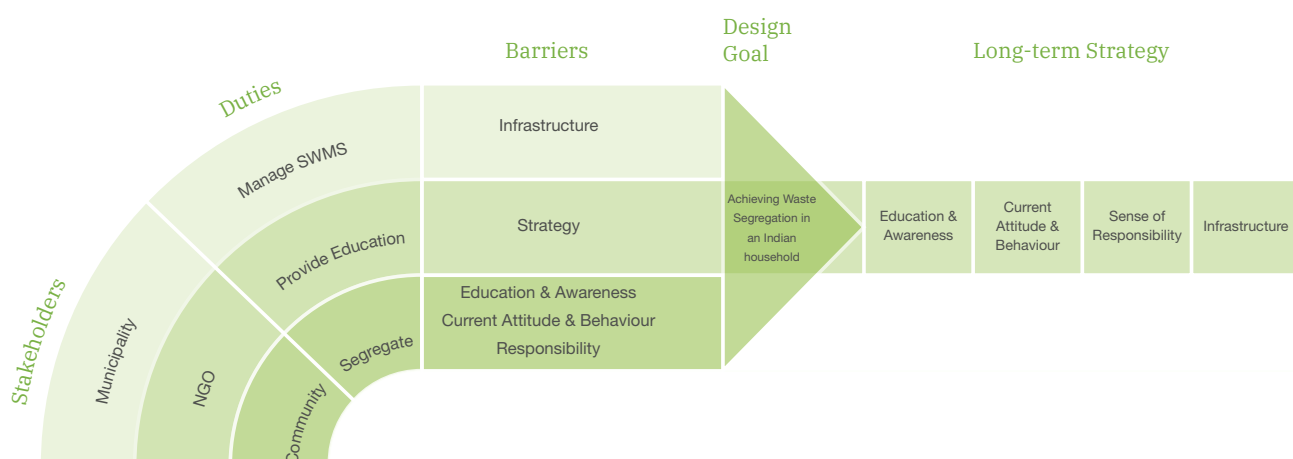The following is the order of barrier priority and it's reasoning.

Figure 16 - Long-term strategy for the Waste segregation system.

1. Education and Awareness

To begin waste segregation a citizen needs to be properly informed about the topic - understand the problems of waste, waste segregation, how it should be carried out etc. Having this basic information is important step to begin action.

2. Attitude and Behaviour

After gaining apt information from the NGO, the next step is to put it into practice. But, as explained in the Chapter 1, people are in the habit of throwing waste into one bin. Their current attitude and behaviour stands in the way of adopting the waste segregation practice. This is an important barrier that needs to be tackled to move forward.

3. Sense of Responsibility

Once people have adopted segregation into their lives, they then become the ambassadors of change, spreading the message of waste segregation through their actions and words hence, reaching out and on-boarding more people in the community.

4. Infrastructure

Lastly, when the NGO has lowered all the barriers at community level leading to a large number of people adopting the practice of waste segregation in a community. They will have enough leverage to request the municipality for more infrastructure for the community.

The above structure encapsulates all the stakeholders and the actions that need to be carried out by each over a period of time. For the NGO we can think about this structure as phases in a long term strategy that need to be crossed one after the other to achieve waste segregation in Indian households.

The next section of the report only discusses the guidance at community level for Phase 1 - Education and Awareness and Phase 2 - Attitude and Behaviour. These phases are the beginning steps to a systemic change.

Phases 3 and Phase 4 are out of scope for the graduation project.

6.2 Guidance at Community level

In the organisational level, long term strategy, the NGO directly interacts with all community members in Phase 1 – Education and Awareness and Phase 2 – Current attitude and behaviour

These are critical first steps in the strategy. Hence, on-field research and literature review needs to be done to understand the context before proceeding to designing for these phases.

For Phase 1 - On-field research of the NGO information transfer process was observed and then analysed.

For Phase 2 - A Literature Review was performed to research how to motivate a change in the current attitude and behaviour. This was followed by an example on the subject.

Figure 17 - Waste Warriors presenting at Green-View Apartments

Phase 1 - Education & Awareness

From my on-field research I observed that to spread the message of waste segregation the NGO currently shows a PowerPoint presentation to community members living in a locality, which is a great tool to spread awareness because it can be done for any number of people and does not need a special place or many resources.

I got the opportunity to attend one of the presentations given by the NGO at Green View Apartments, a residential high rise apartment complex. They began with talking about their established organisation i.e. who is Waste Warriors and its origins. Through the presentation the NGO showed community members the adverse effects of mismanaged waste hence, motivating them to segregate by appealing to their emotion i.e. the love for their environment, God, family etc. They also showed their credibility by showing them the diverse solid waste management projects that they have initiated and are currently working on in collaboration with the municipality.

But, I noticed that when the NGO began to speak about types of waste and how to segregate, people began to look confused but they did not interrupt the presentation due to common courtesy. At the end of the presentation during the question-answer round, some people asked simple questions, the answers to which were already given through the presentation. The NGO had to repeat the answers again.

Conclusion

Since, people were asking Waste Warriors to repeat themselves it indicates that the information transfer process was not optimal in nature. Also, from a designers perspective I noticed that the information flow could be more structured and the visualisation of the information could be simplified.

I also realised that the NGO was trying to cover a large number of topics in one presentation such as composting, waste collectors and helping the informal sector which steered the the presentation in different directions hence moving away from the main topic.

Reflection

The presentation is the very first and important part in the system. It is the first stop to on-boarding people towards waste segregation. Hence, it needs to be impactful and gain people's attention. Through my observations I saw an opportunity to make improvements to the presentation. The NGOs current presentation have great positive attributes e.g. – informative, emotional, practical etc. but by adding a few more attributes such as insightful, engaging and fun will help the presentation become a powerful agent of information transfer.

Insightful

Since, waste segregation is a new concept in India the presentation needs to take into consideration the knowledge level of people as the starting point so as to not have a knowledge gap which could lead to confusion. The main points are that they should easily be able to understand the crux of the problem, their role and how to do it hence, giving them the basic understandable knowledge. Knowing this information can act as meaningful drivers and can help in motivating community members to segregate their waste.

Engaging

As compared to a conventional presentation where there is just one sided communication, using an interactive presentation that grasps the attention of the audience makes the information in the presentation more memorable. Engaging people both physically and mentally through a two way style communication between the audience and the presenter allows the audience to reflect on their experiences and knowledge, which increases their attention towards the presentation, making them gain and retain more information.

Fun

Making a learning experience fun and enjoyable, creates a friendly and comfortable environment. It triggers audiences to express their feelings, makes them more open to interact, learn and discuss with others in the audience. When we enjoy learning it helps us recollect the subject easily. But, we need to make sure that the fun experience does not overpower the learning, or else it can manifest into distraction.

Phase 2 - Motivation

As mentioned in Chapter 2 those who understand waste segregation believe that it is a good way to solve the SWM crisis at the household level but, this thought is not converting into action. People are still disposing their waste in the same way (burning, landfills etc.). Some reasons for this attitude problem are habit, inconvenience, social norms etc. which are all related to a person's psychology. From literature research I discovered that one of the ways to create behavioural change towards a particular task is through motivation.

The term motivation has been defined in psychology literature as 'the psychological forces or energies that impel a person towards a specific goal (Sheldon, William, & Joiner, 2003). There are many concepts/ theories such as the theory of reasoned action, intrinsic and extrinsic motivation etc. that identify motivation as an important behavioural change determinant.

Theories also identify different factors that influence motivation including internal and external drivers, conscious and subconscious processes, different beliefs about the consequences of their current behaviour and expected outcome of their new behaviour, social norms, others attitude and behavioural approval etc.

In the long term strategy, this phase of behavioural change is critical because this is when community members begin to contemplate whether to change their behaviour or not, measuring the advantages and disadvantages of the act of waste segregation. This is the point where the NGO needs to motivate community members.

The following are a few psychological drivers of motivation I came across in my research and the reasons I chose them.

Extrinsic Incentives

A meta-analysis from 2014 determined that extrinsic motivation (through extrinsic incentives) can be a very effective form of motivation.

Social Incentive & Immediate Rewards

In a Ted-Talk done by T. Sharot (professor of cognitive neuroscience at the University college, London) – 'How to motivate yourself to change your behaviour' she mentions that the above are 2 important motivational drivers.

Timely Reminders

We tend to forget to do an act that is not part of our daily normal routine. Providing motivational reminders can help with our forgetful nature.

Extrinsic Incentive

Extrinsic incentives are physical or emotional rewards that motivate individuals to act. The incentives can be physical – money, trophies, candy etc. or emotional – recognition, praise, benefits etc. (Amabile, Hill, Hennessey, & Tighe, 1994).

Extrinsic motivation refers to motivation to complete an activity or reach a goal to achieve some external benefit that is separable from the outcome of the activity itself (Higgins & Trope, 1990) (Wrzesniewski, et al., 2014), e.g. a child studying to receive a high grade. The child is motivated to study because if he/she gets a high grade he/she will receive a gift from his/her parents and not because he/she enjoys studying. Hence, extrinsic incentives can be used to motivate people to do useful actions that they would normally not be interested in doing e.g. waste segregation because they see benefit in it for themselves.
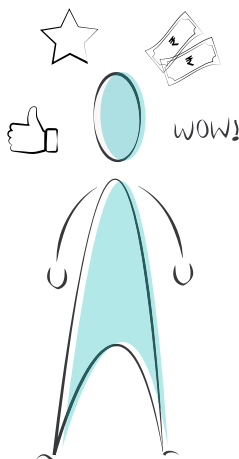

Figure 18 - Extrinsic Incentive illustration

Social Incentive

Social incentives can be explained as a broad range of interpersonal rewards and motivations that encourage people to behave in a socially accepted manner. Social incentives play a central role in human behaviour when relationships among individuals are based on social ties rather than on money (Fiske, 1992).

Social incentives can motivate new behaviour based on the notion that humans are social creatures with a strong need to belong (Baumeister & Leary, 1995) and are influenced by other people's opinions and actions. People are more willing to change their behaviour in order to be socially accepted, acknowledged and respected (Benabou & Tirole, 2006), signal a positive image to others (Ariely, Bracha, & Meier, 2009) as well as receiving affection, praise from them (Buss, 1983).

People choose to engage in pro-social behaviour e.g. helping, cooperating even if such behaviour contradicts their self-interest (Benabou & Tirole, 2006) due to social incentives. In a public setting, this pro-social behaviour increases even further because their behaviour is observable to others (Ariely, Bracha, & Meier, 2009).
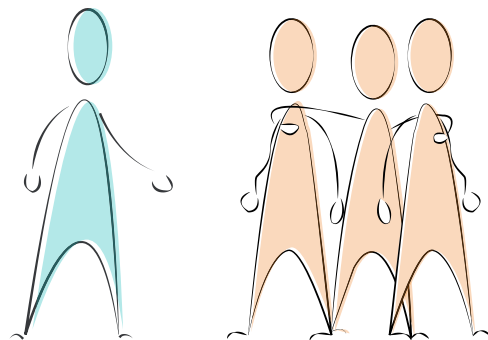

Figure 19 - Social Incentive illustration

Immediate Rewards

People primarily pursue long term goals such as exercising to receive delayed rewards (e.g. improved health) in the future. For this, there needs for continual motivation to pursue the goal related activities (exercise) to receive the delayed outcome (improved health) i.e. long term goals require a person to persist at the activity over time (Baumeister & Tierney, 2011) (Hofmann, Friese, & Strack, 2009). Although there is high value in the delayed outcome, people tend to struggle to pursue the long term goal.

But, according to Fishbach and Woolley in their article – 'Immediate Rewards Predict Adherence to Long-term goals' (Woolley & Fishbach, 2016) suggest that immediate rewards such as enjoying healthy food can increase persistence in reaching these long term goals. Immediate rewards are highly attractive because they appear during or right after the activity i.e. in the present (Ainslie, 2001).

This is because immediate rewards boosts persistence by increasing positive feelings or experience towards the task, which provides an intrinsic reward that creates an incentive (Berridge, 2001) and increases motivation (Custers & Henk, 2005).
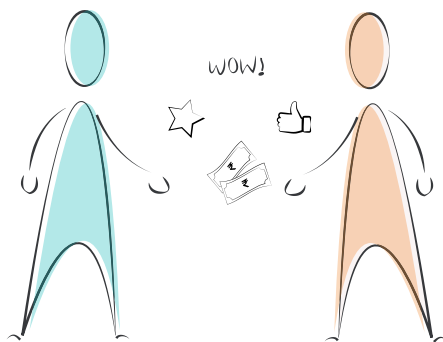

Figure 20 - Immediate Rewards illustration

Timely Reminders

Everyone forgets to do something now and then especially when it is not part of your daily routine. But reminders can be powerful agents to overcome forgetfulness. Using reminders is primarily dependent on behavioural learning theory (Leventhal & Cameron, 1987), according to which behaviour depends on stimuli or cues either external (environmental cues) or internal (thoughts). If there is sufficient repetition of external cues (reminders) then behaviour can be modified (Vervloet, et al., 2012). When the cue occurs the action is remembered automatically. E.g. reminders from a smartphone can be used as cue to remind a person to perform a targeted behaviour.

There are several different triggers that can lead to one performing a behaviour. One of the more powerful one is "visual cues". They are visual signals or triggers to remind you to perform a desired behaviour (Clear, 2018).
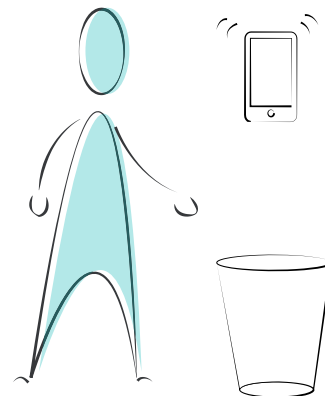

Figure 21 - Timely Reminder Illustration

Behavioural Psychology case study - Opower

Figure 22 - Opower logo

Opower is a company that provides a software-as-a-service customer engagement platform for utilities. Their software uses algorithms to perform data analysis that can provide information about heating, cooling and overall usage to the end-users giving them an opportunity to save money (John, 2009).

Their company has incorporated behavioural science techniques in residential areas in their energy efficiency programs that seeks to motivate customers to lower their energy consumption to the "normal" neighbourhood rate.

Their energy efficiency programs include a personalised "Home Energy Report" that is sent via various communication channels such as the web, email and mail. It is meant to educate the customers about their current energy consumption and empowers the consumers to manage their energy usage (Opower, n.d.). .

In April 2008, Opower tried this messaging experiment on a large scale with around 85000 households who were customers of the Sacramento Municipal Utility District. "The results showed that with Opower's energy bill electricity consumption reduced from 1.2% to 2.1%. This 2.1% decrease has led to a reduction of one billion pounds (over 450,000 tonnes) of Co2 emission equivalent to 75 million dollars in energy savings" (Ayres, Raseman, & Shih).

In the report we can see the same psychological drivers mentioned previously that have made this project a success.

Figure 23 - Opower Home Energy Report

Extrinsic Incentive

The extrinsic incentive/reward in the report is the amount of money saved ($58). The consumer is motivated to reduce their energy consumption, not because of the less amount of CO_2 that they would produce but because they see the benefit of saving money.

Social Incentive

In the report we can see in grey that the average energy use of people in the neighbourhood and in blue is the energy use of the homeowner and in green the most efficient neighbour.

From the report, the consumer gets an opportunity to compare themselves to their neighbour. They can look at where they stand in the average ranking and where the most efficient neighbour stands. In this example the consumer is using less than the average neighbour but more than the most efficient neighbour, triggering them to act on reducing energy consumption.

Immediate Reward

The long term goal of the consumer in this project is to be the most efficient energy consuming neighbour. But, there is a need for continual motivation to pursue the goal which will help in persistence. In the report this is done through (1) the comparison bars; (2) The smiley faces.

(1) At first glance the immediate reward for the consumer is to see that they are doing better than the average neighbour.

(2) The smiley face (GOOD) on the report acts like an extrinsic incentive/ reward. The consumer is being told that "you are doing well" and since there is one higher than the good (GREAT) the consumer strives to achieve that goal.

Both these triggers make a person happy, motivating them to become energy efficient.

Timely Reminder

The bill has messages such as "Unplug electronics when not in use" and "Program your thermostat" with icons which act like external cues to remind a person to do those actions that will save money and energy.

6.3 Conclusions

Reflection

Although waste segregation and household utilities are 2 separate topics that do not directly cross paths, the main thing that they have in common is that they are both working on sustainability issues where the citizen or people are at the core of the problem and there is a need for behavioural change to solve the problem.

One of the shortcomings of the Opower system is that, the Home energy report may not work for people who are below the average consumption mark. To solve this problem, the company could compile data of people who are below average and make a new average mean for them.

The NGO has the capability to bring about change in the waste segregation system because they are the only stakeholder that understands the needs and wants of the other stakeholders which allows them to influence and align their frame of mind towards together achieving certain goals such as waste segregation in every household.

Achieving waste segregation in every household is a long term affair therefore a plan needs to be formulated taking into consideration all stakeholders of the system. The plan needs to be divided into phases so as to satisfy the barriers of each stakeholder over a period of time.

At the community level the 2 main barriers that stand in the way of people segregating are - education and awareness and current attitude and behaviour. The current system of spreading awareness through presentation slides is an ideal because of limited use of resources. The presentation needs to be impactful and leave an impression hence, a few attributes (insightful, engaging, fun) need to be added to the current presentation.

Also, people need to be constantly motivated to make a change in their habits i.e. their attitude and behaviour. In this case, psychological drivers can be used to motivate people to act.

Design Interventions

This chapter is about the design interventions that have been proposed for both levels (organisational and community level).

07

7.1 Organisational level Intervention

In the previous chapter we left off with a long term strategy for the NGO that consisted of phases (barriers) that needed to be crossed one after the other to achieve waste segregation in Indian households.

Metaphorically, we can look at this strategy as a 'growing tree' towards waste segregation. It begins with a seed (knowledge), then a nurtured sprout (behavioural change), a sapling (responsibility) and a strong mature tree (proper infrastructure).

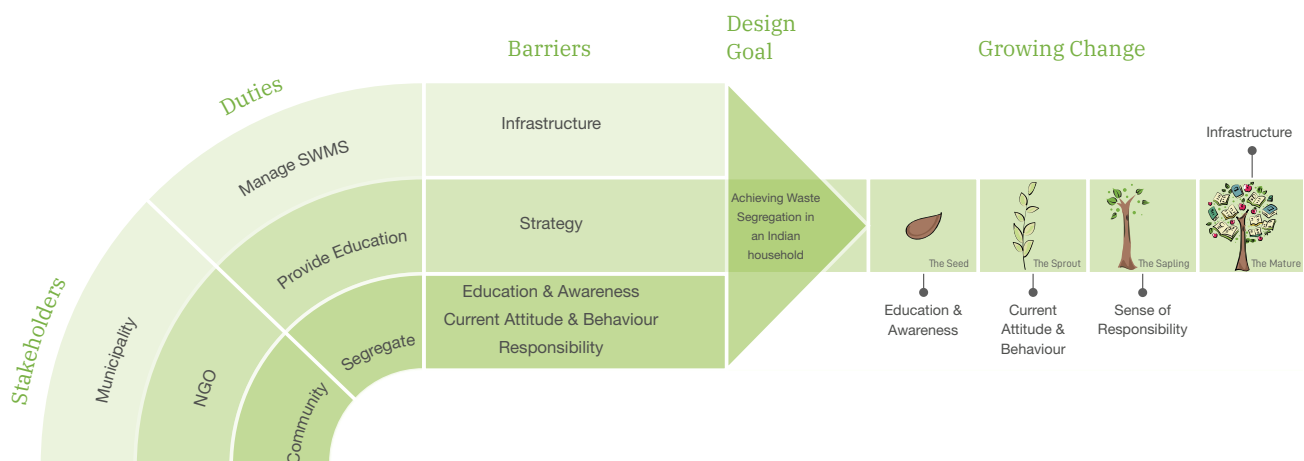The following is an explanation of different phases of growth of the tree and the waste segregation system

Figure 24 - The Phases of Growing Change

Phase 1 - The Seed

The first stage for any tree to grow is that the seed needs to make contact with the ground.
(Tree, 2000)

In the context of a community, the NGO needs to first make direct contact with the members of the community. The NGO needs to impart clear knowledge about the important aspects related to waste and waste segregation and the effects of both. For example – Why is waste a problem? What is waste segregation? How does it affect me? How do I do it? These are very simple questions that need to be answered in a clear, concise manner.

The outcome of this phase is that it should plant a seed in a citizen's mind by being insightful, engaging and fun.
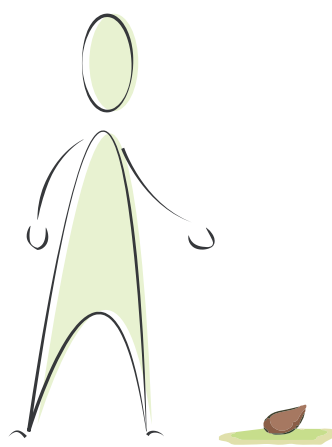
Figure 25 - The Seed Phase

Phase 2 - The Sprout

The seed needs favourable conditions to sprout. It needs the right environmental conditions and perfect nutrients to break through the seed coating, expand and come to life.
(Tree, 2000)

In the same way the information on waste segregation provided by the NGO needs to be constantly nurtured in the individual's mind. They need to be constantly motivated to adopt a new behaviour. There is a need for the right set-up that needs to be carried out properly so as to unlearn an old habit (mixed waste) and learn a new habit (waste segregation).

Figure 26 - The Sprout Phase

Phase 3 - The Sapling

The sapling is a juvenile tree which is ready for transplanting. It grows rapidly and has lots of energy. But, it still needs care, to keep it on track.
(Tree, 2000)

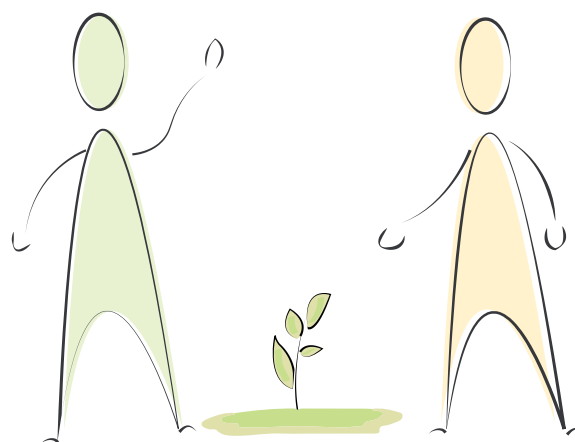In the same way the NGO needs to start transplanting knowledge into active citizens i.e. citizens that have adopted waste segregation into their lives. They need to equip them with knowledge on how to spread the message of waste segregation to others. Hence creating a newly formed self-sustaining system that allows active segregating citizens in the community to carry out their work.

Figure 27 - The Sapling Phase

Phase 4 - The Mature

At this stage the tree begins to grow and flower, reproduce fruit and disperse seeds back into the environment.
(Tree, 2000)

In the context, once enough people begin to segregate from a particular locality/ward it would lead to the creation of a model ward. The NGO and community members will then be able to approach the municipality with a proposal on how to achieve a model ward, begin a collaboration and gain infrastructure to replicate this achievement in different localities.

Figure 27 - The Sapling Phase

At the end of all these phases ideally each and every citizen of Dehradun has gained ample knowledge and are practicing waste segregation in their homes with proper collection services provided by the government.

7.2 Community level Intervention

In the previous section we understood that there is a need to plant a seed in a person's mind with phase 1 (The Seed) because it is the first step on the journey to a well functioning waste segregation system. Phase 1 has a very short time span because in this phase the NGO will go to the community and give them a presentation.

But phase 2 is important because in this phase information needs to be nurtured in both the community members mind and the NGO's mind. For the people, information of the presentation and motivation to adopt a new behaviour needs to be nurtured. Also, I realise that the minds of the members of the NGO needs to be nurtured to understand behavioural psychology.

Hence, in this chapter the presentation structure (Appendix D). will be showcased along with the pilot program that nurtures the mind of both the community members and the NGO (Appendix È).

Find the presentation here

Figure 26 - Presentation representation

The Seed - Education & Awareness

For a community member to begin segregating, they need to have a proper understanding of waste and waste segregation. In my context this information will be provided to the community members through the NGO. The information transfer process needs to be optimal i.e. people should be clearly able to understand and remember all the information provided.

For this purpose I decided to design a presentation with the following attributes i.e. it needs to be insightful, engaging and fun (reasons mentioned in Chapter 6). After iteration the following presentation experience was envisioned.

The Presentation Experience

The first step to designing a good presentation is to have a proper structure. Hence, I designed a structure using specific keywords that would address different topics necessary to impart whole-some knowledge to motivate the community to begin waste segregation in their homes.

The following are the keywords in sequence along with the reasoning and explanation of the content in the designed presentation (Appendix D).

(1) Credibility

The first thing that needs to be done in the presentation is that the NGO needs to establish 'Credibility'. People need to know that Waste Warriors is a trustworthy source of information, before listening to their message.

In the presentation the NGO does this by showcasing their years of experience, their current projects and collaborations with municipalities and private companies such as Coca-Cola.

Figure 26 - Waste Warrior collecting dry waste from a neighbourhood

(2) Understanding the Problem

The NGO needs to make the solid waste management problem very clear to the community members with respect to their own context. Community members need to understand the current state of affairs with regard to waste in their surroundings, landfills and its effect on their health and environment.

In the presentation this has been done through an animated video that encapsulates the journey of waste from a person's home to being dumped in landfills where ragpickers scavenge for recyclable material. It also shows how waste comes back into the lives of the people through polluted air and water.

Along with the video, some real life photos have also been shown so as to draw a parallel between the video and real life context.

(3) Solution

Understanding the problem is then followed by showing people the solution to the solid waste management problem in the context hence, creating a sense of hope that the problem can be averted.

In the presentation a global solution is proposed that everyone is familiar with i.e. the concept of 3Rs. It explains how adopting the 3Rs reduces – (1) waste going into landfills and water streams (2) burning waste in open air (3) Air and water pollution and hence is good for the human health and environment.

Figure 27 - Animated video of improper waste disposal

Figure 28 - Introducing the 3Rs

(4) Benefits

Better human health and a clean environment are intangible in nature hence, people do not see the long term benefit of the 3Rs. But making this benefit more tangible by showing the community members products made out of the 3Rs, allows them to imagine using these products in their own lives and how it is directly benefiting them.

In the presentation the community members are shown products that can be made by reusing waste e.g. planters, seating, accessories etc. and recycling waste e.g. bricks, pavers, tiles, t-shirts etc.

During the presentation items such as pavers, coasters, bricks etc. are shown physically to the people which makes the presentation more inter-active because they can see, touch and feel the new products hence, creating an impression in a person's mind.

Figure 29 - Street pavers made from recycled plastic

(5) The 'You' factor

The NGO needs to clearly mention that to solve the solid waste management problem and receive the benefits the people have a major role to play i.e. they need to simply segregate their waste.

(6) Trust

In the presentation the NGO proposes waste segregation as an easy task to perform but people may get discouraged realising that they need to change their waste disposal habit, thinking that it would be a hard task.

To clear this misconception a well-known trust-worthy citizen that is already segregating in the community will be asked to answer a few questions with regard to their experience with waste segregation. Questions such as – How do you segregate your waste? Is it a hard task? Would you like to say something to your community with regard to waste segregation? Hence, making the people feel at ease about the task because someone from their own community has experienced it and validating its simplicity.

If there is no waste segregating citizen in the community, then the NGO can show the video that they already have which consists of an elderly woman from the city of Dehradun who talks about her experience of segregating waste at home.

(7) Action

Once the community members understand the effects, benefits and their role in the waste segregation process they are well prepared to receive information about the specifics of waste segregation and the actions they would need to perform.

The presentation using visual graphics, contains details of the types of waste, proper waste disposal information (segregation, composting) and instructions about the measures that need to be taken at home to begin waste segregation.

This part of the presentation also has a 3 bin (organic, recyclable, non-recyclable) interactive activity where people are asked to point out to which bin particular types of waste (drawn on cards) will be disposed of. This would again make the presentation engaging and interactive and would make them think and discuss amongst themselves, creating a unified community discussion on the topic. It would simultaneously test the knowledge gained by the people allowing the NGO to figure out if more explanation was needed.

(8) Future Vision

The presentation would draw to a close by providing the community members with a vision for the future. This is done through a guided fantasy (a gentle but powerful storytelling technique that focuses the imagination in proactive and positive ways) which would allow an individual to experience a future of a clean and healthy environment due to the effort they made to segregate their waste. The guided fantasy creates a positive experience and a futuristic long-term goal that would ideally motivate the community members to achieve it.

After the guided fantasy the community members will be asked to write down a pledge on a postcard to adopt waste segregation into their lives and they take it home to act as a visual reminder of the presentation, its content and the pledge they made. The postcard would contain pictures of the 'benefits' of waste segregation on the front and the types of waste on the back. The guided fantasy script and postcard can be found in Appendix E.

Figure 30 - 3 types of waste graphic visual

Evaluation

To see the presentation in action the NGO organised a presentation session in the Nanaurkheda locality. We arrived there early to set-up the projector, bins, recycled products etc. Due to space constraints we conducted the presentation outdoors where we innovatively hung a white piece of cloth on the entrance gate of a community member's home and projected the presentation on it. 12 people from the community took time out on a Sunday and came to the presentation. The presentation was carried out as planned and went off without a hitch.

I evaluated the presentation on the basis of the positive attributes listed in the previous chapter i.e. insightful, engaging and fun. Due to time and contextual constraints the evaluation was done on the basis of observation. The reaction of the people to different parts of the presentation were noted hence producing qualitative data to the presentation experience.

Insightful

The presentation was very graphic. It used animated videos, visuals, activities, discussions and concise information to transfer the message of waste segregation.

There was also a 3 bin game, in which people had to use the knowledge learnt in the presentation to identify the correct bin for a particular type of trash. From the responses of the audience it was observed that they got most of the answers correct. The ones that they did not were very tricky to understand which bin it would go into – e.g. household dust, light bulbs, medicine packets etc. This proved that the people had received and understood the information provided properly.

The people were also shown items that were made out of recycled material – colourful coasters, bricks, paver blocks and a bag made out of plastic chips packets. They looked at the items with fascination. They had never seen these kinds of items before. From their expression it showed that they had received a new piece of information that they were not aware of.

Figure 31 - Presentation at Nanaurkheda locality.

In the case of the guided fantasy, there was a calm enjoyment. People had their eyes closed and were intently listening to the presenter. As he read the story of the person walking in a meadow and listening to the sound of a stream and birds chirping, I could see the smiles grow on people's faces. They were totally engaged in the story, with their imagination painting a future of a clean Dehradun. The presenter and I felt that this part really gripped the audience.

Engaging

The presentation had a lot of points where the community members had to interact with the presenter and each other e.g. questions were asked about their current method of waste disposal at home, their knowledge about the 3Rs, community members sharing their experiences with each other and the 3 bin game.

Initially the people were a little shy to talk. Only a few people were answering questions in a quiet tone. But, after sometime when an elderly known lady from the audience began to talk about her experience with waste segregation all the people began to intently listen to her views. Also, the 3 bin game loosened a lot of people's inhibitions. All were answering and discussing the answers to the game amongst themselves.

Fun

The main elements of fun in the presentation was the bin game and the guided fantasy in the end. As mentioned above the bin game got a lot of people excited and engaged with a lot of chatter amongst the people, curiosity, wonder and a smile on their faces.

The Sapling - Motivation

After showcasing the presentation and providing the community members with information on all relevant aspects related to waste and waste segregation people need to be constantly motivated/nudged to change their attitude and behaviour to adopt the new habit of waste segregation.

People's attitudes and behaviours are connected to their psychology and we need to use psychology to change them. In Chapter 6 I identified 4 key motivational behavioural psychology drivers (1) Extrinsic incentives; (2) Social Incentives; (3) Immediate rewards; (4) Timely reminders, that can be used in the context.

NGO members need to understand these psychological methods so that they will be able to apply and design for motivation in the waste segregation project and even other human-centred projects.

But, the NGO needs guidance in learning and applying these psychological drivers. Hence, I designed a pilot program that would encompass all of them so that the NGO gets to experience them first hand thereby applying the Gestalt method of 'learning by doing' for teaching the NGO.

LET'S PUNCH-IN

A Pilot Program that uses behavioural psychology to encourage people to segregate.

... waste is of 3 types, dry, wet, non-biodegrable ...

What environment related problems you have in your locality ?

Oh!! our streets are filled with plastic waste

We could do a clean-up drive !!

IDENTIFY
Identify a street with 20 houses where you want to spread the message of waste segregation

INTERVIEW
Interview to 4 - 5 residents from different homes about their practical environmental problems

BRAINSTORM
"How can we solve this environmental problem with the resources we have?"

PRESENTATION DAY
Explain waste segregation to the residents living in those 20 houses

Extrinsic Incentives
are physical or emotional rewards that motivates a person to do an activity because they see a benefit for themselves

Reminders
People tend to forget to do things that are not part of their habits. There is a need for sufficient cues to remind them.

We are planning to do a Clean-up drive. We need your help!!

THE ANNOUNCEMENT
"We are planning to do a Clean-Up drive in the street and we need your help. We need to collect atleast 30 dry waste bags in the coming month. We will come every 15 days for the pick up i.e. twice in the month. Please segregate your waste and we can clean the street together."

PICK-UP 1 & 2

KNOCK KNOCK

Hello Sir, Can we have your dry waste?

Here you go son.

We did not segregate

Thank you my son

Hno. 5

Immediate Rewards
People struggle with pursuing long term goals. Providing short term immediate rewards for current action can motivate people to persist.

| State | House Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| State | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

The Clean-Up Drive - 30 bags

| State | House Number | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| State | | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |

PUNCH-IN

Punch

You are doing a really good job Yogesh ji. This bag is soo full

30 bags later.....

Sir, we will do a street clean-up after we collect 30 bags

Oh!! Aman ji segregated also. Hmm. I'll do it next time

Hno. 2

H.no. 1

Punch

Ok!! Aman ji Thank you!!

Social Incentives
can motivate new behaviour because people are easily influenced by others opinion and actions

CLEAN-UP DAY

(1) Identify
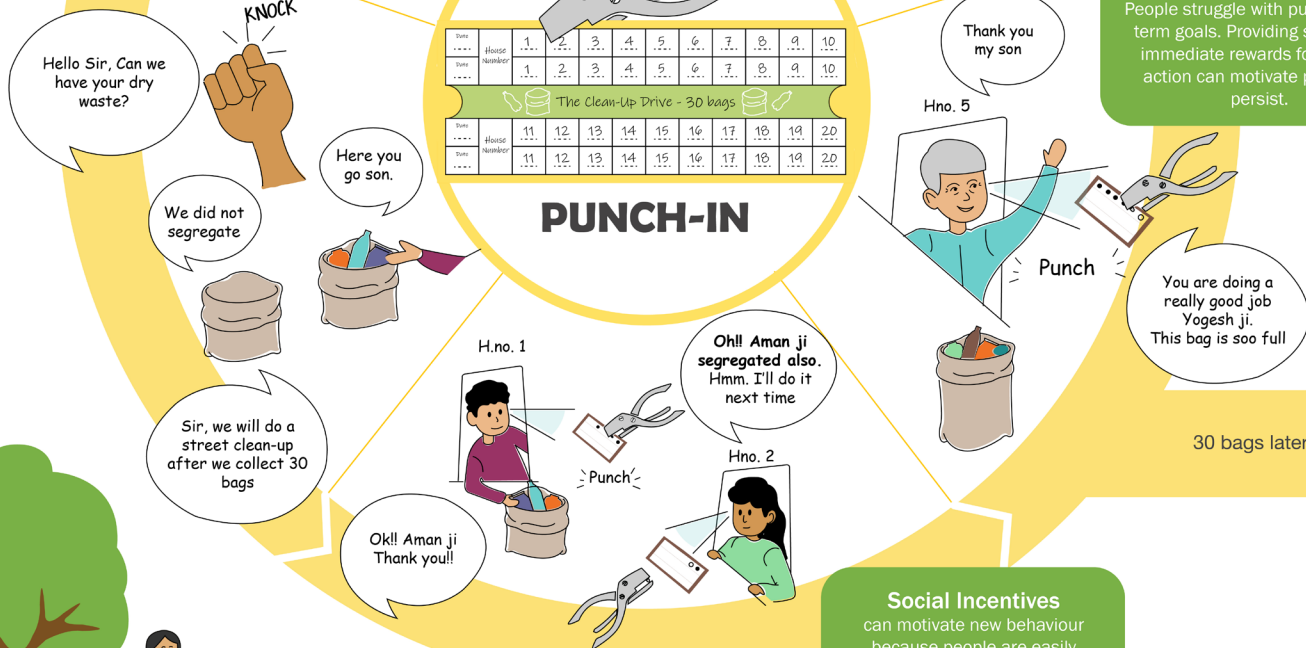
The Pilot Program - Punch - In

The Pilot program is a small experiment that will be carried out by the NGO in a locality. Through this experiment the NGO will be able to practically use and see the psychological drivers in action, hence giving them a better learning experience.

Punch-In starts off with the NGO identifying about 20 homes along one street in a small locality where everyone in the street is familiar with their neighbours.

This is followed by an interview round where the NGO identifies about 4-5 houses in the locality and asks them about their locality's physical environmental problems e.g. a dirty street.

The NGO lists down these environmental problems and then begins a brainstorming session amongst themselves about what solutions they could propose to these problems taking into consideration their experience and resources. The brainstorm concludes with the NGO identifying a solution to one of the problems. For example for a dirty street the NGO can organise a street clean-up drive.

The NGO in collaboration with the community head organises a community presentation with at least one member from the 20 homes. After the presentation is complete, the NGO as usual provides them with a big plastic bag to keep their dry waste and notes down their WhatsApp numbers so that they can be added to a WhatsApp group.
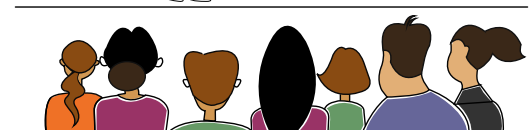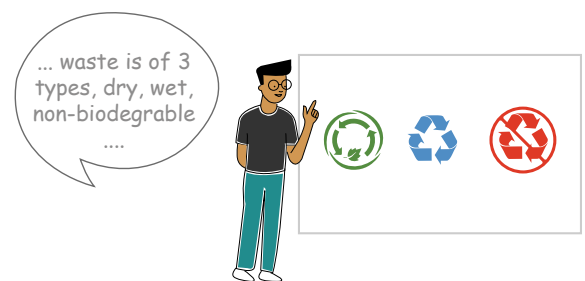

(2) Interview

(3) Brainstorm

(4) Presentation Day

Figure 32 - Phases of the Punch-In pilot program

They then make an announcement to the people in the community– "We are planning to do a clean-up drive in your street and we need your help. We need to collect at least 30 dry waste bags in the coming month. We will come every 15 days for the pick-up i.e. twice in the month. Please segregate your waste and we can clean your streets together."

Extrinsic Incentive

This is an extrinsic incentive. In this clean-up drive people begin to see benefits for themselves i.e. a clean street which motivates them to segregate their waste.

Figure 33 - The Announcement

When the NGO arrives to pick-up the dry waste 15 days later, they knock on each person's door asking for their dry waste. The NGO is carrying a ticket that consists of 40 aligned boxes and 20 house numbers written across it and a punch machine. This ticket is used to note the house numbers that have provided the NGO with their dry waste bag. When the person provides their bag the NGO punches their house number in front of the person hence confirming that the person has segregated their waste.
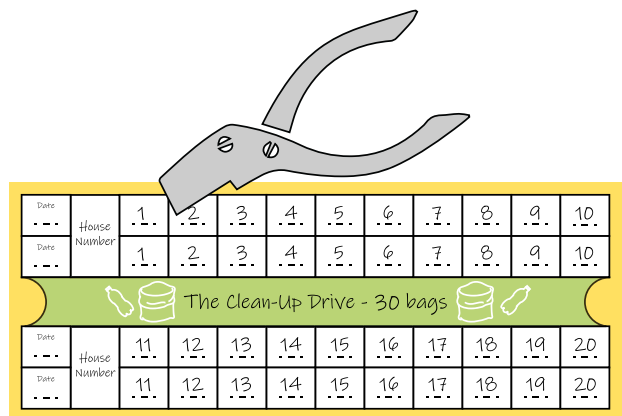
Figure 34 - The Punch-In ticket

In this way the NGO will go to different houses. Some will provide them with their dry waste – hence they are punched-in on the sheet of paper while others may not have segregated, they are reminded about the extrinsic incentive – a clean street. When people begin to see in the punched paper that their neighbours have segregated their waste it creates –
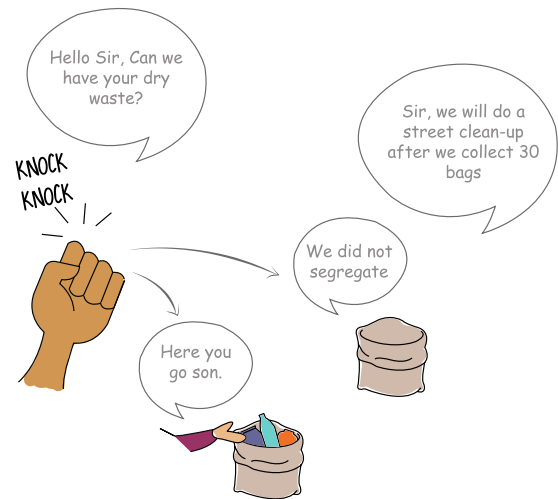

Figure 35 - Conversation between Waste Warriors and community members at pick-up

Social Incentive

Some people segregate because they want to be acknowledged, respected and project a positive self-image to others. While others get influenced by their neighbours' response towards segregation and want to be part of that group. In this particular setting everyone is able to see who has segregated their waste through the paper hence, making their behaviour observable to others which also creates social pressure. In this context all these factors influence community members waste segregation behaviour.
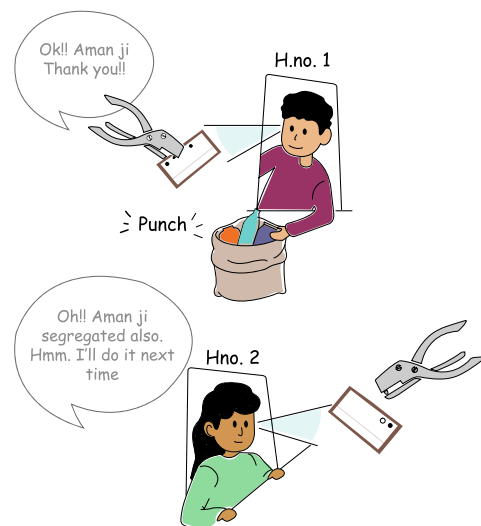

Figure 36 - Reaction of one neighbour to the other segregating their waste

Immediate Rewards

Waste segregation in people's homes is a long term goal. The long term goal is beneficial to everyone living in the community. But since reaching that goal will take time there is a need for continual motivation through rewards. The punching that is done on the piece of paper in front of the people acts like an immediate reward. The punching on paper and a compliment gives a positive feeling to a person about the work they have done. This is an intrinsic incentive which converts into motivation to persist in doing segregation.
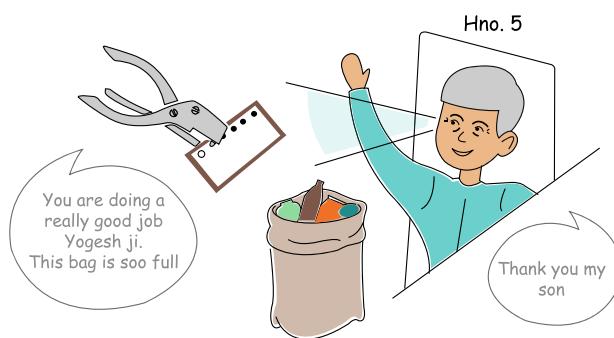

Figure 37 - Motivating through the Punch-In ticket

Timely Reminders

In this context the reminders that have been designed have the main goal of reminding people to use the waste bag provided by the NGO by repeatedly showing people what is expected from them in different ways.
The following are a few ideas.

A short video of a husband and wife in their daily lives easily using the bag at home. This would show the participation of both in the process, the placement of the bag, the easy use of the bag and activities that need to be conducted before using the bag (cleaning, crushing etc.)
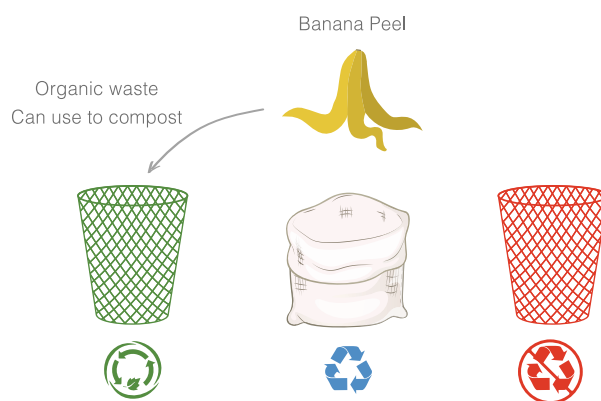

Figure 38 - The 3 bin Video

A 3 bin video, where the video shows 3 bins (organic, non-recyclable or dry waste bag) and a few items that engages the viewer in answering which items goes into which bin

A fun gif, where a stick man is walking with a plastic bottle in his hand and 3 bins coming closer to him and flipping the bottle into the bag.

An animated video about how the dry waste from their bag is taken to a segregation and recycling centre to make new products that come back into their home.
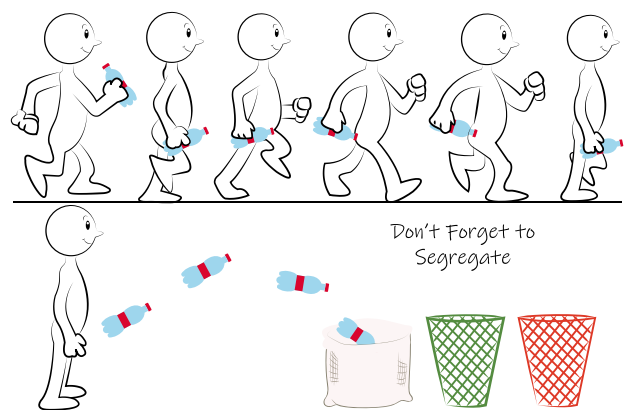

Don't Forget to Segregate

Figure 39 - Flip the bottle into the correct bin

After the 30 days, if the Punch-In paper has 30 punches on it – the NGO conducts the clean-up drive with the people, else the clean-up drive is conducted after 30 punches have been received.

The NGO can repeat the same experiment with the same or other localities using different extrinsic incentives. Depending on the experiment results the NGO can reiterate the Pilot Program. At the end of it the NGO should receives deep insights on the psychological drivers and can apply it to other activities and projects.

7.3 The Designed Toolkit

The design goal of this project was to guide an NGO in achieving waste segregation in Indian households. This guidance manifested itself as a long-term strategy, presentation and a behavioural psychology led pilot program.

The main idea behind the toolkit is that all the relevant information gathered can be presented to the NGO in a simplified manner, so that they can begin to learn, understand and use it in their organisation.

Since the final design interventions are a conglomeration of many ideas, the final designed toolkit is also made up of different element with each element communicating different information. The final toolkit consists of a guide book on encouraging waste segregation, a waste segregation presentation and the pilot program poster.
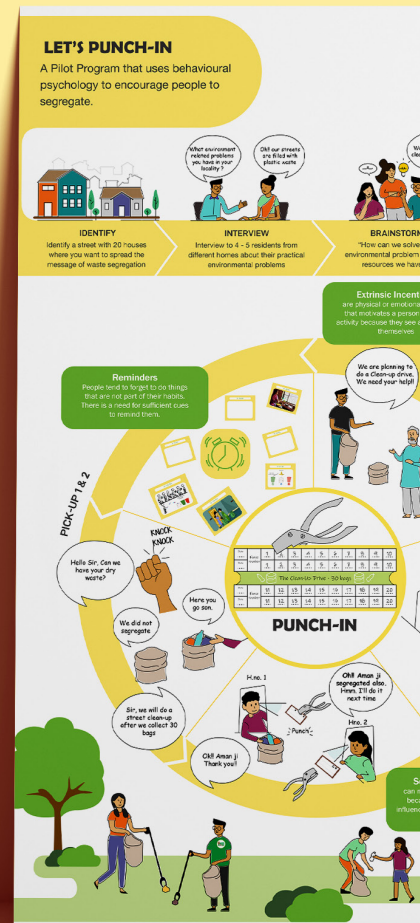
Figure 40 - Final Toolset

The Guide Book

The guide book consists of clear and concise summary of the Design Interventions that have been proposed for this project at organisational and community level.

It has been designed in such a way that it can used by any NGO who wants to encourage waste segregation in Indian households.

The book has been divided into the following parts.

Mission and Vision

Mission
To guide an NGO in encouraging waste segregation in Indian households

Vision
To achieve waste segregation in every household in India

01 The Growing Change

A proposed long-term strategy for an NGO to bring waste segregation to every Indian home.

This section draws a paralell between the growing phases of a tree and activities the NGO needs to be carrying out in the field.

02 The Laws of Attraction

Attracting the attention of people towards waste segregation through a presentation

This consists of the overview of all the topics and elements that needs to be in a waste segregation presentation.

03 The Art of Motivation

Psychological methods to motivate people to segregate their waste.

The psychological drivers are explained in this section.

04 A Pilot Program

A pilot program that uses behavioural psychology to motivate people to segregate their waste.

A detailed pilot program to encourage waste segregation in households and help an NGO learn the psychological methods by the 'learning by doing' method.

Reminders

At the end of the guidebook there are blank reminder cards for the NGO to jot down their own timely reminder ideas.

A Guide to
Growing Change

**Find the
guide here**

Figure 41 - Guide book

CONTENT

MISSION

To guide an NGO on encouraging waste segregation in Indian households

VISION

To achieve waste segregation in every household in India

THE GROWING CHANGE

A proposed long-term strategy for an NGO to bring waste segregation to every Indian home

01

A GROWING TREE

Metaphorically we can look at this strategy as a 'growing tree' towards waste segregation. It begins with a seed, which is nurtured into a sprout, becomes an energetic sapling and finally a proper mature tree.

The Seed

The Sprout

The Sapling

The Mature

THE SEED

In the context of a community, an NGO needs to first make direct contact with the members of the community.

The NGO should impart clear and concise knowledge about the important aspects of waste and waste segregation.

The outcome of this phase is that it should plant a seed in a citizen's mind by being insightful and impactful.

The first stage for any tree to grow is that the seed needs to make contact with the ground.

THE SPROUT

In the same way the information on waste segregation provided by the NGO needs to be constantly nurtured in the individuals mind.

They is a need for the right set-up that constantly motivates people to adopt the new habit of waste segregation.

The seed then needs favourable conditions to sprout. It needs the right environmental conditions and perfect nutrients to break through the seed coating, expand and come to life.

THE SAPLING

In the same way an NGO needs to start transplanting knowledge into active people in the community. An NGO needs to equip these citizens with knowledge on how to spread the message of waste segregation.

Hence creating a newly formed self-sustaining system that allows active segregating citizens in the community to carry the message of segregation to others.

The sapling is a juvenile tree which is ready for transplanting. It grows rapidly and has lots of energy. But, it still needs care, to keep it on track.

THE MATURE

In the context, once enough people begin to segregate from a particular locality/ward it would lead to the creation of a model ward.

The NGO and community members will then be able to approach the municipality with a proposal on how to achieve a model ward. The municipality and the NGO can then begin a collaboration to replicate this achievement in different localities.

At this stage the tree begins to grow and flower, reproduce fruit and disperse seeds back into the environment.

THE LAWS OF ATTRACTION

Attracting people's attention to waste segregation through a presentation.
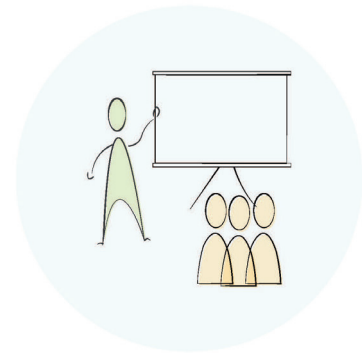
02

1

CREDIBILITY

When giving a presentation the first thing an NGO needs to establish is Credibility.

People need to know that you are a trustworthy source of information.

Example :
An NGO should showcase their knowledge, skills, experience, collaborations and projects.

2

UNDERSTANDING THE PROBLEM

An NGO needs to make the solid waste management problem very clear to the community members with respect to their own context.

People need to understand the current state of affairs with regard to waste in their surroundings, landfills and its effects on people's health and their environment.

Example
This can be done through a video that encapsulates the journey of waste from a person's home to being dumped in landfills where rag pickers are scavenging for recyclable material.

It could also show how waste comes back into the lives of people through polluted air and water.

Along with the video, some real life photos could also shown, to draw a parallel between the video and real life context.

3

THE SOLUTION

Understanding the problem is then followed by showing people the solution to the solid waste management problem in the context hence, creating a sense of hope that the problem can be averted.

Example
After understanding the problem a global solution needs to be proposed that everyone is familiar with e.g. the 3R's and how it reduces the negative effects.

THE BENEFITS

Tangible benefits people directly get from the 3R's should also be highlighted e.g. planters, accessories, bricks, pavers, tiles etc. which allows them to imagine, using these products in their lives.

4

Example
Physically interacting, seeing, touching and feeling a product is very a powerful tool and creates an impression in a person's mind

5

THE 'YOU' FACTOR

An NGO clearly needs to mention that to solve the problems presented and to receive the benefits people have a major role to play i.e. they need to simply segregate their waste.

TRUST

An NGO proposing waste segregation as a simple act to a community may not be trusted, because the community members think it will be hard to change a habit. Hence, there is a need to build trust in the NGO's message.

6

Example
The misconception of waste segregation being a hard task can be changed by asking a member from their own community to share their experience.

7

ACTION

Once the community members understand the effects, benefits and their role in the waste segregation process, they are well prepped to receive detailed information of waste segregation and the actions they need to perform.

The information should contain types of waste, measures that need to be taken at home and correct disposal methods.

Example:
The graphics to understand the information needs to be very visual and concise

For optimum information transfer an interactive and engaging game can be introduced, where people need to discuss and guess into which bin a particular waste should be thrown. This would serve as a good reminder.

FUTURE VISION

In the end providing community members with a vision for the future where their city is clean and healthy could act as a motivator for the people to segregate their waste.

8

Example :
An NGO could help people to experience the future through a guided fantasy (a gentle but powerful story telling technique that focuses the imagination in a proactive and positive way.

Also, the NGO can ask community members to write down a pledge on a e.g. postcard to segregate waste which they keep in their house and acts as a constant reminder.

THE ART OF MOTIVATION

Psychological methods to motivate people to segregate their waste.

03

EXTRINSIC INCENTIVES

Extrinsic incentives are physical (money, trophies etc.) or emotional (recognition, praise etc.) rewards that motivate an individual to act.

Extrinsic incentive can be used to motivate people to do useful actions that they would normally not be interested in e.g. waste segregation because they see benefit in it for themselves. The benefit may not be an outcome of the activity itself.

Social incentives can motivate new behaviour based on the notion that humans are social creatures with a strong need to belong and are influenced by other people's opinions and actions.

People are more willing to change their behaviour to be socially accepted, respected, signal a positive image to others as well as receive affection and praise.

This pro-social behaviour can increases further when their behaviour is observable to others.

SOCIAL INCENTIVES

IMMEDIATE REWARDS

There is a need for continual motivation to pursue activities to reach a long-term goal (e.g. exercising for improved health). Although there is a high value in the delayed outcome, people tend to struggle to pursue the long term goal.

But immediate rewards (physical or emotional rewards) boosts persistence by increasing positive feelings or experience towards the activities, which provides an intrinsic reward and increases motivation.

Everyone forgets to do something now and then especially when it is not part of your daily routine.But reminders can be a powerful agent to overcome forgetfulness.

Using reminders or cues either external (environmental cues) or internal (thoughts) can change behaviour which there is sufficient repetition. Then the cue occurs the action is remembered automatically.

TIMELY REMINDERS

PUNCH-IN

A pilot program that uses behavioural psychology to motivate people to segregate their waste.

04

Figure 42 Guidebook layout

Panel 1 (top-left): The Clean-Up Drive - 30 bags

The Punch-In ticket

Panel 1:
IDENTIFY
Identify a street with 20 houses where you want to spread the message of waste segregation.

Panel 2:
INTERVIEW
Interview 4-5 residents from different homes about their practical environmental problems.

Panel 3:
BRAINSTORM
"How can we solve this environmental problem with the resources we have?"

Panel 4:
PRESENTATION DAY
Explain waste segregation to the residents living in those 20 houses

Panel 5:
THE ANNOUNCEMENT
"We are planning to do a Clean-Up drive in the street and we need your help. We need to collect atleast 30 dry waste bags in the coming month. We will come every 15 days for the pick up i.e. twice in the month. Please segregate your waste and we can clean the street together."

This is an extrinsic incentive. In this clean-up drive people begin to see benefits for themselves i.e. a clean street which motivates them to segregate their waste.

Panel 6:
TIMELY REMINDERS
Timely reminders are a very basic but an important part when it comes to motivation. In this context the reminders that need to be design should have the main goal of reminding people repeatedly to throw their dry waste into a waste bag in different innovative ways.

EXAMPLE 1
THE 3 BIN VIDEO
Banana Peel
Organic waste
Can use to compost
A 3 bin video, where the video shows 3 bins (organic, non-recyclable or dry waste bag) and a few items that engages the viewer in answering which items goes into which bin

EXAMPLE 2
THE WALKING MAN
Don't Forget to Segregate
A fun gif, where a stick man is walking with a plastic bottle in his hand and 3 bins coming closer to him and flipping the bottle into the bag.

EXAMPLE 3
THE JOURNEY OF SEGREGATE WASTE
An animated video about how the dry waste from their bag is taken to a segregation and recycling centre to make new products that come back into their home.

EXAMPLE 4
SEGREGATION AT HOME
A short video of a husband and wife in their daily lives easily using the bag at home. This would show the participation of both in the process, the placement of their dry waste bag, the easy use of the bag and activities that need to be conducted before using the bag (cleaning, crushing etc.)

Figure 42 Guidebook layout

PICK-UP DAY 1

Knock on people's doors and ask them for their dry waste. Some may have done it others may not have. Those who have not segregated provide them with a reminders about the benefit (clean-up) they will receive if they segregate their waste.

WHAT HAVE THE OTHERS DONE?

Those who have segregated get a punch on the ticket on their house number infront of them.

Those who do not segregate do not get a punch. But, they should be able to see the other people in the locality who have segregated their waste through the ticket.

This is a Social Incentive. Through this ticket, the everyone is able to see who has segregated and their behaviour is observable to others. Some people will segregate because they want to create a positive self image while others get influenced by their neighbours responses and want to be part of the group.

REWARDING WORK

When picking up the waste bag from peoples homes, compliment people on their hard work and punch the ticket infront of their eyes.

This is an immediate reward that acts as a continous motivator. Seeing that a person received a reward (emotional or physical) creates positive feelings about the work they have done. This is an intrinsic reward which acts like an incentive to persist in segregating.

PICK-UP 2

The same process is carried out the second time on the second pick up.

30 DAYS LATER

If 30 dry bags have been picked up over 2 pick-up's then a clean-up drive date will be set. Else, it will be conducted when 30 bags have been collected.
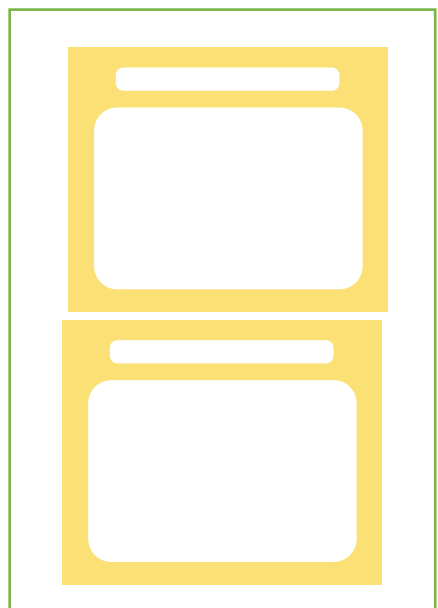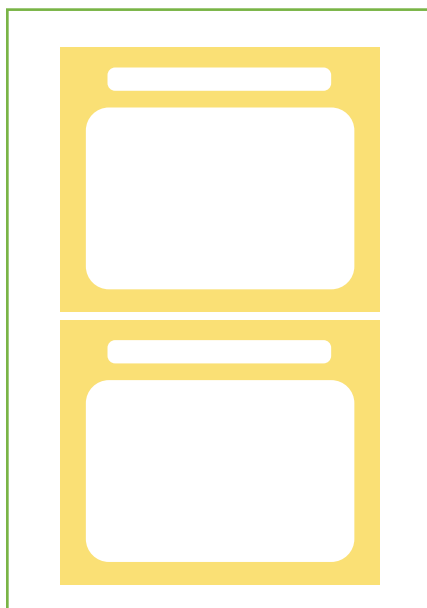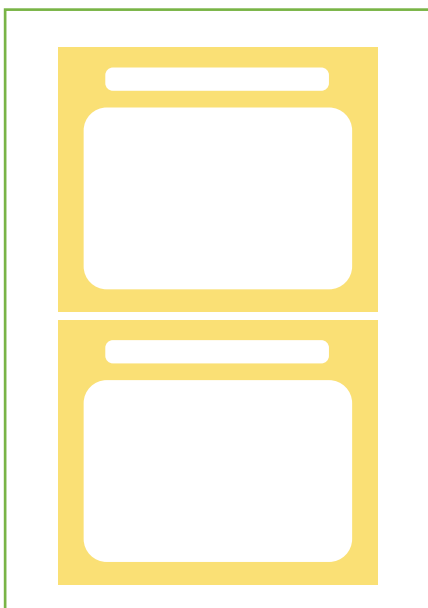
Figure 42 Guidebook layout

The Presentation

A presentation on waste segregation with the dialogues that need to be said by the presenter in the notes section and explanation of the slides (credibility, problem etc….) in the comments section.

This set-up allows a new presenter to easily learn the presentation experience, the dialogues and the reasoning behind each slide, since all of them are just a click away.

Figure 26 - Presentation representation

The Punch-In Poster

An attractive poster for the NGO to hang in their office so that the pilot program can be easily discussed amongst a team, attracts the interest of a passer-by and educates them about the drivers. It will also act as a visual reminder for the NGO to use the drivers in their current and future waste segregation projects (Appendix F).
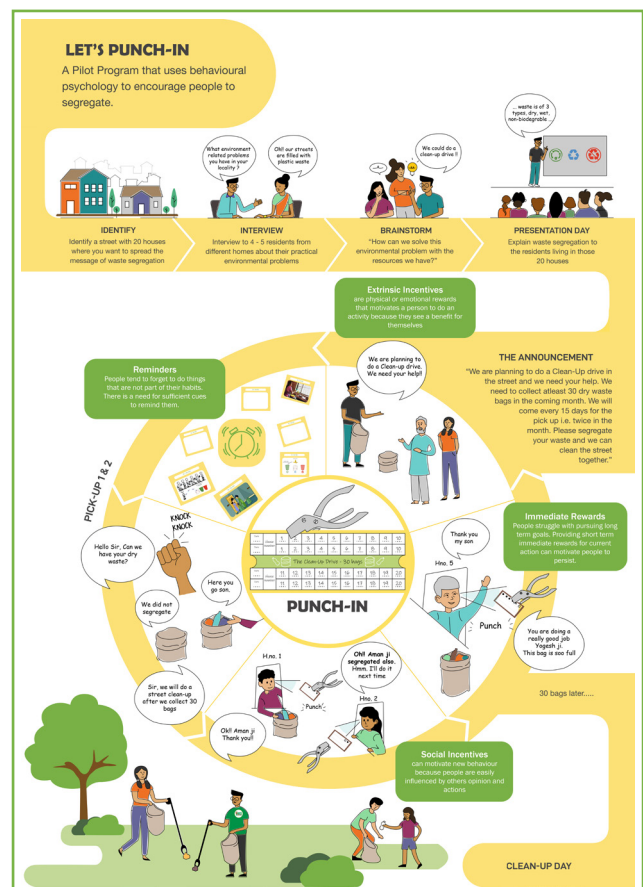
Figure 43 - Punch In Pilot Poster

Conclusions

The last chapter of this report concludes with the overall outcomes along with the limitation faced during the project. This is followed by how the project can be taken further and finishes with a personal reflection of the journey

08

8.1 Conclusions

The amount of solid waste generated by India has increased exponentially due to the growing population, urbanisation etc. This has led to a large amount of waste generation which is thrown into landfills or burnt. To curb this problem Waste segregation is currently being promoted in many areas in India. The municipalities and NGO's are spreading awareness on waste segregation and how to do it to a large number or neighbourhoods, But, there has been no significant change when it comes to people's waste disposal methods.

To understand why there has not been change, I did on-field research, conducting 2 context mapping workshops with families and inter-views with waste segregating citizens and NGO members. From this I understood that people believe waste segregation is vital for a healthy environment, but even though they understood this they were not taking any action. The research also helped me uncover the main barriers standing in the way of waste segregation were (1) Education and awareness; (2) Current Attitude and Behaviour; (3) Sense of responsibility; (4) Infrastructure; (5) Strategy.

The research gave me an overall view of the Waste Segregation system in India which I found was very complex and multi-dimensional. It consisted of multiple stakeholders who each had their own duties and were connected to others in the system in one way or another.

Since, it is a complex problem I decided to use the Systemic Design Approach that would help me think about the system as a whole and then zoom in to find leverage points for design interventions that could affect the system steering it into the direction of waste segregation.

For my project I chose the context of waste segregation at household level and the stake-holders were the NGO, community members, and the municipality. Through the systems thinking process, I realised that the main stakeholders at the core of the waste segregation problem were people from the community followed by the NGO and the government. The barriers pertaining to the community members as mentioned previously were education and awareness, current attitude and behaviour and sense of responsibility. While for the NGO it was strategy and for the government it was infrastructure.

Firstly, people needed to overcome their barriers but, they needed support from the NGO because the duty of the NGO is to spread awareness and encourage waste segregation. But, the NGO had a barrier of their own i.e. their strategy.

The NGO was the middle-man that had the capability of influencing both stakeholders to bring about systemic change in the waste segregation system. But, they needed a long term strategy that could encapsulate all the identified stakeholders and their barriers.

This led to the designing of a long-term strategy for the NGO that would be carried out in 4 phases - (1) The Seed; (2) The Sprout; (3) The Sapling and (4) The Mature. The first 3 phases covered the barriers faced by the community members while the last is faced by the municipality.

The first 2 phases were those where the NGO had to directly interact with the community members. For Phase 1 - Education and Awareness, a presentation was designed that was clear and concise information about waste segregation and encompassed attributes such as insightful, engaging and fun. For Phase 2, people needed to be motivated to adopt the new habit of waste segregation. Hence, a pilot program was designed that consisted of psychological drivers (extrinsic, social, immediate incentives and reminders) to enable motivation in the community members. The Pilot program also resulted in a 'learning by doing' experience for the NGO where they gained knowledge on behavioural psychology and could use it in their other human centered projects.

All the research led to the design of a final toolkit that was a collection of different tools all having the goal of encouraging waste segregation in an Indian households. The tools were -
1. A guide proposing a long term strategy for NGO's, how to make a presentation imapctful and memorableengross attracting people's attention to presentation psychological drivers
2. A poster of the Pilot Program (Punch-In)
3. A powerpoint presentation on waste segregation

8.2 Recommendations

My project was a research project on the complex topic of achieving waste segregation at the household level. Even at that level there are many stakeholders, scenarios and interactions that occur in the context that have not been explored in this research. Hence, there is a vast scope for more research and designing to make a sustainable waste segregating system.

In my project, I have proposed design interventions at organisational level and community level for different barriers discovered during my research. But there are certain recommendations and future actions that need to be carried out.

Firstly, the pilot program needs to be tested in the field and evaluated over a period of time. The evaluation should include the reactions (observation and interview) of community members to the program and their behaviour and the learning curve of the NGO members with respect to the psychological drivers. For this, an evaluation system needs to be designed for both.

Secondly, the long term strategy needs to be discussed with the NGO and detailed further taking into consideration their resources and experience. It should also be adaptable to any NGO working on waste segregation in India.

Thirdly, the guidebook needs to be examined by different NGOs and their thoughts and feedback should dictate an iteration. Further research and information that pertains to the topic of the guide 'encouraging waste segregation' could also be tested and added to make it a full-fledged guide.

Fourthly, the presentation needs to be further tested and fine tuned. It should be adaptable depending on - number of people attending, type of locality and people, physical constraints etc.

Lastly, a website can be created that can host the tool collection so that many NGO's could have access to the tool for their work.

8.3 Limitations

The research trip to India was a fruitful one as it showed me the current on-field situation with respect to SWM and waste segregation in India. But, there were a few limitation I faced when it came to my research there.

To understand waste segregation in the context I got the opportunity to interview segregating families and NGO members, but I wasn't able to interview non-segregating families. This was because did not have many close contacts with those who didnt segregate and people were not open to talk about their non-segregating habit.

In the context mapping session with parents there were time and language constraints. They were in a hurry to get back to their work and my hindi was not well polished hence, I was not able to do in-depth interviews to gain more insight on waste segregation in their communities.

During the presentation testing I was not able to interview families afterwards to understand their perspective on each part of the presentation, again due to time constraints. Hence, I was only able to do an evaluation through observation.

I was not able to test and evaluate the pilot program, the content of the manual and the long term strategy due to limited time. Also, seeing change in attitude and behaviour through the above elements will take alot time to manifest, observe and evaluate.

Figure 43 - At a clean-up drive

8.4 Personal Reflection

For my graduation I was fortunate to come across an organisation of young, motivated 'Warriors' who wanted to bring about change in their society. As fate would have it, through them I got to learn and get an overview on all aspects of solid waste and solid waste management in India which was a subject that was totally new to me. They provided me with information on SWM that I did not know before and now all my friends ask me 'Which bin will this go into?' which is allowing me to spread the message and information of segregation even here.

One thing that my on-ground research taught me was to 'adapt' when things are not going your way. I made a lot of assumptions about the topic before I left from India and once I reached there and began to research everything went topsy-turvy, which got me nervous. But, I learnt how to think on my feet and adapted whatever information I had gathered into a new project goal. Hence, one key takeaway from this project is, do not make too many assumptions about a situation or a problem, if things do not go your way then adapt, and do onsite research whenever possible, because what is in your mind may not be what is on the field.

It is stressful doing a project by yourself. I tended to get lost in my work and felt like I didn't know what to do. I learnt that whenever this happens, get a new perspective by talking to other people and designers. Discussing your work with others, only makes a design richer.

This experience also made me a more confident in interacting with all people from different backgrounds that I did not know. I learnt how to create casual small talk with them which also helped me brush up my Hindi speaking and reading skills. Another thing I learnt was to keep in mind the resource and ability an organisation has when it comes to designing a product or service for them. If not taken into consideration, your design will not be accepted nor used.

Lastly I was very excited to work on a project that included psychology in design. Designing for behavioural change is a very tricky subject with an uncertain outcome. Your designs may tend to fail and will need to be reiterated a large number of times. But, if and when the design achieves it goal, it can change an unsustainable habit into a sustainable one which would lead to emotional reward for oneself and that goal is worth the wait.

8.5 References

McDaniel, M., & Einstein, G. (2007). Prospective memory: An overview and synthesis of an emerging field. Sage Publications.

(MoEF), M. o. (2015). Municipal solid waste (Management and Handling) rules. New Delhi, India: The Gazette of India.

Agarwal, A., Singhmar, A., Kulshrestha, M., & Mittal, A. (2005). Municipal solid waste recycling and associated markets in Delhi, India. Resources, Consevation and Recycling 44, 73-90.

Ainslie, G. (2001). Breakdown of will. New York: NY: Cambridge University Press.

Amabile, T., Hill, K., Hennessey, B., & Tighe, E. (1994). The Work Preference Inventory: Assessing intrinsic and extrinsic motivational orientations. Journal of Personality and Social Psychology. 66(5), 950-967.

Ariely, D., Bracha, R., & Meier, S. (2009). Doing good or doing well? Image motivation and monetary incentives in behaving prosocially. American Economic Review, 99, 544-55.

Ayres, I., Raseman, S., & Shih , A. (n.d.). Evidence from Two Large Field Experiments that Peer Comparison Feedback Can Reduce Residential Energy Usage . Oracle.

Bank, T. W. (n.d.). Trends in Solid Waste Management . Retrieved from The World Bank: https://datatopics.worldbank.org/what-a-waste/trends_in_solid_waste_management.html

Baumeister, R., & Leary, M. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. Psychological Bulletin, 117:497–529.

Baumeister, R., & Tierney, J. (2011). Willpower: Rediscovering the greatest human strength. New York, Penguin Press.

Benabou, R., & Tirole, J. (2006). Incentives and Prosocial Behavior. American Economic Review 96, 1652-1678.

Berneche, P., Salvadro, S., & Marıa, G. (2001). Solid waste characterization study in the Guadalajara metropolitan zone, Mexico. Waste Manage Res 19, 413-424.

Berridge, K. C. (2001). Reward Learning: Reinforcement, Incentives and Expectation. Psychology of learning and Motivation, Vol 40, 223-78.

Bhada-Tata, P., & Hoornweg, D. (2011). A compilation of global MSW generation rates and composition: projections and policy recommendations. 2nd International Conference on Solid Waste Management in the Developing Countries. Khulna, Bangladesh: Proceedings of the Waste Safe.

Bhide, A., & Shekdar, A. (1998). Solid waste management in Indian urban centres. International Solid Waste Association Times, (1), 26–28.

Board, P. P. (2010). Status report on municipal solid waste in Punjab. Patiala: Punjab Pollution Control Board.

Buss, A. (1983). Social rewards and personality. Journal of Personality and Social Psychology 44, 553-563.

Chandra, Y., & Devi, N. (2009). Studies on municipal solid waste management in Mysore city-A case study. Report and Opinion, 1(3), 15-21.

Chaturvedi, B., & Gidwani, V. (2010). The right to waste: Informal sector recyclers and struggles for social justice in post-reform urban India. India's New Economic Policy: Critical Perspectives Delhi: Routledge.

Chintan. (2007, May). Retrieved from Privatisation of Waste management in Delhi: http://www.chintan-india.org/others/seminar_press_release18-01.pdf

Clapp, J. (2002). The Distancing of Waste: Overconsumption in a Global Economy. Confronting Consumption, Cambridge, MA: MIT Press, 155–177.

Clear, J. (2018). Atomic Habits. Cornerstone Digital.

CoLab. (2016). Follow the Rabbit - A Field buide to ss=ystemic design. Retrieved from ryerson. ca: https://www.ryerson.ca/content/dam/cpipe/documents/How/Follow%20the%20Rabbit_%20A%20Field%20Guide%20to%20System%20Design.pdf

Commission, P. (2014). Report of the Task Force on Waste to Energy (Volume I): In the Context of Integrated Municipal Solid Waste Management. New Delhi, India: Planning Commission.

Corral-Verdugo, V. (2003). Situational and personal determinants of waste control practices in northern Mexico: a study of reuse and recycling behaviors. Resources, Conservation and Recycling, Vol. 39, 1-8.

Custers, R., & Henk , A. (2005). Positive Affect as Implicit Motivator: On the Nonconscious Operation of Behavioral Goals. Journal of Personality and Social Psychology, 89 (2), 129-42.

D. Scott, F. W. (1994). Environmental attitudes and behavior: a Pennsylvania survey. Environment and Behavior Vol. 26, 239-60.

Davis, M., & Cornwell, D. (2012). Introduction to Environmental Engineering. Second Edition - McGraw-Hill.

Dayal, G. (1994). Solid wastes: sources, implications and management. Indian Journal of Environmental Protection, 14 (9), 669–677.

DeCharms, R. (1968). The internal affective determinants of behavior. New York: Academic.

E. Sanders, P. S. (n.d.). Convivial toolbox - How to bring people we serve directly into the design process. Delft: BIS Publishers.

Fawcett, L., & Garton, A. (2005). The effect of peer collaboration on children's problem-solving ability. Br. J. Educ. Psychol. 75, 157–169.

Fiske, A. (1992). The four elementary forms of sociality: Framework for a unified theory of social relations. . Psychological Review, 99, 689-723.

Ghose, M., Dikshit, A., & Sharma, S. (2006). A GIS based transportation model for solid waste disposal – A case study on asansol municipality. Journal of Waste Management, 26 (11), 1287–1293.

Ghosh, S. K. (2016). Swachhaa Bharat Mission (SBM) – A Paradigm Shift in Waste Management and Cleanliness in India . International Conference on Solid Waste Management, 5IconSWM 2015 , 15 – 27 .

Guerrero, L. A. (2013). Solid waste management challenges for cities in developing countries. Waste Management, 33(1), 220–232.

Higgins, E., & Trope, Y. (1990). Activity engagement theory: Implications of multiply identifiable input for intrinsic motivation. Handbook of motivation and cognition: Foundations of social behavior, 229-264.

Himabindu, P. U. (2015). Critical review on biomedical waste and effect of mismanagement. International Journal of Engineering Research & Technology, 4(03), 0181–2278.

Hofmann, W., Friese, M., & Strack, F. (2009). Impulse and self-control from a dual-systems perspective. Perspectives on Psychological Science 4, 162-176.

J. Andreoni, R. P. (2004). Public goods experiments without confidentiality: A glimpse into fund-raising. Journal of Publc Economics, 88(7-8), 1605-1623.

John, J. (2009, December 17). gtm. Retrieved from GreenTechMedia: https://www.greentechmedia.com/articles/read/opower-separates-heat-light-in-home-energy

Jovanovic, D., & Matejevic, M. (2014). Relationship between Rewards and Intrinsic Motivation for Learning – Researches Review. Procedia - Social Behavioural Sciences, 456-460.

Kansal, A. (2002). Solid waste management strategies for India. Indian Journal of Environmental Protection, 22(4):444-448.

Kumar, S. (2009). Assessment of the status of Municipal Solid Waste Management in Metro cities, State capitals, Class I cities, and Class II towns in India: An Insight, Waste Management. 29:883-895. Leventhal, H., & Cameron, L. (1987). Behavioral theories and the problem of compliance. Patient Educ Couns, 10:117-38.

Luo, Y., Chen, X., Qi, S., You, X., & Huang, X. (2017). Well-being and Anticipation for Future Positive Events: Evidences from an fMRI Study. Frontiers in Psychology.

M.R. Gidde, V. T. (2008). Municipal solid waste management in emerging mega cities: A case study of Pune city. Indo Italian Conference on Green and Clean Environment, (pp. 441-450).

Milea, A. (2009). Waste as a social dilemma: Issues of social and environmental justice and the role of residents in municipal solid waste management, Delhi, India. Lund, Sweden: Lund University.

Ministry of Environment, F. a. (2016). Solid Waste Management Rules Revised After 16 Years; Rules Now Extend to Urban and Industrial Areas': Javadekar. Delhi: Press Information Bureau.

Narayana, T. (2008). Municipal solid waste management in India: From waste disposal to recovery of resources? Waste Management, 1163-1166.

Nema, A. (2004). Collection and transport of municipal solid waste. In: Training Program on Solid Waste Management. Delhi, India: Springer.

OECD Environment Directorate . (2009, March). Retrieved from OECD: http://www.oecd.org/env/tools-evaluation/extendedproducerresponsibility.htm

Opower. (n.d.). Products : Oracle. Retrieved from Oracle: https://www.oracle.com/industries/utilities/products/what-is-opower.html

R.K. Henry, Z. Y. (2006). Municipal Solid Waste management challenges in developing countries - Kentan case study. Waste Managment 26(1), 92-100.

Rathi, S. (2006). Alternative approaches for better municipal solid waste management in Mumbai, India. Journal of Waste Management , 26 (10), 1192–1200.

Rathi, S. (2007). Optimization model for integrated municipal solid waste management in Mumbai, India. Environment and Development Economics, 12(1), 2007, 105-121.

Rekacewicz, P. (2009). The richer we get the more we discard. UNEP/GRID-Arendal.

RF Baumeister, M. L. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. Psychological Bulletin, 117:497–529.

Ryan, A. J. (2014). A Framework for systemic design.

Ryan, R., & Deci, E. (2015). Toward a social psychology of assimilation: self-determination theory in cognitive development and education. Self-Regulation and Autonomy: Social and Developmental Dimensions of Human Conduct, 191–207.

S. Kumar, S. R. (2017). Challenges and opportunities associated with waste management in India. United Kingdom: The Royal Society.

Sankhe, S., Vittal, I., Dobbs, R., Mohan, A., Gulati, A., Alblett, J., . . . Sethy, G. (2010). India's urban awakening: Building Inclusive cities, sustaining economic growth. 2010: McKinsey Global Institute. Sharholy, M. (2008). Municipal Solid Waste Management in Indian cities- A Review, Waste Management. 28:459-467.

Sharholy, M., Ahmad, K., Mahmood, G., & Trivedi, R. (2005). Analysis of municipal solid waste management systems in Delhi – a review. In Book of Proceedings for the second International Congress of Chemistry and Environment, (pp. 773–777). Indore, India.

Sharholy, M., Ahmad, K., Mahmood, G., & Trivedi, R. (2005). Analysis of municipal solid waste management systems in Delhi – a review. In Book of Proceedings for the second International Congress of Chemistry and Environment, (pp. 773–777). Indore, India.

Sheldon, K. M., William, G., & Joiner, T. (2003). Self Determination Theory in the Clinic. Motivating physical and mental health. New Haven: Yale University Press, 45.

Siddiqui, T., Siddiqui, F., & Khan, E. (2006). Sustainable development through integrated municipal solid waste management (MSWM) approach – a case study of Aligarh District. National Conference of Advanced in Mechanical Engineering (pp. 1168–1175). New Delhi, India: Jamia Millia Islamia. Tchobanoglous, G., Theisen, H., & Vigil, S. (n.d.). Integrated Solid Waste Management. McGraw Hill edition.

Tree, M. (n.d.). Home: Mr Tree. Retrieved from The Lifecycle of a Tree: https://www.mrtreeservices.com/blog/lifecycle-of-a-tree/

UNDP. (2018). Plastic Waste Management Programme (2018-2024). Retrieved from UNDP India: https://www.in.undp.org/content/india/en/home/projects/plastic-waste-management.html

Vervloet, M., Linn , A., van Weert, J., de Bakker, D., Bouvy, M., & van Dijk, L. (2012). The effectiveness of interventions using electronic reminders to improve adherence to chronic medication: a systematic review of the literature. Journal of American Medical Informatics association, 19(5):696-704.

Woolley, K., & Fishbach, A. (2016). Immediate Rewards and Predict Adherence to Long-term goals. Personality and Social Psychology Bulletin.

Wrzesniewski, A., Schwartz, B., Cong, X., Kane, M., Omar, A., & Kolditz, T. (2014). Multiple types of motives don't multiply the motivation of West Point cadets. Proceedings of the National Academy of Sciences. 111(30), 10990-10995.

Appendices

This chapter is about the design interventions that have been proposed for both levels (organisational and community level).

08

Appendix A - Sensitizing

Sensitizing Booklet Template

Plastic in my life

Wait! Please leave this space empty until the end.

How does my Mom/Dad use plastic?

Day 2

Step 2 – Investigation

Ask your mom/dad for what all things she/he uses plastic. Keep in mind that there are different types of plastics.

My mom/dad uses plastic for.......

Introduction

First of all thank you so much for participating!!!!

I am trying to research the topic of 'Plastic Waste in an Indian house' and I need your help. This booklet is to help you take on the role of a 'researcher' and by filling it you will be able to help me with my research.

This booklet is set-up as a diary, with small exercises spread over 7 days. I suggest you to 'do' one exercise per day, in this way it should take you about 15 minutes a day.

This is an inital research hence there are no right or wrong answers only 'your answers'. Think freely, and answer in the way that fits you.

1. The workbook includes few pictures, icons and words at the end of the booklet, that you can use to do the exercises.
2. Try to write, draw, cut and paste images (from booklet or magazines) as much as possible. The more research and stories you can tell, the more interesting it will be!
3. Please remember to bring this booklet at our next meeting, where we will share and discuss our research and reflect on our experiences.

Have fun!
Jennifer

Keep in mind that other people might also have a look at your workbook, so please try to keep it as readable as possible.

The 2 faces of Plastic & Plastic Waste

Day 3
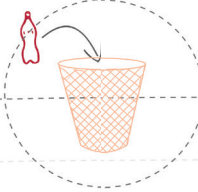
Step 3 – Knowledge

Use your own knowledge to think about....
What are the good and bad things about Plastic and Plastic waste?

Plastic 👍

Plastic 👎

Plastic Waste 👍

Plastic Waste 👎

This is the journey of a soft drink bottle...

This is an example of a journey map for making friends

Day 4

Step 4 – Experiences

Remember a day when you bought your favourite soft drink from the store. Now, try and map the journey of your soft drink bottle. Think!!!! Where did the soft drink bottle come from? When and how did you use it? Once it was empty and you had to throw it out what did you do? Where did it go after you threw it in the bin?

journey

feeling/ smilies

Why did you
feel like that?

Don't forget to use the smilies and other icons at the back to express how you feel

Plastic in my House

Step 1 – Observation
Look around your home !!!
What are the different plastic products in your house?

My Living Room	My Kitchen	My Bathroom

Hmmm... Plastic Waste ????

Step 5 – Computer Research
Now is the time to do some computer research.
Write down a few questions that you would like to know the answers to about Plastic Waste.

1. _____
2. _____

Now go on the internet and try to find answers to these questions.

1. _____
   _____

2. _____
   _____

What have I learnt ?

Step 6 – Learnings
From all the wonderful research you have done write down the 3 most important things you have learnt about Plastic Waste.

1. _____
   _____

2. _____
   _____

3. _____
   _____

And Finally !!

Step 7 – Presenting
After researching Plastic products in your home, how it is used, Plastic Waste and its effects, it is now time for you to present and express your opinion on Plastic Waste.

Pick one or two pictures (maybe more), some words and icons from the back of the booklet that represents – What Plastic Waste means to you?

Just express yourself !!!

Put the pictures, words on the 1st page of your booklet

Thanks for participating. Hope you had fun!!

Filled out Sensitizing Booklet

Plastic in my life

Wait! Please leave this space empty until the end.

Challenge

It is a challenge to finished the plastic from our daily life. but If it reduce then it is a happy feeling.

less

happy

Plastic in my life

Wait! Please leave this space empty until the end.

Start from your 🏠 → Be a *leader*

→ Take away the plastic waste to Garbage Vans.

Now, it's time to take Action Ee make the World happy.

Appendix B - Context Mapping

Context Mapping Structure

1. Ice breaker (15 min)

Ball game – make sounds as you throw the ball around the class – make weird noises.
Chai Coffee – Tell and explain to each other your biggest dream.

2. Explain the purpose of this session
The purpose of this session is that I am a researcher and I am researching Plastic Waste and the separation of Plastic waste from other household waste. I need your help because I am new to Dehradun and I don't know much the environment, the education and your communities, your schools, homes etc. You are experts in that.
We are doing this workshop so that you can help me in my research and we will do this by doing a bunch of fun activities.

3. Rules of today's workshop
There is no right or wrong answers.
Do not judge each other on their answers – each has their own perspective

This is going to be a casual discussion. so please speak freelyyy.

So lets start! I had given you all booklets to fill out through the week. I hope you were able to complete them and did not have any problems.

By filling up the booklet you have researched and analysed plastic & its waste in your own context.

4. Lets discuss your booklet on Plastic that you did over the week (10 min)
Then both of you together present an answer to each question. Read out the ones you think are important to share with the rest of us.

• 1st question - What are the different plastic items in your house?

• 2nd question – mom uses plastic for -------- because she says it is----- but she can also use---- to do the same task
• 3rd question - 1 good thing about plastic and plastic waste? 1 bad thing?
• 4th question - Journey of a soft drink bottle
• 5th question - One question you did not know the answer to? What's the answer?
• 6th question - What have I learnt about plastic?
• 7th question – Presenting analysis (make each group do it)

 Let's start with the first activity

5. Activity 1 - The Plastic City 5 copy – (5min)
Imagine and make a simple drawing of a street in your neighbourhood.
BREAK DOWN THE QUESTION
Now, draw plastic lying everywhere on your street. Now write, how does everything and everyone look?
What are they saying? What are they thinking and feeling?

Read out your answers (5-7min)

6. Let's have a discussion on Plastic waste Separation. Does everyone know what it is?
Activity 2 – Questions to discuss on. – 1 copy
• What is Plastic Waste Separation?
• Why is it done?
• What are the effects of Separating Plastic Waste from your normal waste?
• Who are the people involved in the Plastic Separation process?

7. Activity 3 - Make a collage for plastic separation. (10min)

This is a section for you to describe what YOU FEEL about Plastic Separation

Explain the task -
Think of plastic separation in relation with education, community, family, environment (5min). Give some space to write and think. SHOW EXAMPLE

Instructions – use these components to express how you feel about the experience of Plastic Segregation. You can do whatever you want as long as it makes sense to you.

Material – template, pictures, words, icons, scissors, glue, sketch pens

Explain/ present your collage.

Reason – to understand what they think and feel about the topic.

PRESENTATION

8. Activity 4 – Story (15 min)
Imagine!! You and Your family has been separating your plastic waste from your normal waste for a while now. Now let's write a story about your journey

It all started when ……..
Each one was given a role…. My father….. my mother….. my brother/ sister……
The main things we needed to do this were…..
But the problems were…..
But we motivated each other by….

PRESENTATION/ NARRATE STORY.

Collage Template

What does Plastic Segregation mean to you?

Make a collage of what you think, feel or have experienced about Plastic Segregation.

Provided below are different topics to think about while making your collage. You could even draw arrows and make connections between them if they influence each other.

Use the pictures and words provided or even draw, write to express your thoughts and feelings about the subject.

Your family

Environment

Yourself

Education/ Awareness

Society

Students

आप के लिए प्लास्टिक कचरे को अलग करने का क्या मतलब है ?

प्लास्टिक कचरे के बारे में आप क्या सोचते हैं, महसूस करते हैं और अनुभव करते हैं, इसका कोलाज बनाएं।
उपलब्ध कराए गए चित्रों और शब्दों का उपयोग करें। आप ड्राइंग कर सकते हैं लिख भी सकते हैं।

शिक्षा / जागरूकता

पर्यावरण

प्लास्टिक कचरे को अलग करना

आपका समुदाय

आपका परिवार

आप

Parents

Filled out of parents and students

Worksheet 1 (top left):

What does Separating Plastic Waste mean to you?
Use the pictures and words provided to make a collage of what you think, feel or have experienced about Separating Plastic Waste. You can even draw and write. You can maybe think about the topics of Education/ Awareness, the Environment, your Community and family etc. in relation to Separating Plastic Waste.

* This is Nature → You, so don't be hesitated.
belong to
Just spread awareness about good & bad things about plastic
* Be a leader → collect your friends & clean the environment, give it back!!
You
If you want, a clean, surrounding.

Worksheet 2 (top right):

What does Separating Plastic Waste mean to you?
Use the pictures and words provided to make a collage of what you think, feel or have experienced about Separating Plastic Waste. You can even draw and write. You can maybe think about the topics of Education/ Awareness, the Environment, your Community and family etc. in relation to Separating Plastic Waste.

Surprise   Confusion   fair
You
Challenge   AAhh!!!   happy
Nature

Worksheet 3 (middle left):

What does Separating Plastic Waste mean to you?
Use the pictures and words provided to make a collage of what you think, feel or have experienced about Separating Plastic Waste. You can even draw and write. You can maybe think about the topics of Education/ Awareness, the Environment, your Community and family etc. in relation to Separating Plastic Waste.

1) I think separating Plastic waste is Wonder idea.
3) I should talk to people living near my house.
You
2) It will help us Nature.
4) I should aware the people. to ma

Worksheet 4 (middle right):

आप के लिए प्लास्टिक कचरे को अलग करन का क्या मतलब है ?
प्लास्टिक कचरे के बारे में आप क्या सोचते हैं, महसूस करते हैं और अनुभव करते हैं. इसका कोलाज बनाएं। उपलब्ध कराए गए चित्रों और शब्दों का उपयोग करें। आप ड्राइंग सकते हैं लिख भी सकते हैं।

शिक्षा / जागरूकता   पर्यावरण
                          अच्छा
प्लास्टिक कचरे को अलग करना
गुजरात करना
आपका समुदाय   आपका परिवार स्वच्छ
उल्टा प्रश्न   आप अच्छा

Worksheet 5 (bottom left):

What does Separating Plastic Waste mean to you?
Use the pictures and words provided to make a collage of what you think, feel or have experienced about Separating Plastic Waste. You can even draw and write. You can maybe think about the topics of Education/ Awareness, the Environment, your Community and family etc. in relation to Separating Plastic Waste.

It is Challenge to save Nature
You
If we want to save nature we need to look after the seberation of plastic waste.
→ It will be easy to reuse, reduce and reuse if we will segerate

Worksheet 6 (bottom right):

आप के लिए प्लास्टिक कचरे को अलग करन का क्या मतलब है ?
प्लास्टिक कचरे के बारे में आप क्या सोचते हैं, महसूस करते हैं और अनुभव करते हैं. इसका कोलाज बनाएं। उपलब्ध कराए गए चित्रों और शब्दों का उपयोग करें। आप ड्राइंग सकते हैं लिख भी सकते हैं।

सुंदर
शिक्षा / जागरूकता   पर्यावरण
प्लास्टिक कचरे को अलग करना
आपका समुदाय   आपका परिवार
                          आप   खुश

Plastic City Template

The street of Plastic Waste

1. Make a simple drawing of a street in your neighbourhood with people, animals, your family, friends etc.

How does everything & everyone look?

- - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - -

What is everyone saying to each other? Why?

- - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - -
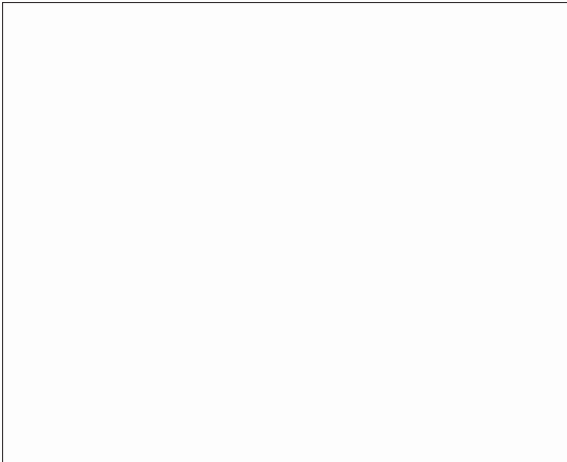
What are they feeling? Why?

- - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - -

2. Now, imagine that this street is filled with plastic lying around everywhere.

Students

प्लास्टिक कचरे की गली

अपने आस – पड़ोस के लोगों, जानवरों, दोस्तों, परिवार आदि के साथ एक गली की साधारण ड्राइंग बनाएं

सब कुछ और सब लोग कैसे दिख रहे हैं ?

आपके परिवार के सदस्य एक–दूसरे से क्या कह रहे हैं? क्यों ?

आप और आपका परिवार क्या महसूस कर रहे हैं? क्यों?

अब, कल्पना करें कि यह गली हर जगह प्लास्टिक से भरी पड़ी है।

Parents

Collage Words

खुश इच्छा संबंधित आसान बंधन
बेचैन आश्चर्य बात सुनो सुंदर उदासी
हर्ष
साथ में नेता उलझन ईमानदार ऊर्जा
प्रकृति आशा
प्रेरणा स्त्रोत मजेदार व्यस्त
ऊब घर
राहत
सुरक्षा निष्पक्ष अभी सम्मोहन विश्वास
बहादुर गौरव दोस्त आराम क्षमा
लड़ाई
बातचीत असुरक्षा चुनौती शर्म
शक्तिहीन

happy Desire belong easy bond
Sadness
nervous Wonder listen Joy beautiful
Confident
Together leader Confusion honest
BUSY
Nature Bored Inspiration Hope
Home
Relief SATISFY AAhh!!! funny energy
Fascination
security fair now WOW!!!
brave Pride
Surprise friends Ease forgive fight
talk Challenge Shame powerless
INSECURITY

Collage images & icons
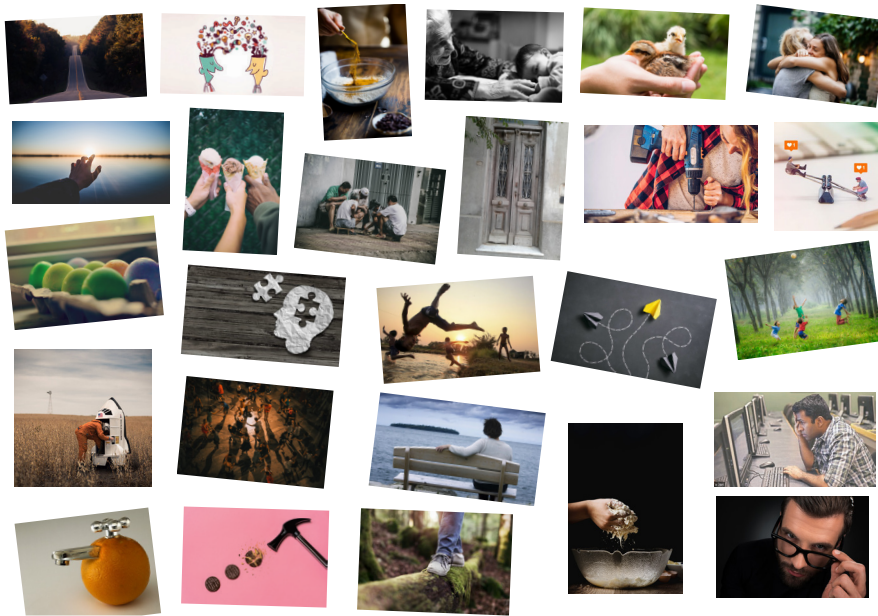
Collage Pictures
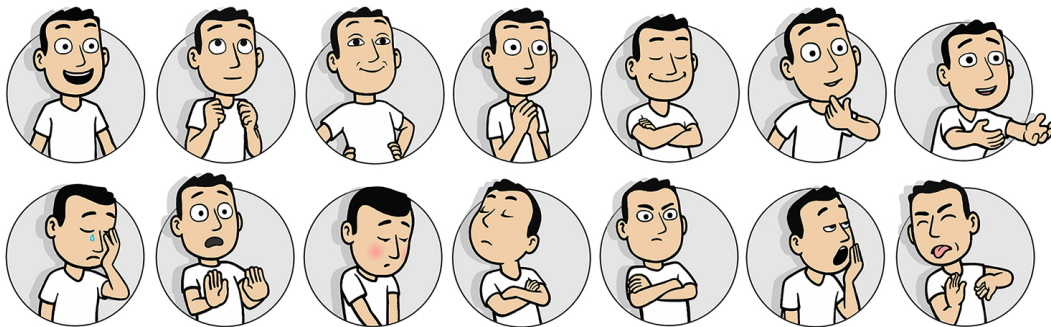
PreEmo
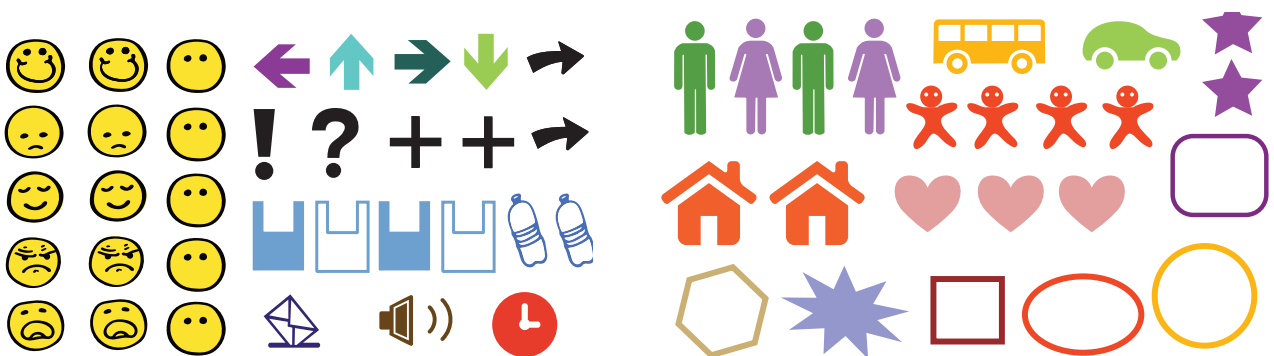
Icons

Plastic Segregation Discussion

Discuss & Write

What is Plastic waste Separation?

Why is Plastic Waste Separation done?

What are the effects of Separating Plastic Waste?

How does Separating Plastic Waste affect you?

Who are the people involved in the process of separating plastic?

चर्चा करें और लिखें

प्लास्टिक कचरा अलग करना क्या होता है ?

प्लास्टिक कचरे को अलग क्यों किया जाता है ?

प्लास्टिक कचरे को अलग करने का क्या प्रभाव हैं ?

प्लास्टिक कचरे को अलग करने से आप और आपके परिवार पर क्या प्रभाव पड़ता है?

प्लास्टिक कचरे को अलग करने की प्रक्रिया में कौन लोग शामिल हैं ?

My Story to Plastic Waste Separation

My story of Plastic waste separation.

Imagine!! You and your family have been separating your plastic waste from your normal waste for a while now. Let's try and write a story about your journey and how you achieved it.

It all started when one day when _ .
_ .

We decided to do it because _
_ .

So each person in the family took up a role. My father was in charge of_ _ _ _ _ _ _ _ My mother _ _ _ _ _ _ _
My brother/sister _ _ _ _ _ _ _ _ .

The main things we needed to do this were _ .
_ .

But we faced a few problems in the process which were_ _
_ _but, we got through all these problems.

To make it a habit we kept motivating each other by _
_ .

And that's how we began to separate our Plastic Waste from our normal waste and we continue to do it because it makes us feel_ .

Workshop Outcomes
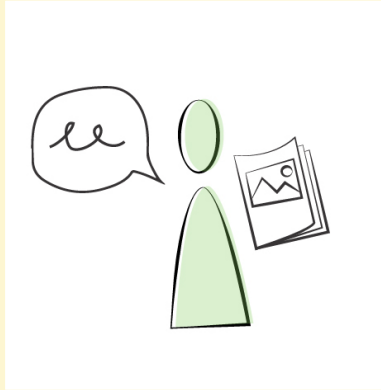
	Discussing the sensitizing booklet	*The Plastic City*
Activities		
Activity Explained	In this activity participants (students & parents) discussed the answers written in their sensitizing booklet with each other.	In this activity the participants were asked to make a simple drawing of a street in their neighbourhood with plastic lying all over the street. They were posed with questions such as – How does everything and everyone look? What are they saying, thinking and feeling?
Reason for this activity	This allowed the participants to express their own thoughts and feelings towards the topic of waste.	This exercise was done so that the participants could reflect on their feelings and views of a future world where there is excess plastic lying around in their vicinity and they would have to directly interact with it.
Observations from activities	Each had completed the booklet and had somewhat the similar answers to most of the questions. The overall essence was that – Plastic is harmful to the environment and it is time to take action, make a change in our lives to have a happy future.	Most participants associated waste with something being smelly and dirty with everyone being sad, confused and hopeless because of the situation

Discussion on Plastic waste segregation
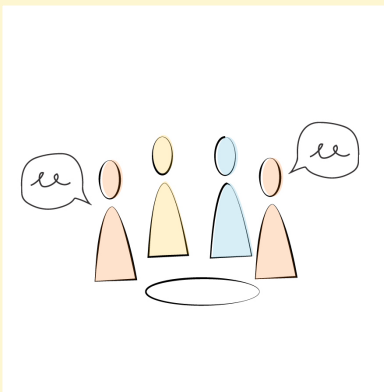
The participants were asked to share and discuss answers to questions such as –
(1) What is Plastic Waste Segregation? (2) Why is it done and what are its effects? (3)Who are the people involved in the process of segregating waste?

These questions were posed to them so that everyone would have the same level of information, knowledge and understanding about Plastic Waste segregation.

Participants spoke from their experience and the knowledge that they already had. They added more information to others thoughts and highlighted different aspects of waste segregation. At the end of the discussion, all had a clear idea about the practical aspects of waste segregation.

Make a collage
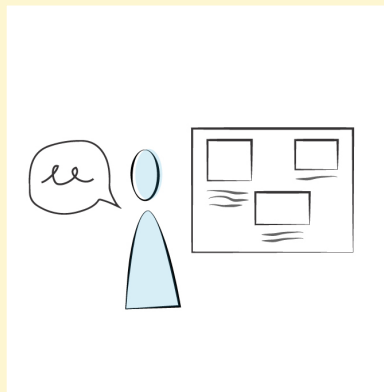
This activity began with the participants (students and parents) going through and discussing the answers in the sensitizing booklets together with each one expressing their own thoughts on the questions.

Participants were asked to express their feelings about waste segregation in relation to education, family, community, environment and yourself through a collage – a physical representation to an abstract topic.

Participants were asked to express their feelings about waste segregation in relation to education, family, community, environment and yourself through a collage – a physical representation to an abstract topic.

Journey to a waste segregating family
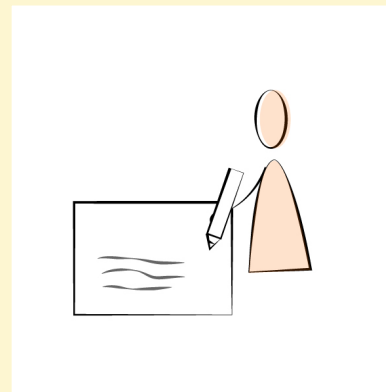
A story template was provided that prompted them to imagine their journey to a segregating family. (1)how the journey began (2)what was the role of each person (3)the things they needed to accomplish segregation, (4)the problems they would face (5) how family would motivate each other.

This story helped me understand, their sources of segregation information (presentation, ads etc.), the power dynamics in an average Indian home, the tangible things they needed, the problems they would face and how would the family members motivated each other.

Participants were asked to express their feelings about waste segregation in relation to education, family, community, environment and yourself through a collage – a physical representation to an abstract topic.

Appendix C

Interview Questions NGO

1. Where does plastic separation not happen? Why does it not happen (logistics, habits etc.)?
2. What do you consider as awareness with respect to plastic waste separation?
3. How aware are the citizens of Dehradun with respect to Dry waste separation in India?
4. In what different ways are you spreading awareness? What message do you spread to schools and communities?
5. How much percentage of households have you reached?
6. How much and what information do you think people have retained and are using to start separating?
7. Why are people separating dry waste? People from which class?
8. Why are people not separating dry waste?
9. How do you think you have gotten through most people? What works?
10. What is the ideal goal of the NGO with respect to the future of waste separation?
11. What do you think the NGO has achieved till now?
12. What do you think is standing in the way of this goal?
13. What are your biggest challenges?
14. What do you think is lacking in the current scenario?
15. Who is your main target audience?
16. How do you approach LIG vs HIG? Do you give different explanations?
17. What is the difference between what you teach LIG and HIG people?
18. What are the common problems with both classes?
19. What do you think they need?
20. What explanations/ presentations do you give to children, youth and parents? Are they differeny

Interview Questions community members

1. Bio data (10min) - Name? Job? Family members?
2. How do you deal with your trash at home (before and after)? Narrate full day. (2min)
3. How did segregation in your life begin? Why did you start to segregate? Who influenced you? (5min)
4. What do other people (aunties) say about waste and waste segregation? Do they have a problem with it?
5. Did you have the same problems? How did you get through it?
6. Have you tried to convince them- that it is not a problem? What do they say? Are there any ways you or your community spreads awareness to others?
7. How interested are your children in segregation? Do they participate much or its only you?
8. Did the full community participate? Why? Why not? Were you able to solve this?
9. If your child came to you and told you about the same information that they learnt in school … would you have agreed? Why? Why not?
With regard to the presentation
10. What did you know about waste segregation before the presentation?
11. Did you understand it fully when it was told the first time? Did you have doubts? Example?
12. Was everything clear after that? Were you able to begin segregating your dry waste the next day? Did you have problems? What? How did you solve these problems?
13. Did you have problems figuring out what goes where?
14. What did you feel when you started to segregate your dry waste? Did you decide to do it as a family?
15. Have they changed their attitude since? Why?

कूड़े का छाँटीकरण

Appendix D - Presentation Slides
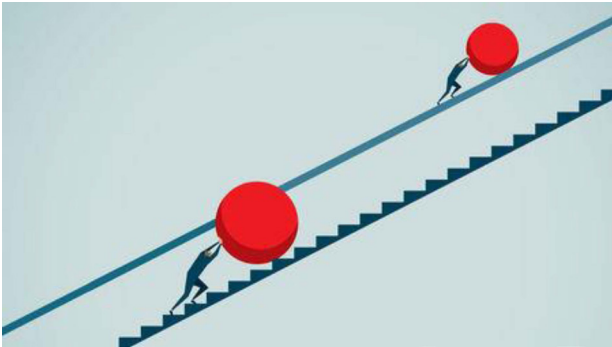
कचरे का छाँटीकरण कैसे किया जाये ?

आप अपने कचरे का
छाँटीकरण कैसे करती हैं?

गिला कचरा   सूखा कचरा

क्या यह कठिन काम है ?

गिला कचरा

क्या आप अपने समुदाय को कचरे के
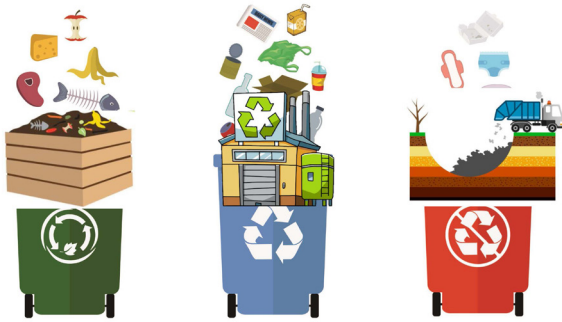छाँटीकरण के बारे में कुछ बोलना चाहेंगी ?

सूखा कचरा

रिसाइक्लेबल   नॉन
              रिसाइक्लेबल

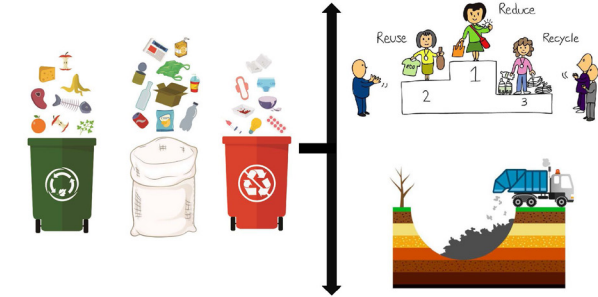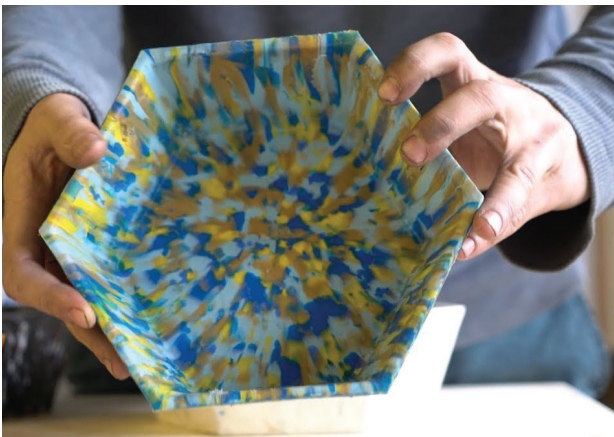# Appendix E - Guided Fantasy Script

Close your eyes. Keep your hands on your knees and take deep breathes.
Breathe in… breathe out…. (3) Just relax..

Your eyes are closed and you are lying on a field of grass with your arms wide open. The grass is cool, you can feel each blade on your skin, smell its freshness – it smells like after the first rain. Take in that smell. The sun is softly touching your face its gentle ans warm. You hear a stream of water flowing, birds chirping. Yo take deep breathe and You open your eyes slowly. You see a clear, bright blue sky and clouds that are just floating away. What are you feeling?

You slowly get up and sit. You see the green hills everywhere and there is a stream near by. Can you hear it? You get up and begin to walk towards the sound. The wind is blowing through your hair. You see the stream in the distance and you get very excited. As You walk towards it can you feel the grass beneath your feet? The water is flowing, so clear. Only pebbles and water. You put your toe in. its cold but pleasant. You step in and look at the water is flowing over your legs. Standing in the water, what do you see around?

You had a beautiful walk in the hills and now you walk towards your home. You see trees with little birds on them, lots of life around you, people laughing, you even hear your favourite song. Can you hear it?
You reach home your children come running out towards you. You hug them. They tell you about their day with so much excitement. What are they saying? You see your friends talking to each other. You walk towards them and are talking about something silly that happened that day that makes you laugh. You are looking into each others eyes thinking – We did it !! Dehradun is beautiful again, because of us. We did it!! As a team. How is everyone looking? How are you feeling?
 Count to 5 and open your eyes

Appendix E - Postcard Design

Appendix G - Reminder Cards