



Project 2

Sustainability awareness kit for children in an Indian urban environment

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IDC IIT Bombay 2010

Healthy and Sustainable ways of living

Why?

Experience at Auroville



Urban Environment ?



Finding the need

“Positivity”



Image 3b

self worth

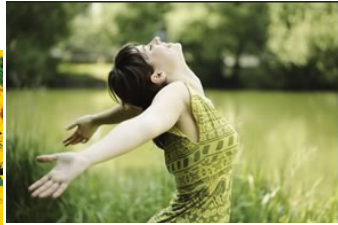


Image 3c

Knowing thyself

Mind and Body

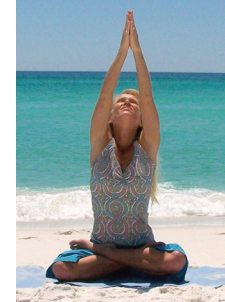


Image 3d

“Balanced life”
activity and relaxation

Happy + useful
life= personally
satisfying life

Health

“Health we discover is a systemic indicator of resilience and viability of a system”

Cleanliness



Image 3f

“Environmental hazards”



Image 3e

“adverse effects of social and economic progress”

Mental

stress
+ve and -ve
- social adjustments
- inability to perform



Image 3g

Social

“Food and fitness”

Physical



Image 3h



Image 3i

“Nature becoming an abstraction”

Exploitation of resources

People competing for less and less

Principles of ecology

Network



Nested system



Cycles



Flows



Development



Dynamic balance



Sustainability

Capacity to endure, ability of an ecosystem to maintain ecological processes, functions, biodiversity and productivity into the future

Butterfly effect

“Designing ecologically becomes a default setting than an aberration”

Collaborative effort and intelligence

Head, heart, hand and spirit

Exchange of information

“Solving for pattern”

Eco communities

“Sustainable development might mean impeding growth and reverting to pre modern lifestyles”

Indian villages

- joint families
- use less
- farming
- close to nature

Systemic approach



“Health society and
habitat as a whole in its
full complexity”

Health and Sustainability



Co housing

Values and mission

Mutual respect and responsibility

Head, heart, hands, spirit

Educating children

Time for sharing experiences

*Preservation of local culture
and wisdom*

Eco-communities

Organic farming

Compact and efficient land use

Waste management

Research and development

Sustainable livelihood

Energy conservation

Architectural exploration

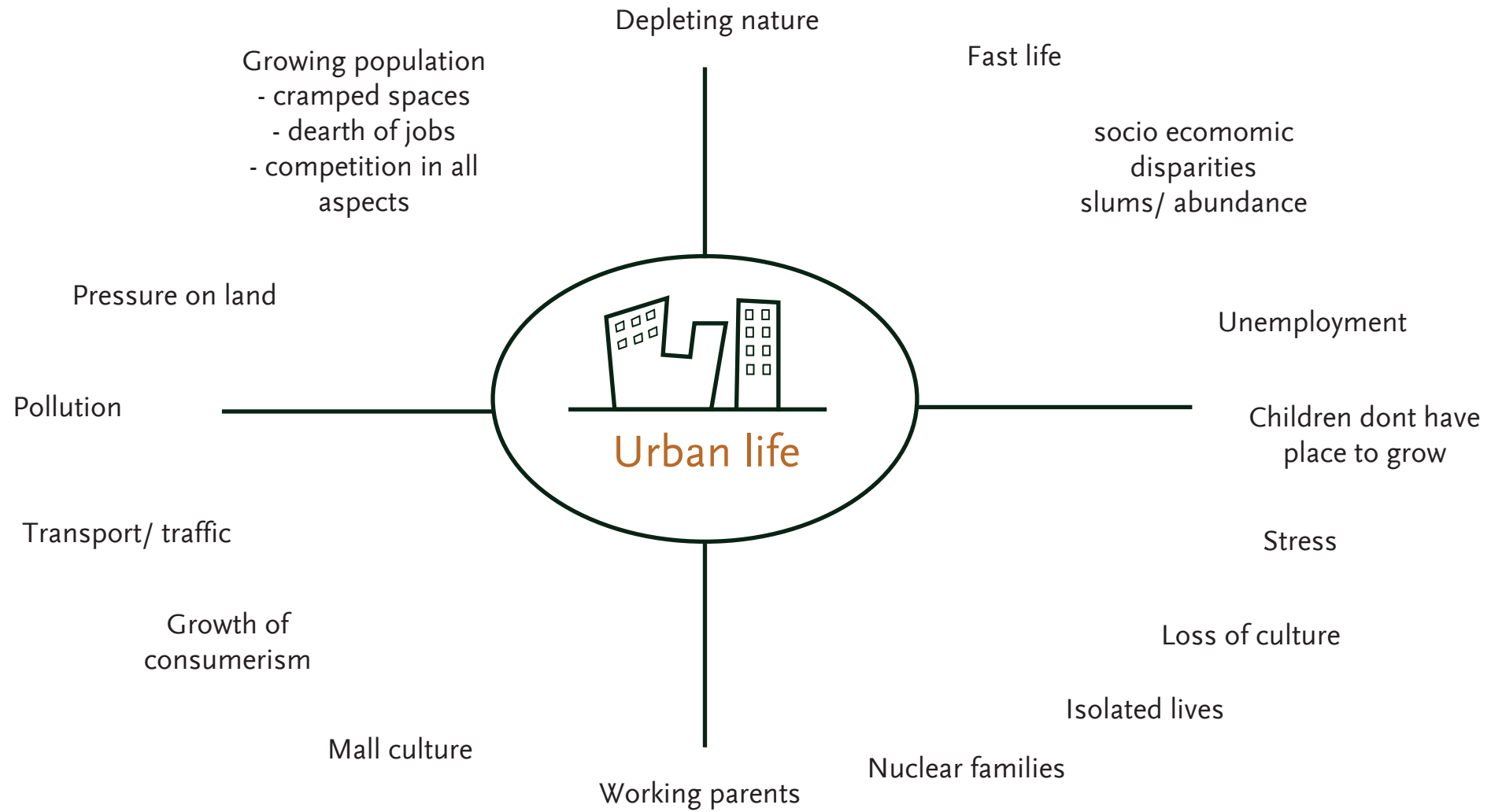
Understanding the systems in nature

Preserving nature, experiencing nature as a primary goal instead of personal benefits

Common wellbeing of people and nature

o impact on the environment

Smaller in size



Problems areas identified

- Health problems in college youth
- Working and travelling women in cities
- Using human energy as a renewable energy resource
- Slums
- Lack of parental attention and love for children in an urbanized society
- Noise pollution
- ”Sustainability awareness for children”

Assumptions based on observations and experience

Children are taught about sustainability in very theoretical manner.

Children know terms but they dont know what to do in daily life

Children forget over a period of time

Understanding the user



Piaget's developmental psychology

Sensori-motor (Birth-2 yrs)

Differentiates self from objects

Recognises self as agent of action and begins to act intentionally: e.g. pulls a string to set mobile

Achieves object permanence:

Pre-operational (2-7 years)

Learns to use language and to represent objects by images and words

Thinking is still egocentric

Classifies objects by a single feature: e.g. groups together all the red blocks regardless of shape or all the square blocks regardless of colour

Concrete operational (7-11 years)

Can think logically about objects and events

Achieves conservation of number (age 6), mass (age 7), and weight (age 9)

Classifies objects according to several features and can order them in series along a single dimension such as size.

Formal operational (11 years and up)

Can think logically about abstract propositions and test hypotheses systematically

Becomes concerned with the hypothetical, the future, and ideological problems

Meeting with the teachers

No of teachers interviewed 4

where? Kendriya Vidyalaya

Analysis

Observation and insights

- Early age is easy to mold*
- Lack of attitude and observation in children
- Difference between what is taught at home and in school*
- Knowledge should be reinforced
- Difference between teaching and practising
- There is a need to affect the conscience
- Children like making and building things*
- Learning is quantitative than qualitative*

Inferences (desirable attributes)

- Appropriate age group- 8-11 yrs
- Element of fun
- Progressive learning, repetitive inputs*
- Collaborative learning*
- Simplify information
- Learning through experiences
- Design for 'children and parents'*
- Do and learn*
- Relate to daily examples and experiences*

How and what they are taught?

Analysis

Current methods of teaching

2nd-4th- *Exagerrated pictorials, story telling, relating to daily examples, simple sentences, use of art and craft, observation and asking questions, puzzles, certain values are taught indirectly, interesting facts, small activities*

5th- 6th- *Realistic images, maps, cycle diagrams, increased text, comparative studies, boxes to emphasize importance, usage of technical words, small experiments*

Problems

Attention span of children is very low.

Activities reduce, text makes study monotonous, learning as a group is almost nil. Multi sensorial experience is absent.

Insights

ICSE then CBSE then SSC in order of difficulty

ICSE has project method of teaching before the 4th std. there are no textbooks. (art,craft,poetry, essays, field trips)

3rd-4th std still have suggestions for some practical activities to impart knowledge.

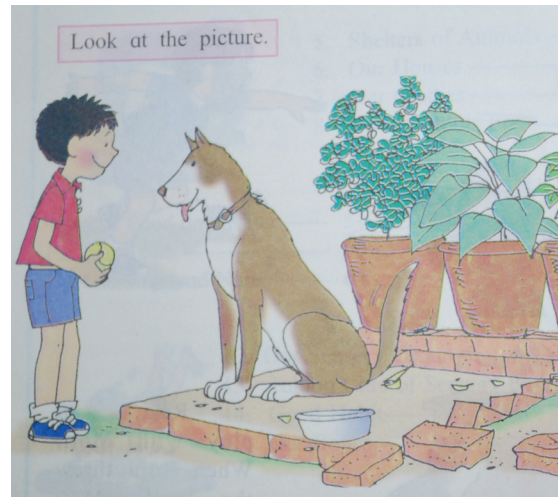
Mostly activities are left for the children to do.

Certain topics are not taught in conjunction to each other. Interrelationships are crucial. Topics related to the environment.

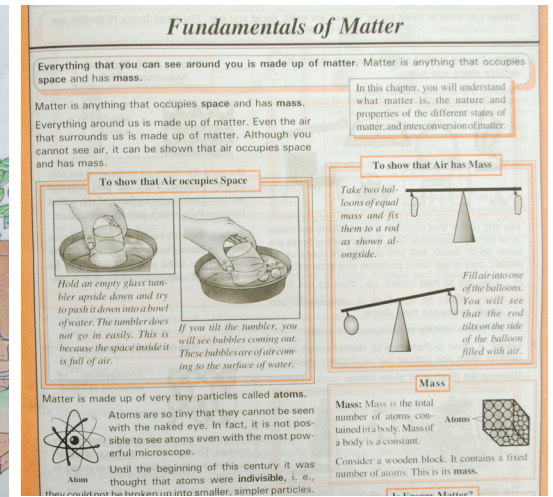
There is a vast difference in the way things are taught to 3rd std and 6th std. (design challenge)

Certain ICSE and CBSE schools have nature clubs and SUPW (socially useful and productive work)

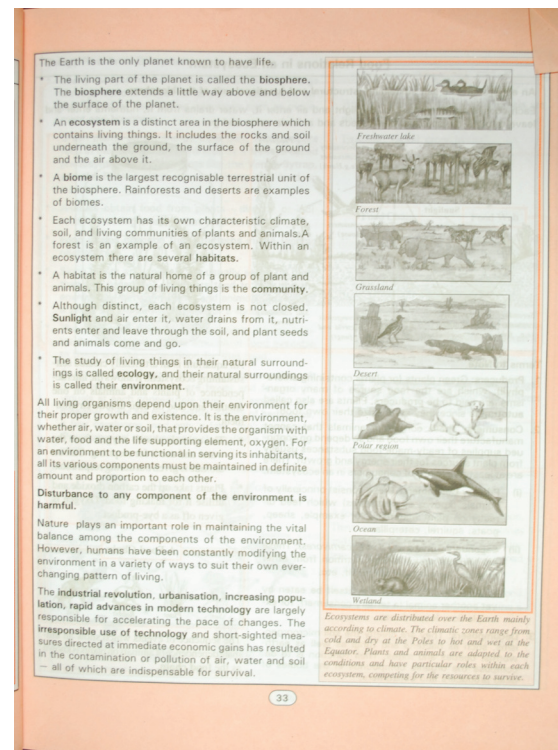
In all cases the education for sustainability is limited and mostly adopt theoretical ways of teaching.



3rd std



6th std



Environmental studies ICSE



Environmental studies CBSE

Alternative methods of teaching

Navnirmitti methods

Learning through
understanding and experiencing

Do and discover method

Focus on smaller
children

Teaching alongside
schools

Encouraging scientific and
mathematic attitude

Group teaching

Dialogue method

Educate children in
rural,tribal areas

Workshops for parents

Group activities, summer
camps

Use of bright colours

Low cost solutions



counting, tables



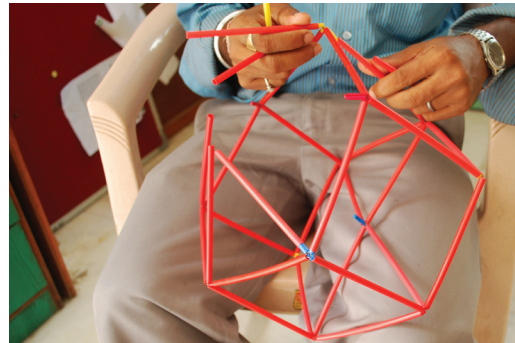
counting, addition, subtraction



counting, addition, subtraction, squares multiplication



counting, addition, subtraction, squares multiplication, handling money



shapes in geometry, 3d objects



counting, addition, subtraction, squares multiplication

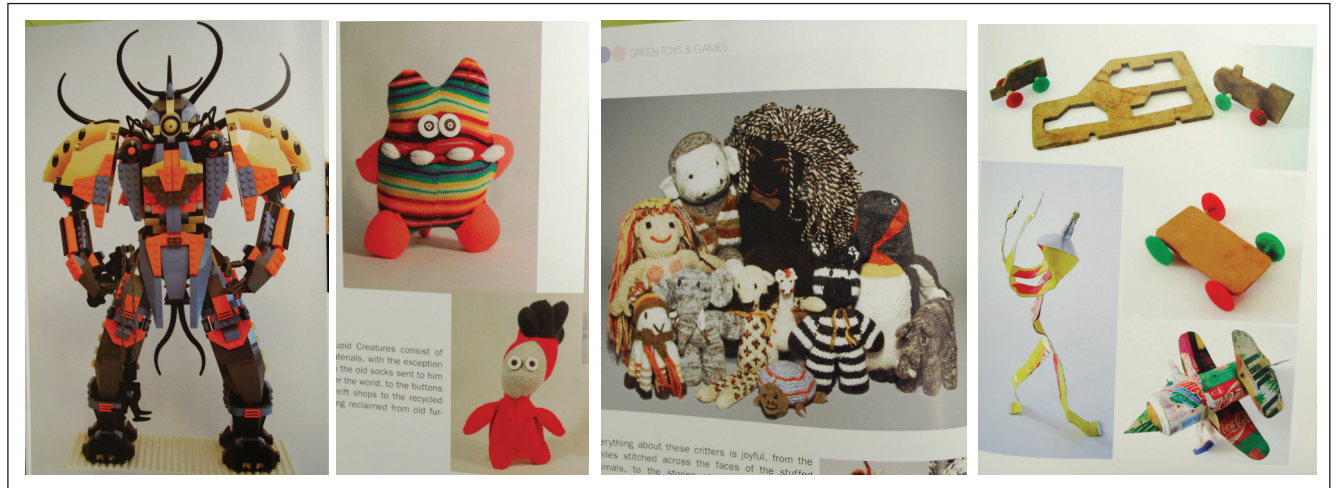


counting, addition, subtraction, squares multiplication, 3d structures





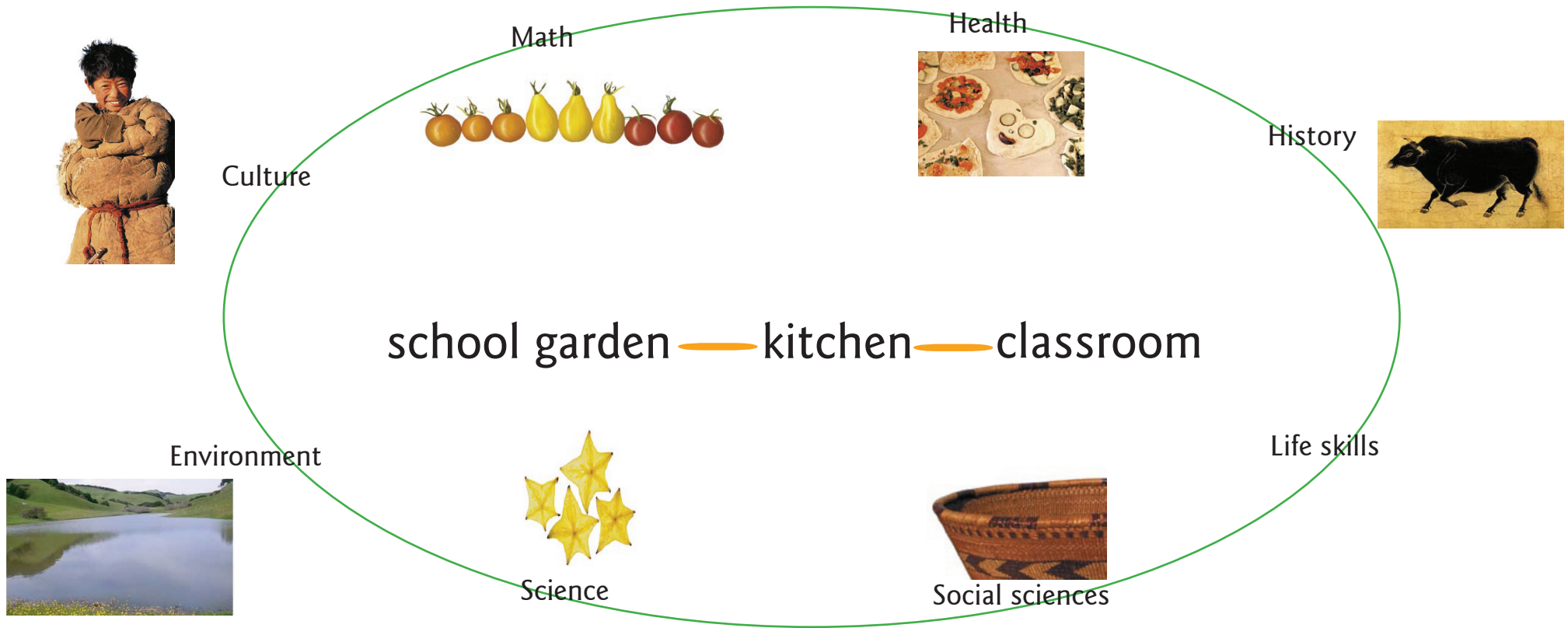
Existing products



Sustainability education in schools (case studies)

Case study 1.

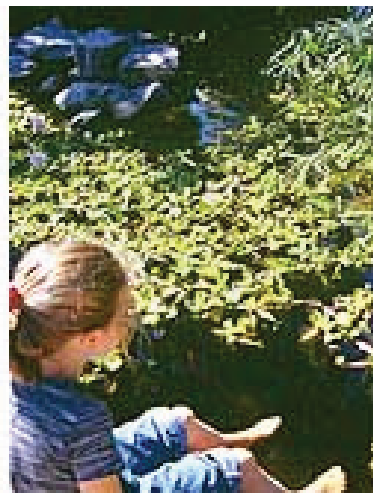
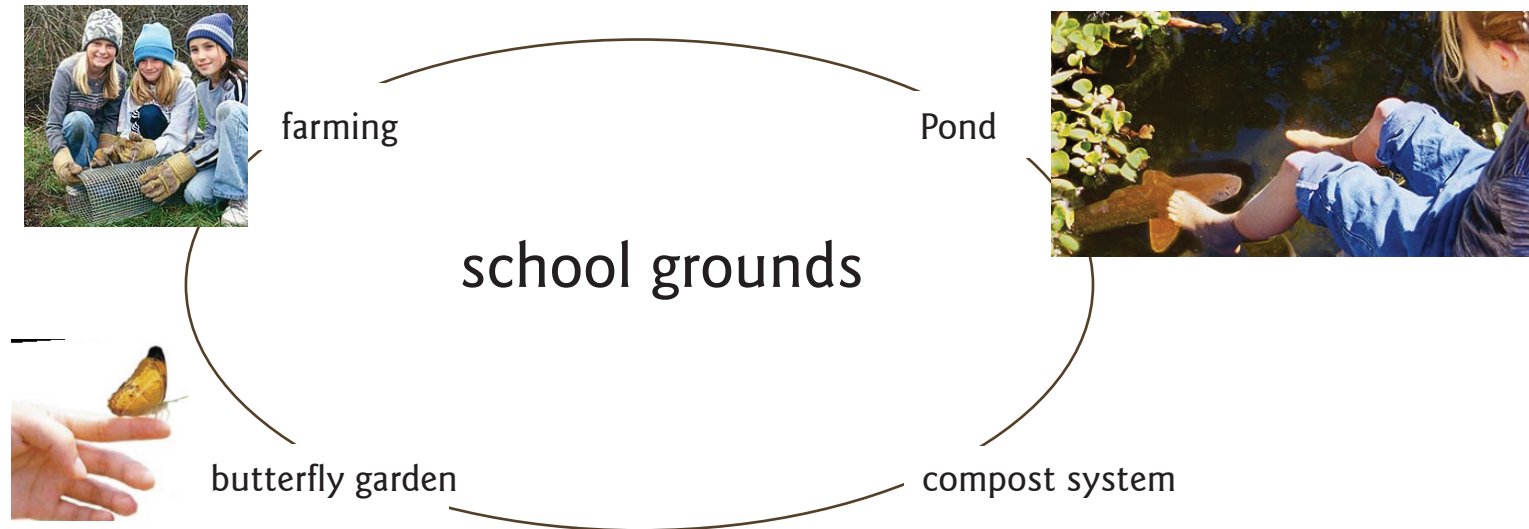
Ecoliteracy.org, edible school yard



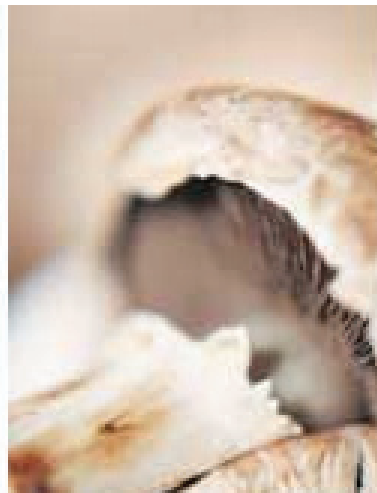
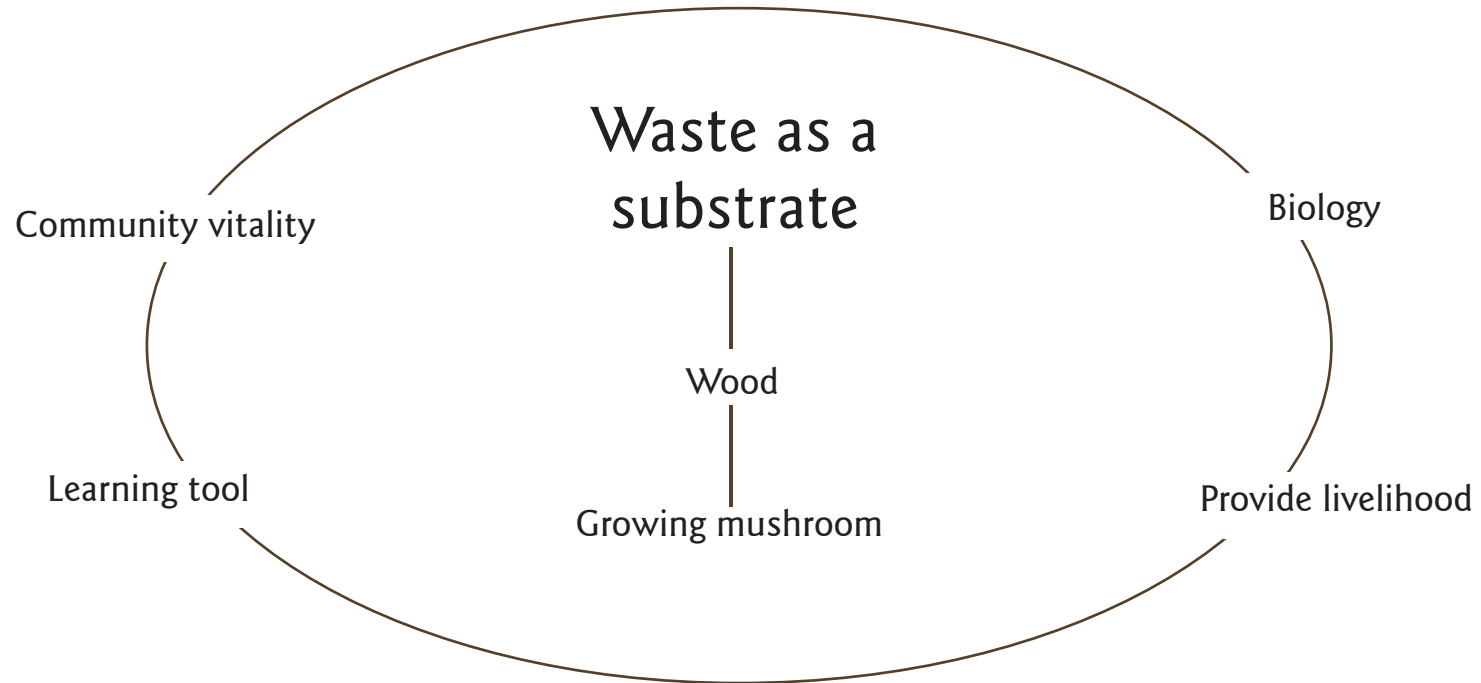
Case study 2.

Eco stars, Mary. E Silvera community

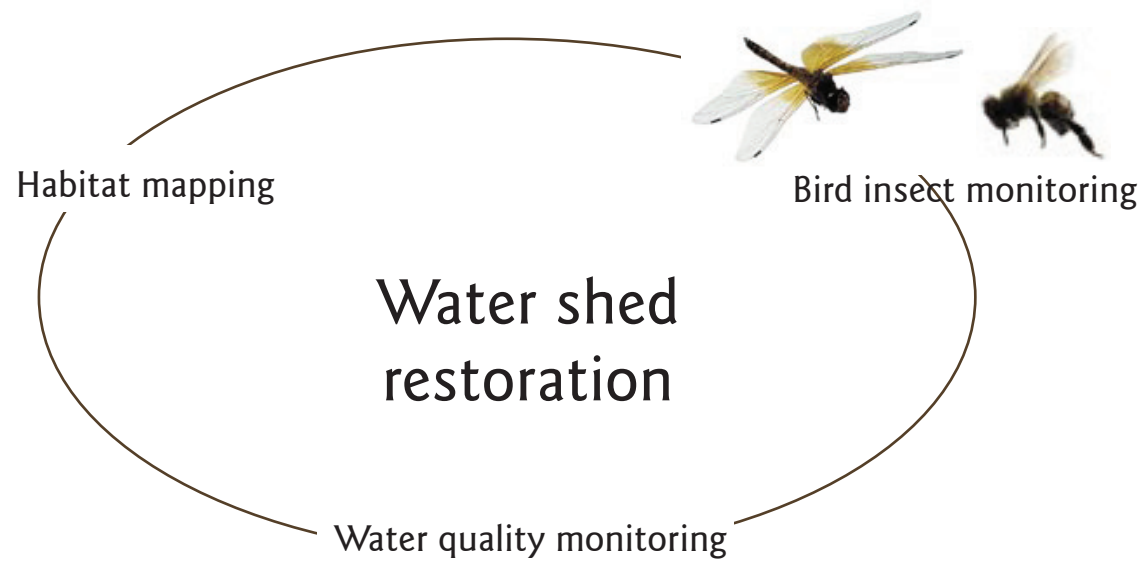
restoration of watershed



Case study 3. Laytonville high school



Case study 4. Art of water sheds



Art and poetry as a tool



How to teach sustainability to children?

Collaborative learning

Expose children to ecological relationships

Encouraging group activities like farming, cooking

Encourage to share

Introduce them to enriching multi sensorial experiences

Tell them simple things to do in daily life and why?

Expose children to local and other cultures

Using Art, Craft and Poetry as tools

Using sustainable products methodology

Progressive learning

Involve parents and other community members

How to teach sustainability to children?

Systemic approach is ideal

What if the system already exists



System- Urban environment
and existing school structure

Design brief

To design a sustainability awareness kit for children (age group- 8 to 11 yrs) living in indian urban environment.

The learning should be fun and experiential such that the child imbibes the values of sustainability. The tool will be an addition to the existing curriculum of studies adopted in schools. The tool will be designed to fit into the existing system. The learning will be collaborative which encourages the 'do and learn' ways of teaching. The teaching would be as progressive inputs at regular intervals.

Design Objectives

Playful and fun learning

Learning in a group

Progressive learning

Do and learn

Sustainable methods of making the product

Low cost

Simplify the information

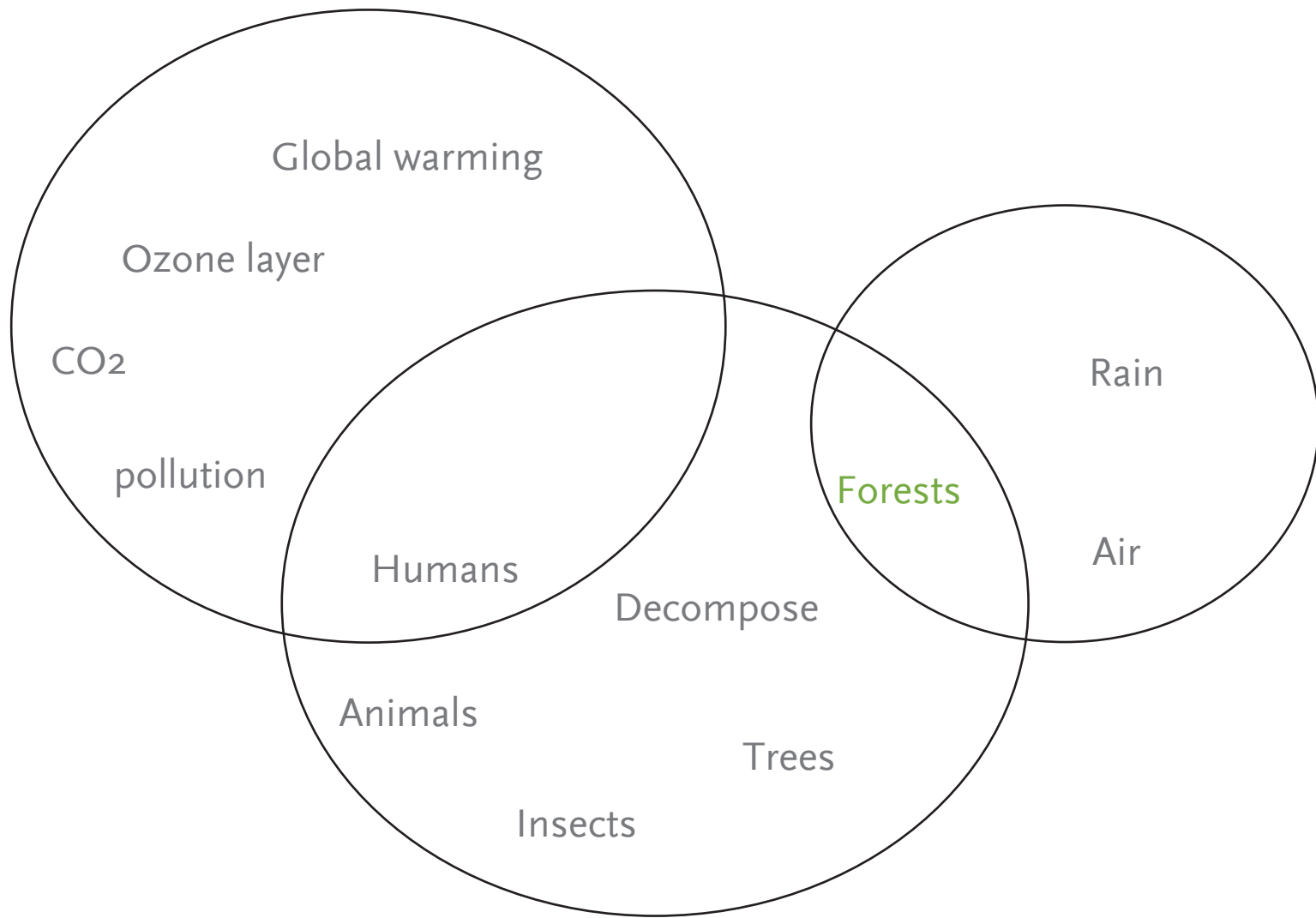
What is being taught?

Reduce, Recycle, Reuse

Ecological cycles (water, land, air), interrelationships

Relating sustainability to daily experiences

Concepts of eco-housing



Ideation

5

SOME CAN BE USED FOR TEACHING PRINTING, TALKING, SPREAD AWAYMENTS.

CLAY OR PAPERMALE

6

VOICE SERVICE

USE IT IN CLOTH

26

Transform. Multidimensional

PULL TO SHOW BOTTOM LAYERS

RECOVERING SQUARE LAYERS

CAN BE

25

MUSICAL INSTRUMENT

AN ECOSYSTEM (IN HARMONY)

REMOVE ONE ELEMENT AND THE TUNE PRODUCED CHANGES.

INDIVIDUAL ELEMENTS HAVE TO BE BUILT BY CHILDREN.

27

PARALLEL LIFESTYLES

TOPBOARD

BOTTOM BOARD

PARENTS DON'T FEEL - PAINFUL

BOARD IS TURNED

CURRENT LIFESTYLE

WHAT YOU CAN DO IN DARK LIFE?

9

MADE OUT OF PAPER MALE

WATER TABLE

SEAN HEE

20

CALL THE IMAGES OF VARIOUS ENTITIES OF A DICE

THE CHILD TOUCHES A CERTAIN IMAGE AND HE HAS TO TALK THE SMALL TALK NEXT ENTITY IN THE DICE

MEMORY GAME

TREE

MAN

LAYERS OF ECOSYSTEM

LINKS CAN BE CREATED

CAN BE ROTATED UP TO A CERTAIN EXTENT

DIAGRAM OF ECOSYSTEM CONNECTIONS

AGGRESSIVE LEARNING

22

MODULAR RINGS (ECOLOGICAL CYCLE)

CAN BE RE-USED TO

PANELS REPRESENTING ENTITIES

PANELS CAN CHANGE MEANING AS BUILDING PLATFORMS (BIO MASSIVE)

CAN BE RE-USED ALONG ANY AXIS

23

MARKS MEAN VARIOUS ENTITIES OF A CYCLE

MOULD FOR MAKING A PASTE

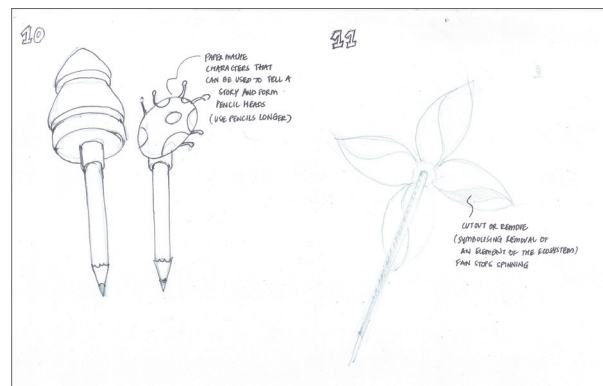
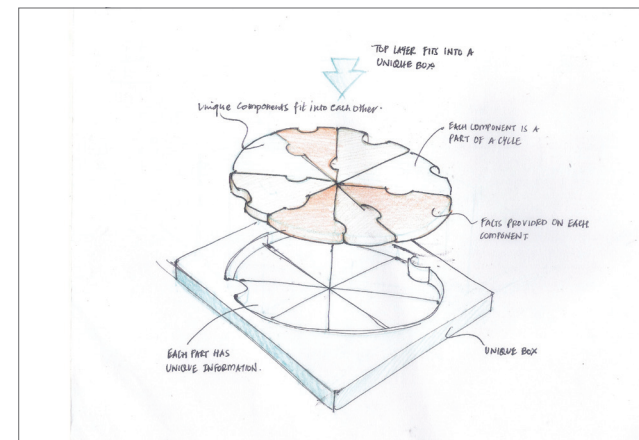
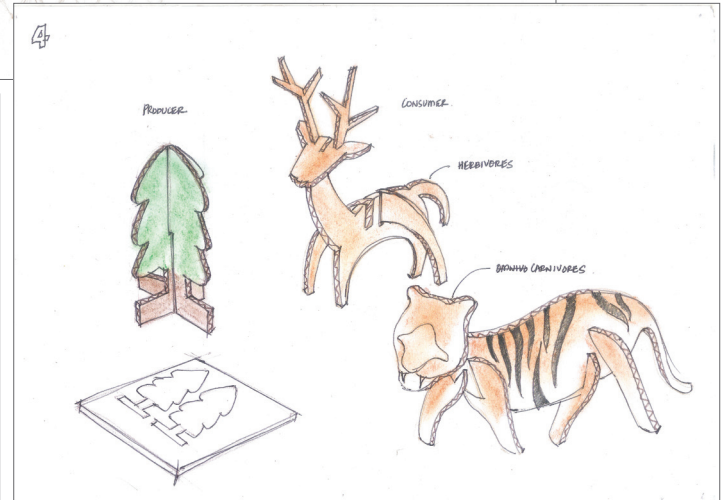
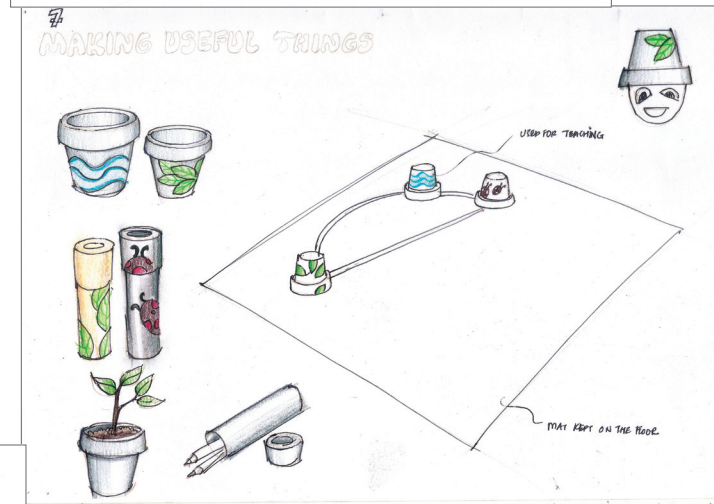
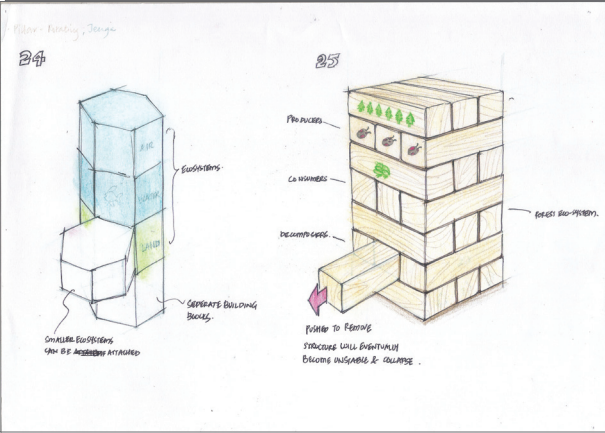
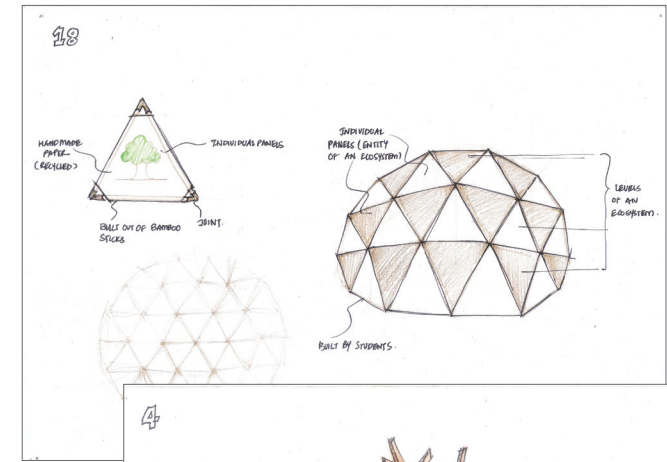
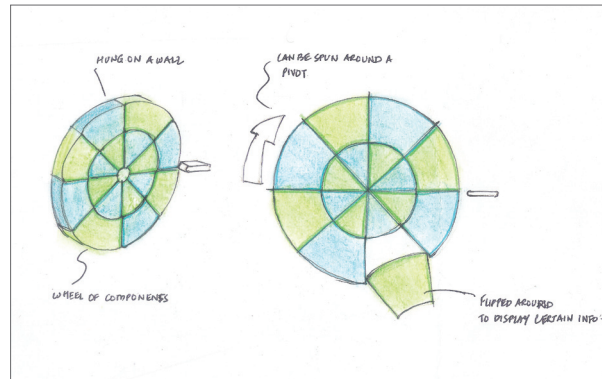
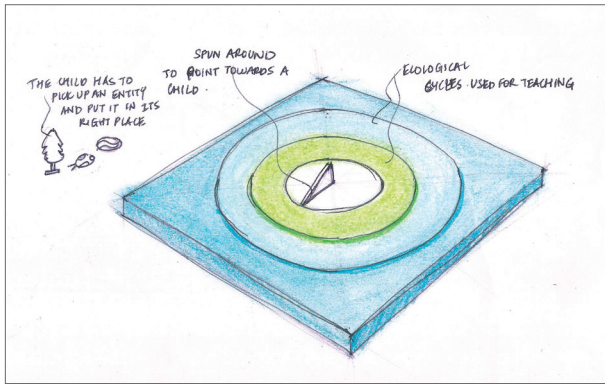
RELATED ECOSYSTEM

RELATED ECOSYSTEM

REMOVE ONE PART OF THE ECOSYSTEM FINDS THE CONSEQUENCES

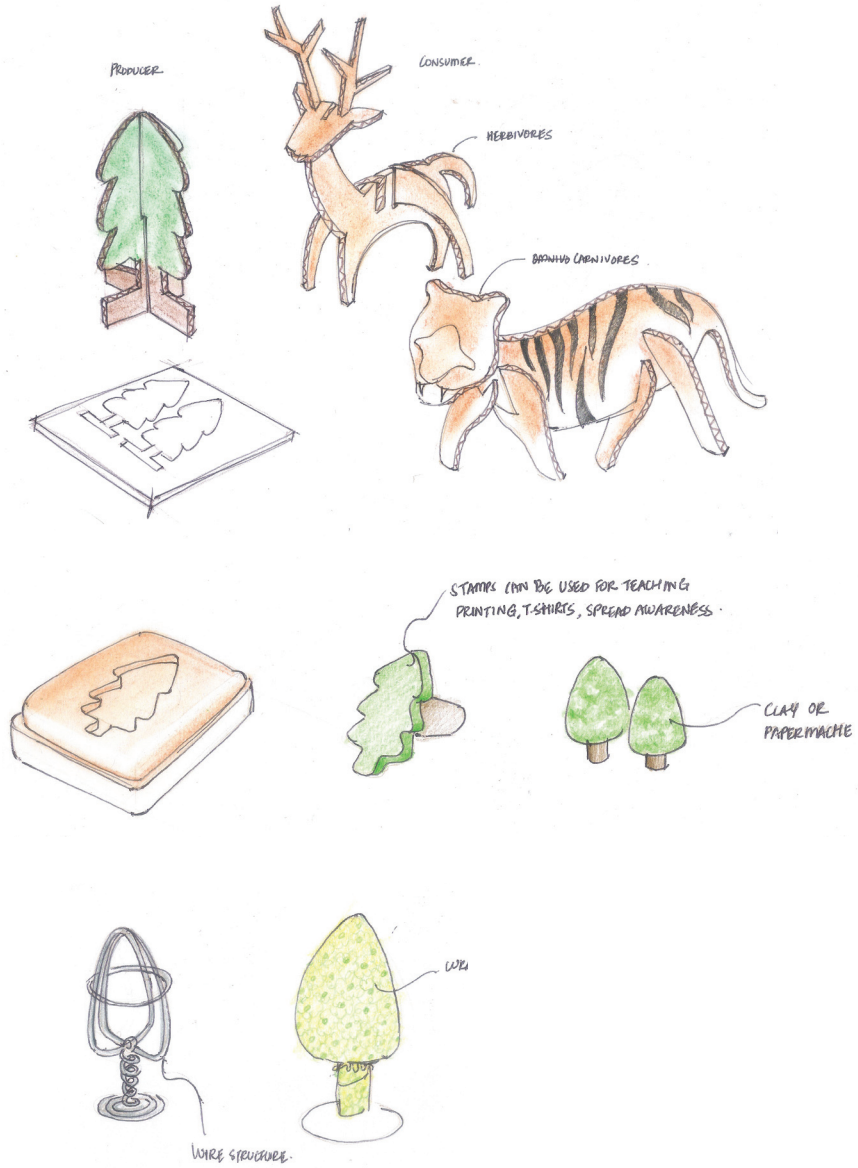
BOTTOM LAYER CAN BE PROVIDED TO TELL YOU WHAT YOU CAN DO

PROVIDE INPUT

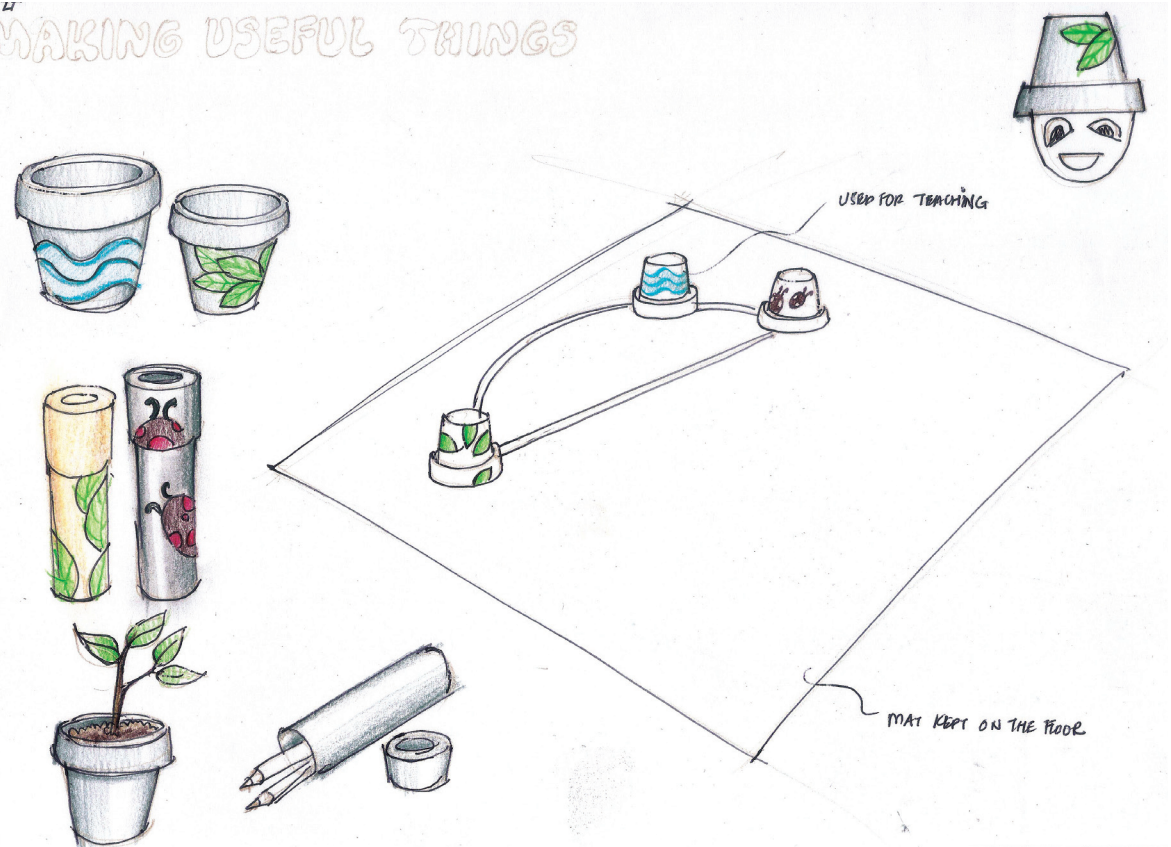


Concepts

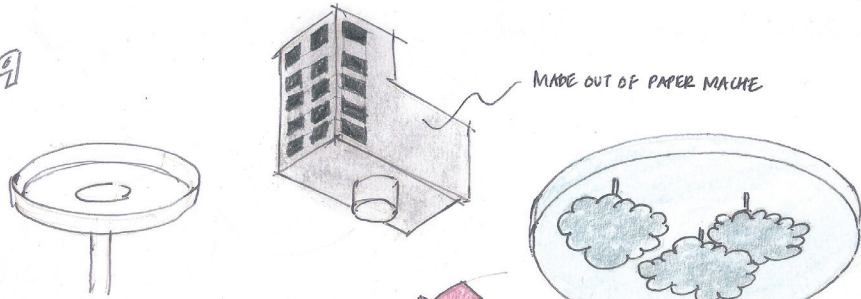
Concept 1.



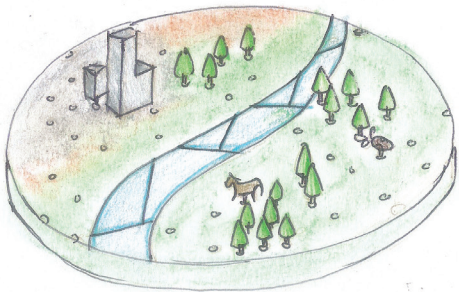
MAKING USEFUL THINGS



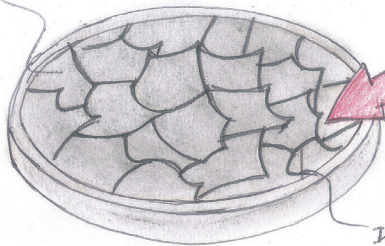
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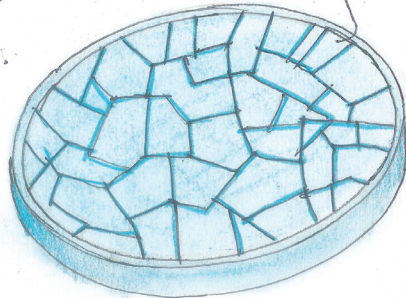
MADE OUT OF PAPER MACHE



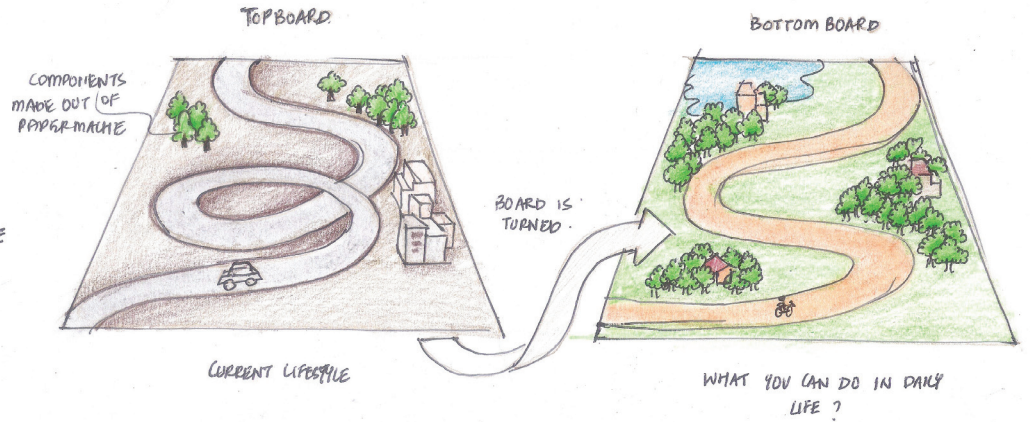
CDM



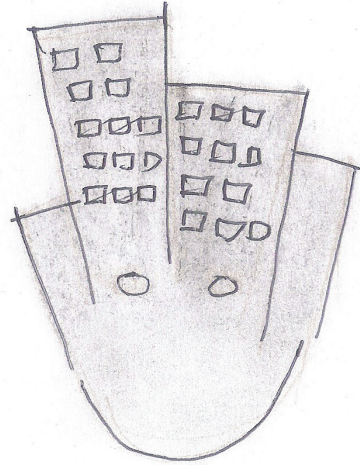
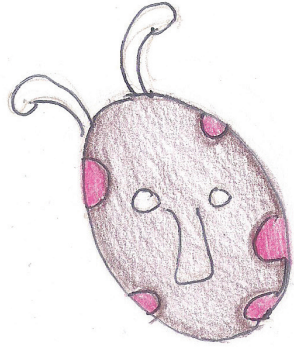
IRON ORE



WATER TABLE

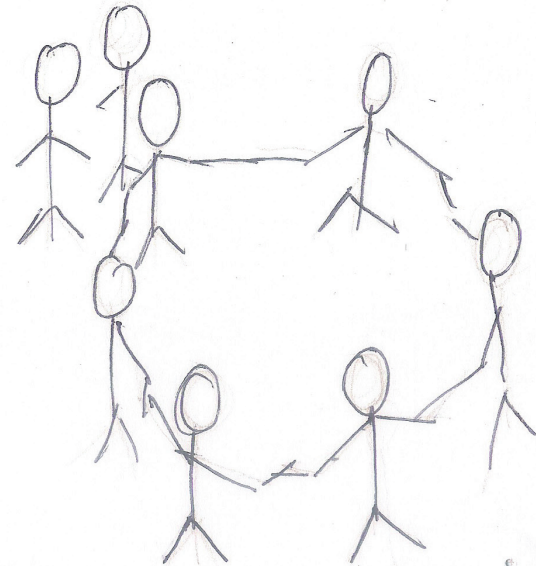
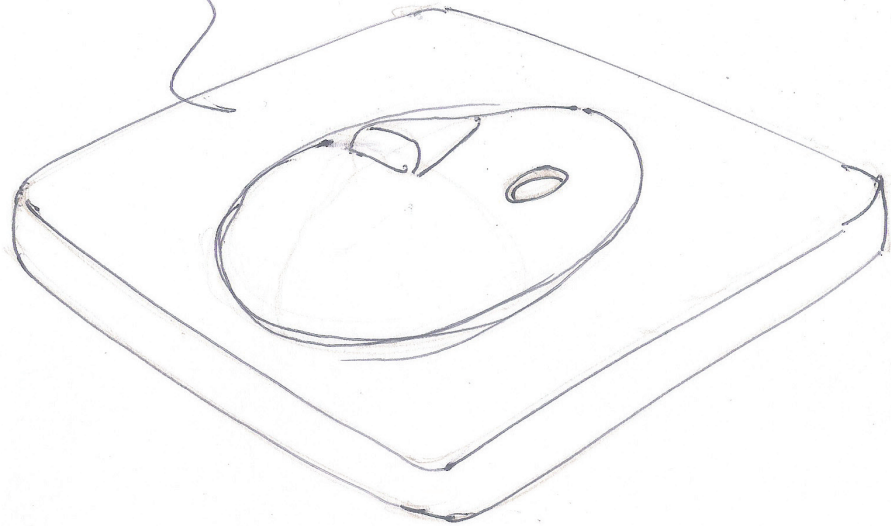


MASKS MEAN VARIOUS ENTITIES OF A CYCLE

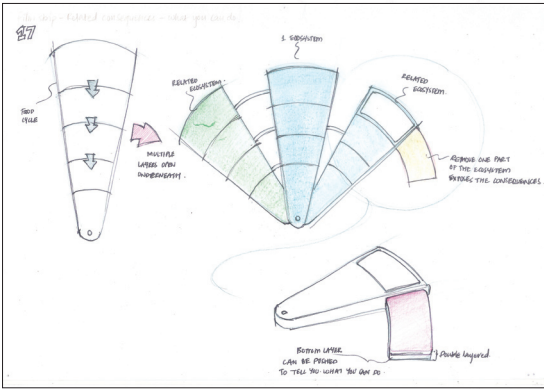
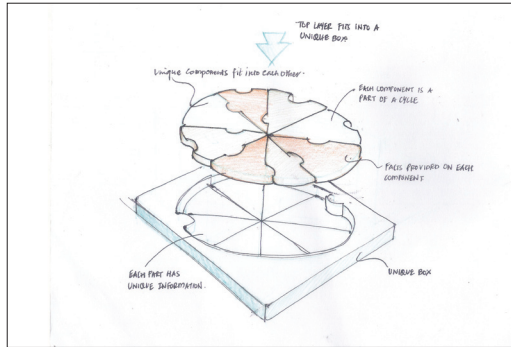
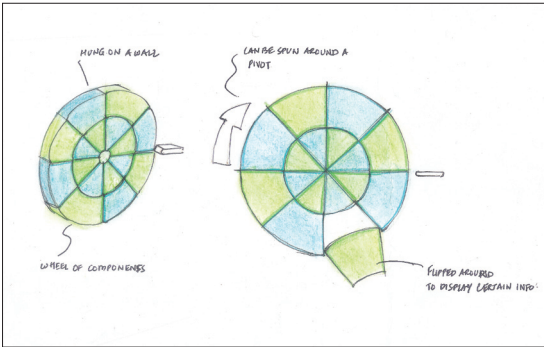


involve the children
make them hold
hands

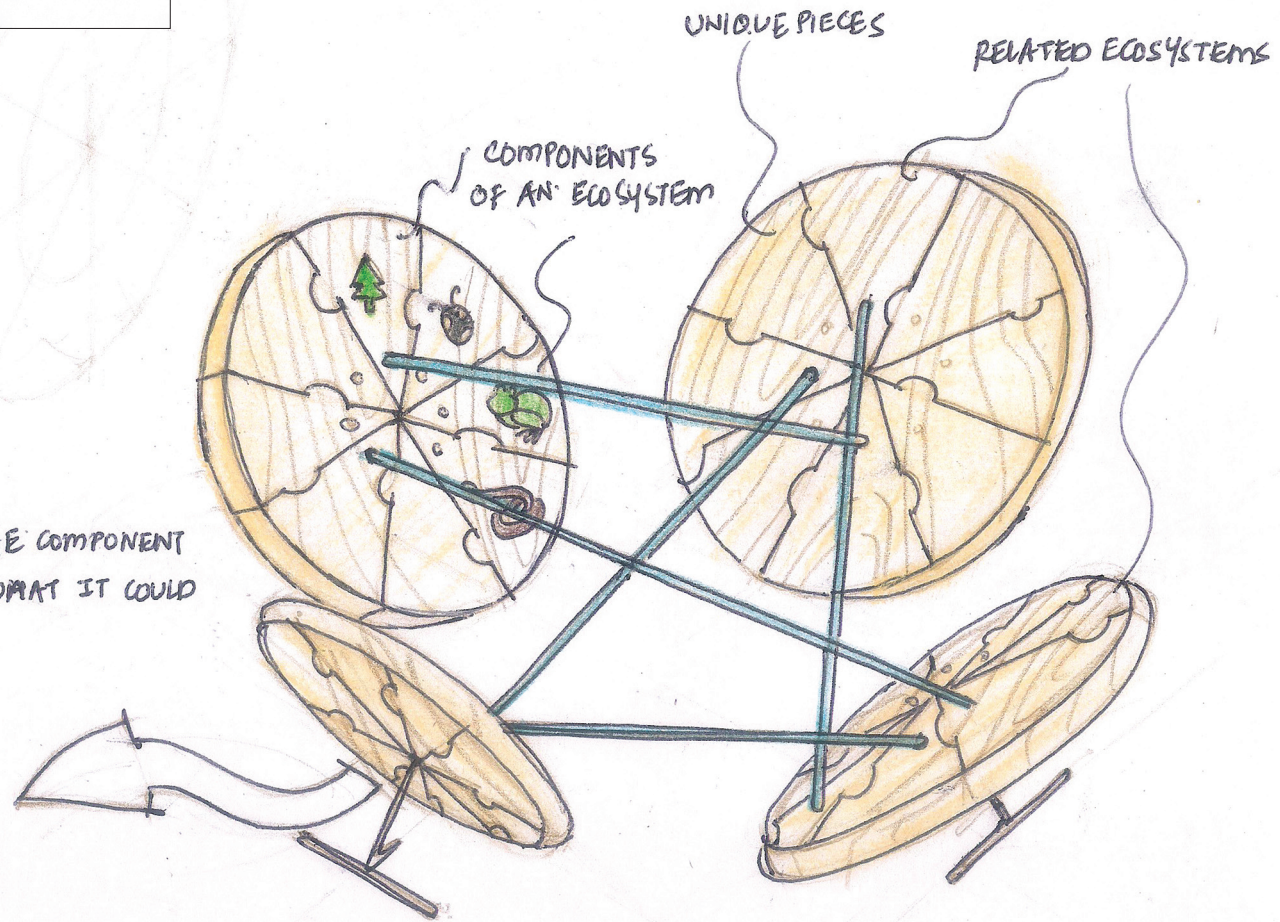
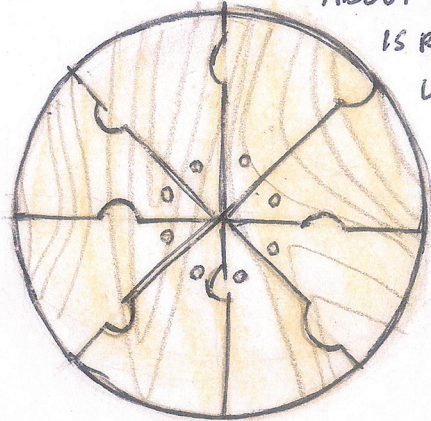
MOULD FOR MAKING A MASK.

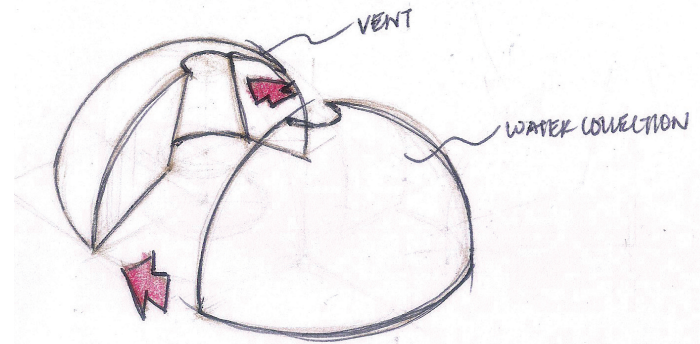
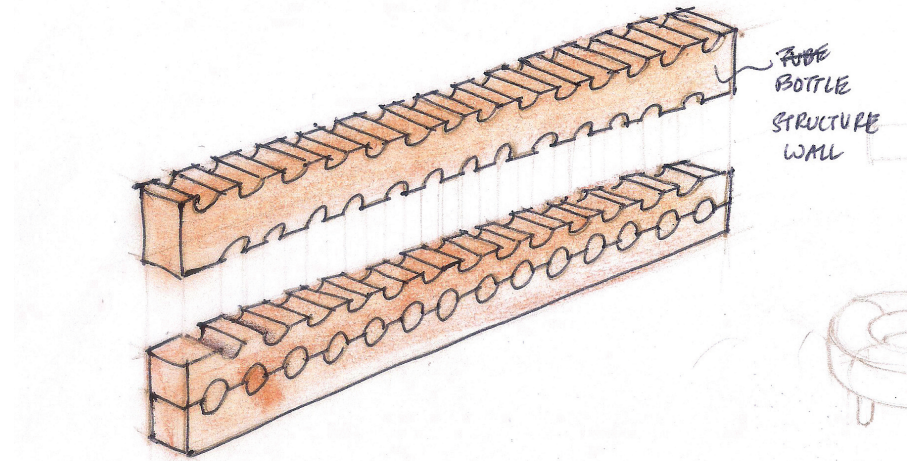
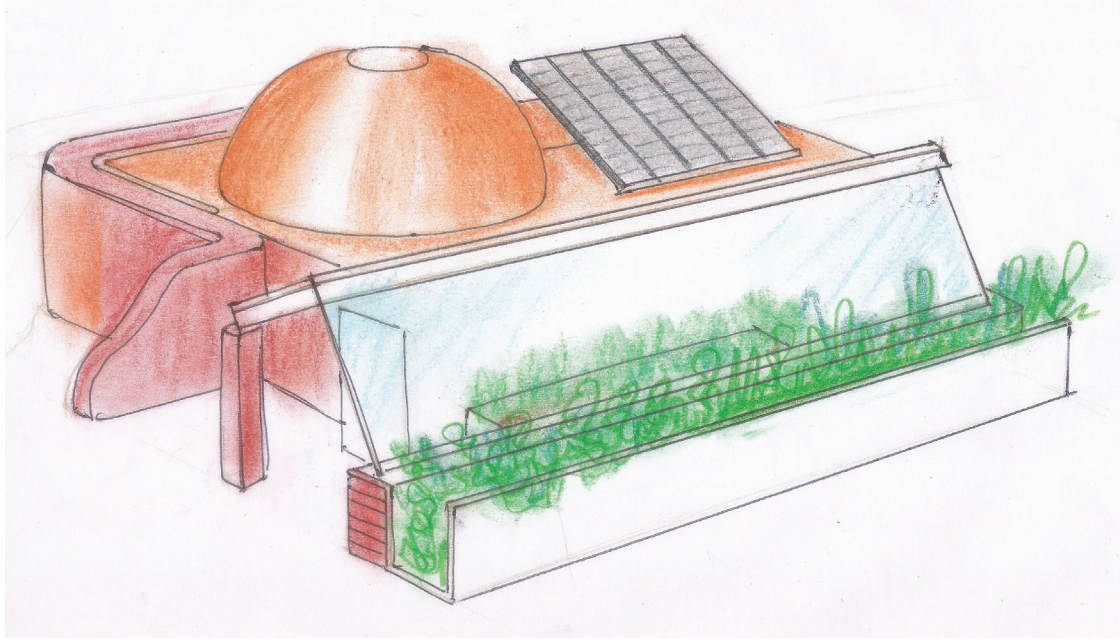


Concept 2.

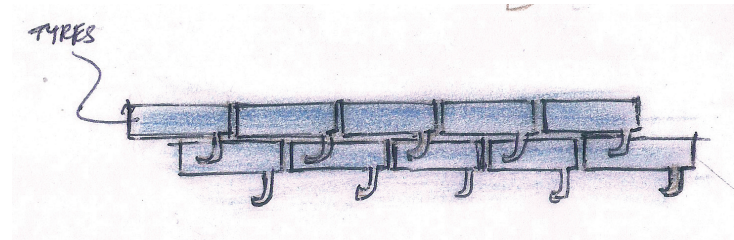


BACKSIDE CONTAINS INFORMATION ABOUT IF A SINGLE COMPONENT IS REMOVED, WHAT IT COULD LEAD TO.

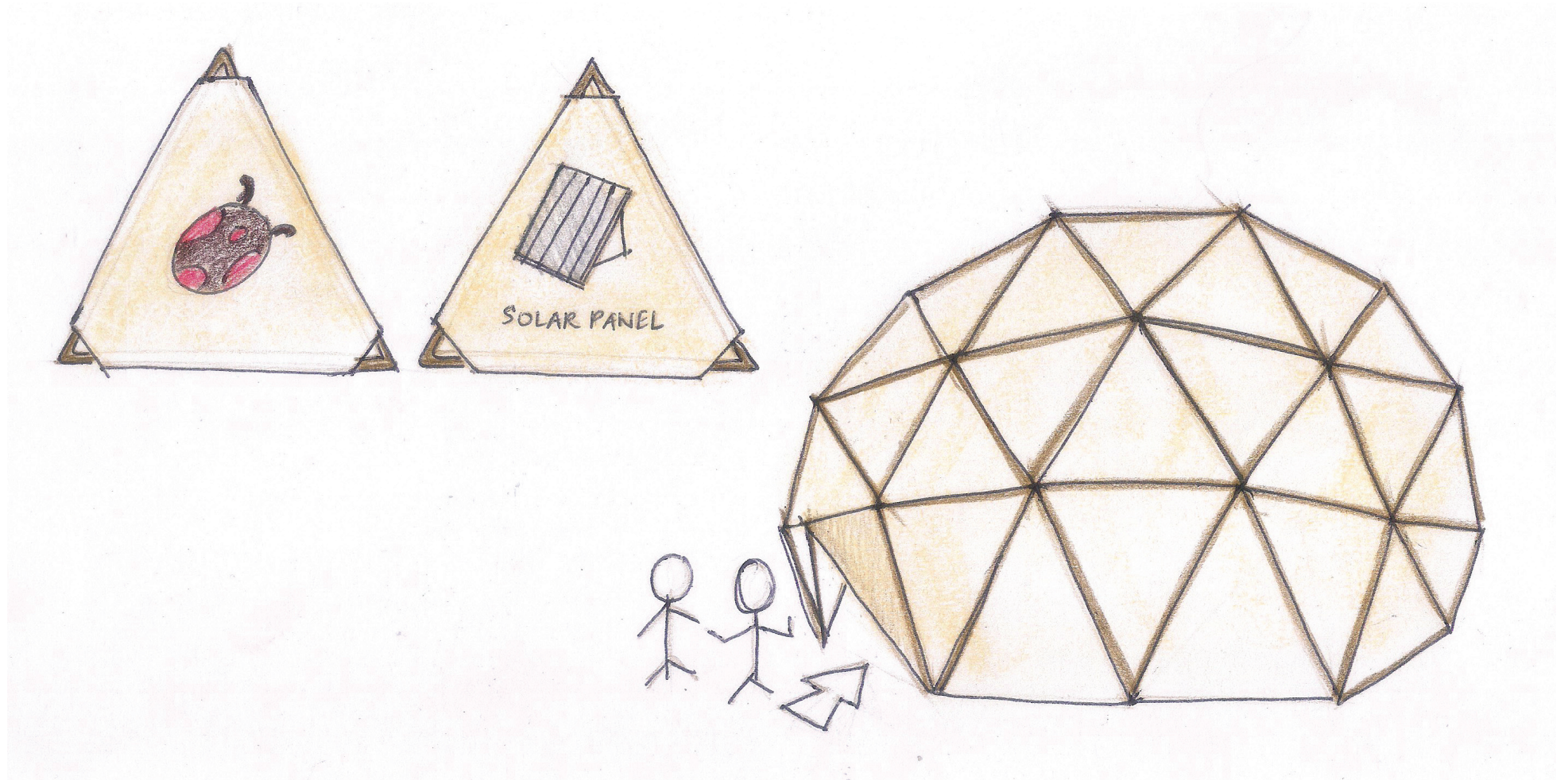




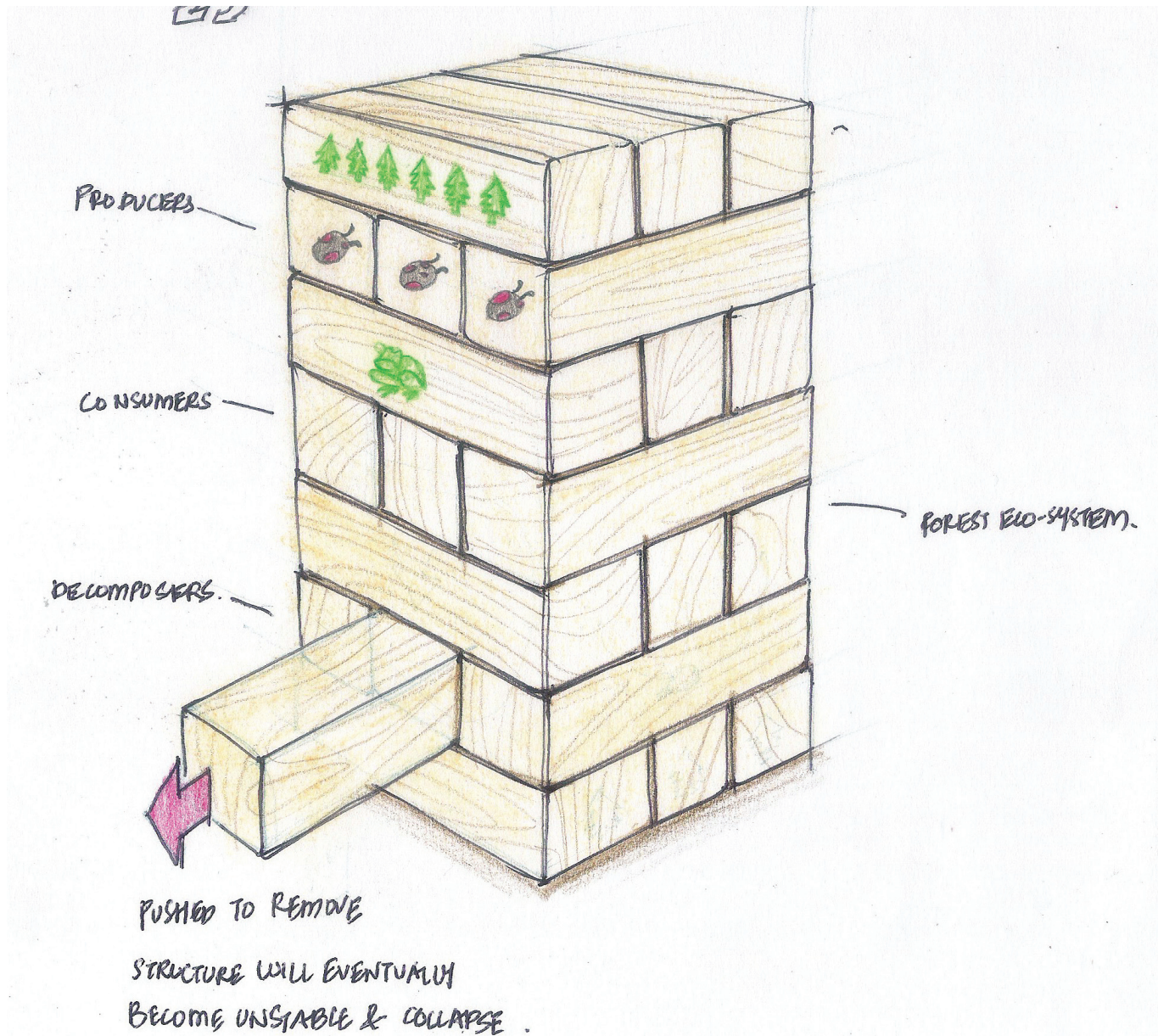
TYRE



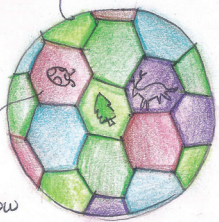
Concept 4.



Other ideas

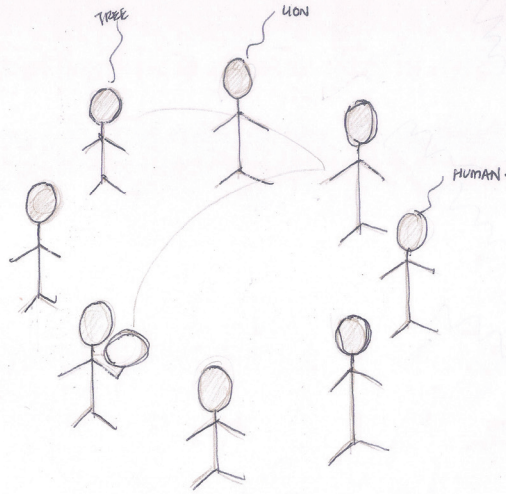


BALL HAS IMAGES OF VARIOUS ENTITIES OF A CYCLE



THE CHILD TOUCHES A CERTAIN IMAGE AND HE HAS TO THROW THE BALL TO THE NEXT ENTITY IN THE CYCLE

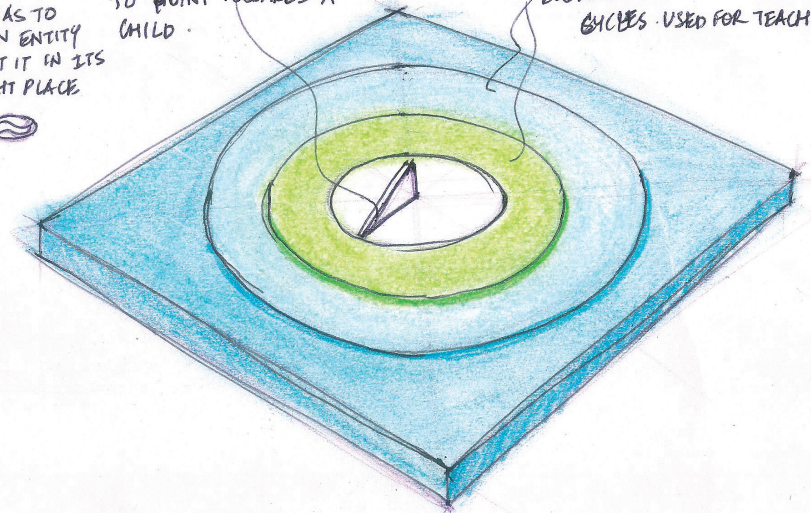
MEMORY GAME



THE CHILD HAS TO PICK UP AN ENTITY AND PUT IT IN ITS RIGHT PLACE
SPUN AROUND TO POINT TOWARDS A CHILD



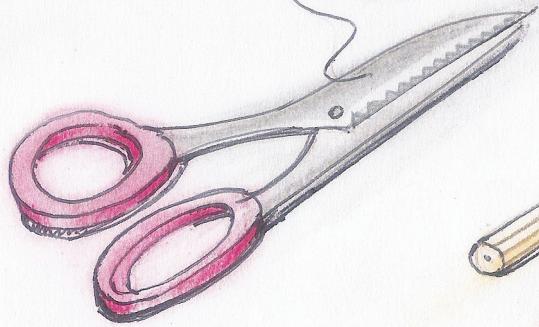
ECOLOGICAL CYCLES USED FOR TEACHING



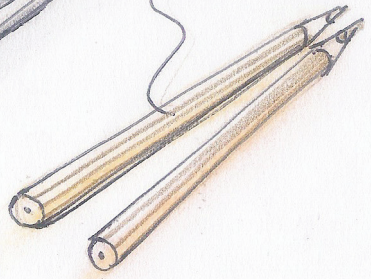
objects

materials
making

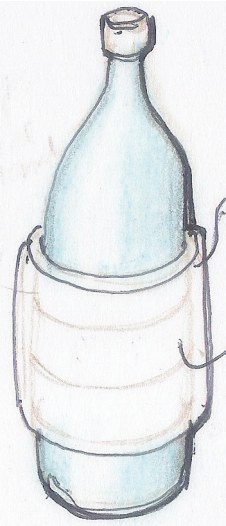
MAKE IT LOOK LIKE
A SAW.



RECYCLED



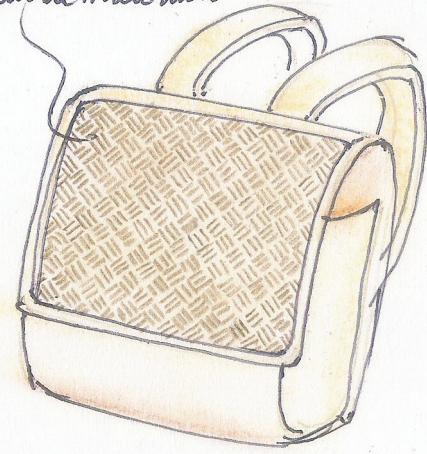
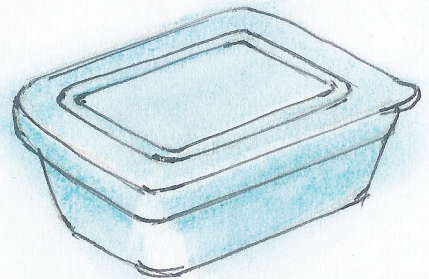
save high
water to
natural
material



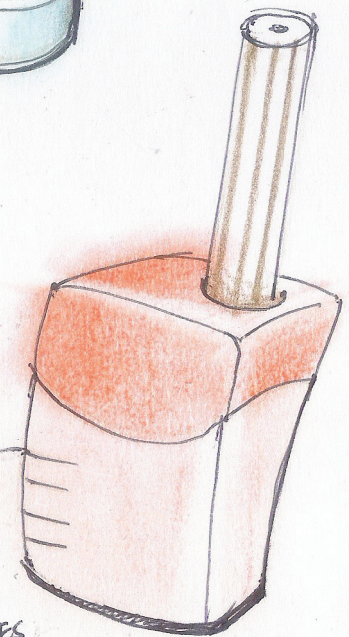
use less water
plastic & hazards

SLEEVES KEEP
WATER COLD (NATURAL MATERIAL)

Natural materials



NO OF TREES
CUT.



WHERE IT ALL COMES FROM?
DAILY ACTIVITIES. CONSCIENCE

Chosen concept is concept 1.

Reason for selection

Fun and Playful learning

Simplified information

Group learning

Progressive learning

Doing and learning

Sustainable methods of making the product

Low cost

Besides satisfying all these parameters it offers the flexibility to teach *multiple concepts through multiple stories*.

Teaching model

Class room scenario



20 students



kit provided to the teacher



kit contains- instructions for the teacher, story to be told, materials and intructions to make the entities of the story, board for teaching



students are divided into smaller groups representing various entities of the story



each group indulges in a craft activity to make the entities



the child becomes a part of the story as an entity as these entities are then used to teach multiple stories

Structure of the story

Ideal situation



Introduction to characters of the story and the roles they play (governing figures and entities)



Human intervention relating to the local context



Creation of the problem



Consequences of the actions and how it affects the characters in the story over a period of time (safe, danger, endangered to extinct)



What can you do in your daily life to make things better

Example

Endangered fish and Global warming

Governing figures

Builders
Fishermen
Fuel manufacturing companies
Electricity providers
Common man (consumer)
Government
miners

Entities

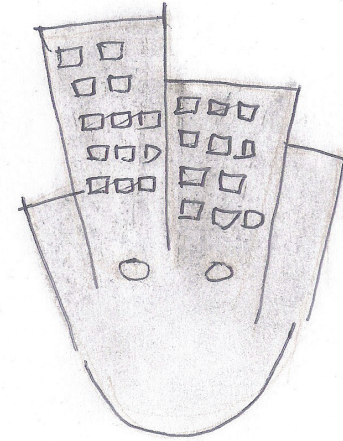
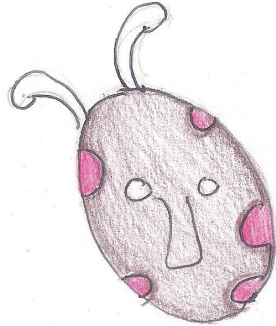
fish
sea weeds
ships
oil
coal
buildings
ocean
river
lake
ozone layer
CO₂
bicycle
glaciers
north,south pole

What is being taught?

Use public transport and share a car to save fuel
Switch off the lights and fans when we don't need them.
Turn off the tap while brushing your teeth or washing your face
Switch off the charging points when not in use
Use an AC only when you need one
Walk short distances
Have a bucket bath and not a shower
Get a bicycle
Do not waste food

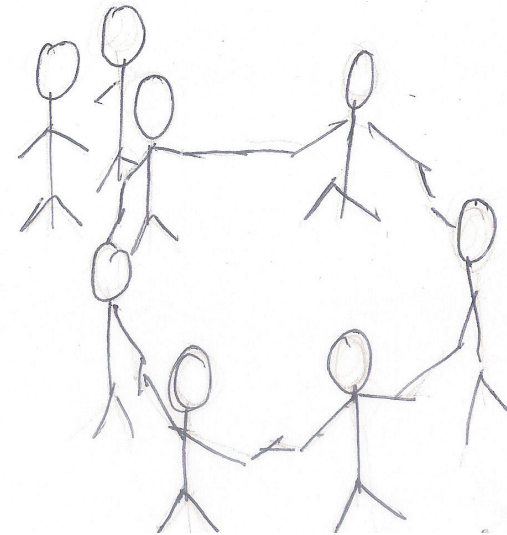
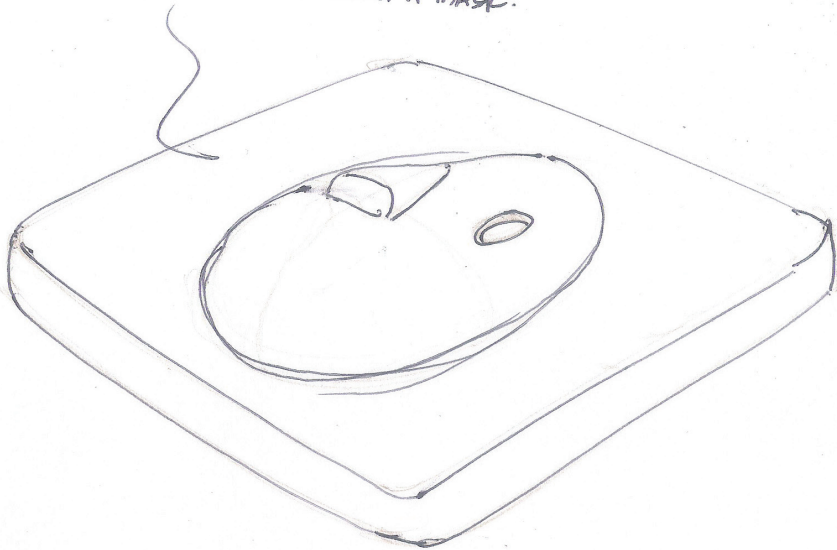
Reinforcing the activity

MASKS MEAN VARIOUS ENTITIES OF A CYCLE

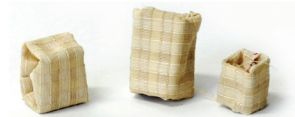
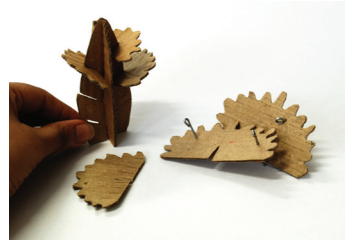


involve the children
make them hold
hands.

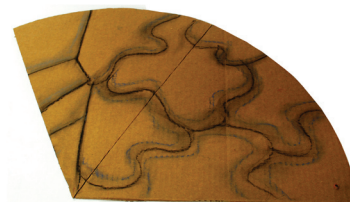
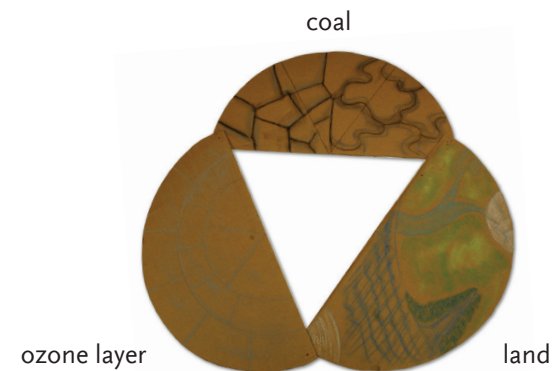
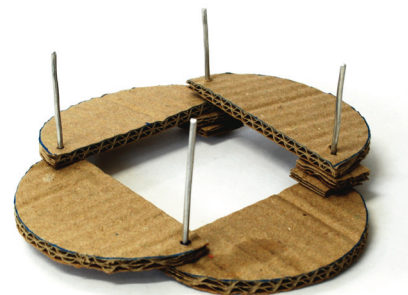
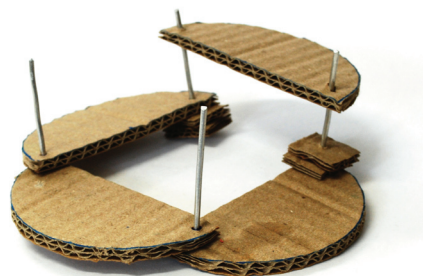
MOULD FOR MAKING A MASK.



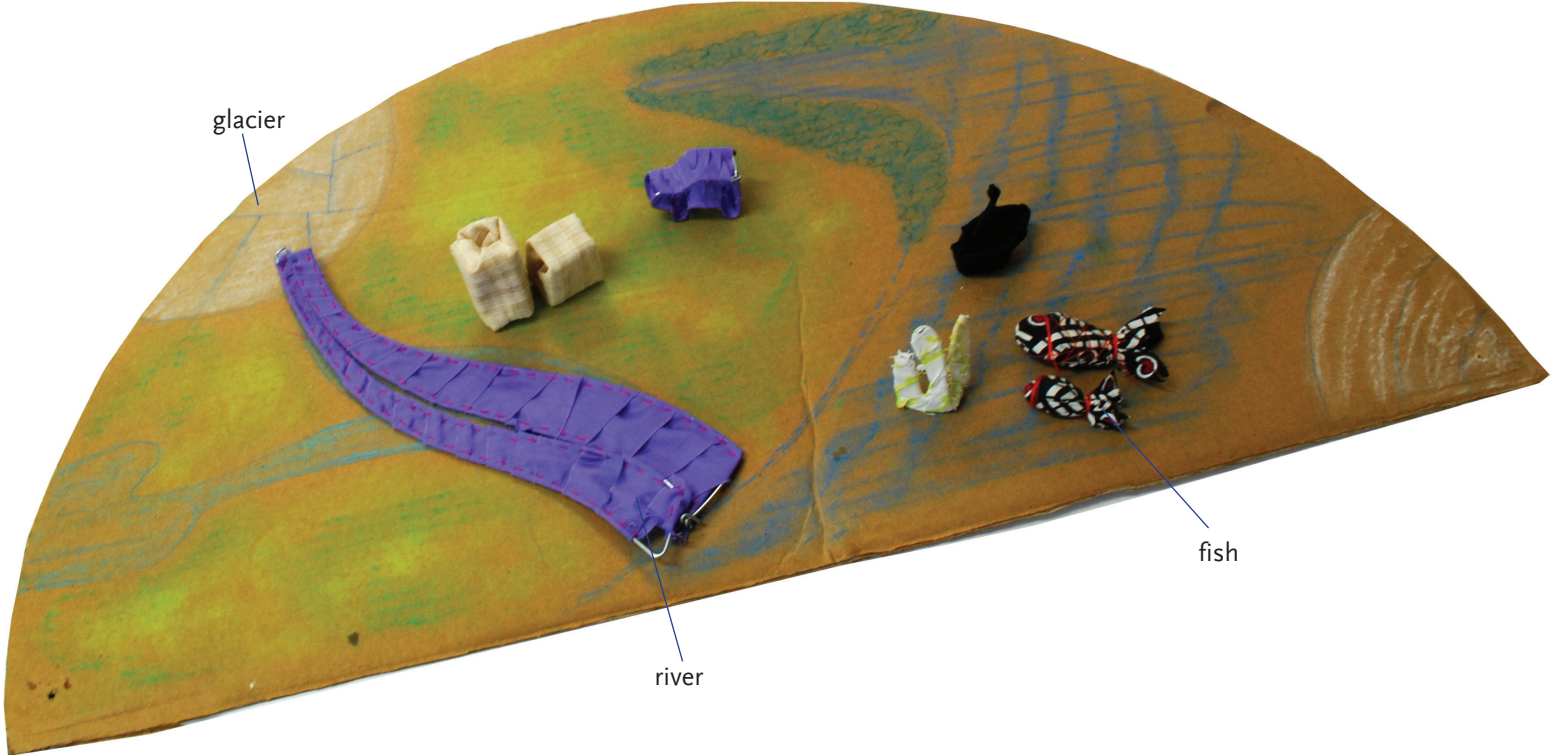
Making the entities



Making the board



Using the board to teach



Feedback received at stage presentation

Reduce the number of messages

Smaller stories

Improve engagement of kids

Coherence of the story and the entities

Relation to the school curriculum

Reduce conflicts

working with smaller groups

Time constraint

Need to work with children closely

Revised model- Version 2

Story theme- hazards of plastic, story of mumbai floods

Values- Reuse of things

Medium of making the entities- corrugated sheets, packaging waste

Narrator- Teacher

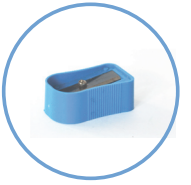
Story structure

- example of a family in mumbai
- every member of the family has a certain lifestyle
- the family goes through a traumatic experience of a flood
- realisation about how they affect things around them
- changed their ways of living

Moral of the story

- Avoid using plastic bags and plastic products
- avoid throwing garbage on the road
- sharing things
- buying things only if you need them
- reusing older things for newer functions eg.plastic bottles for pots, old clothes to make cloth bags.

Making the entities



Trees



flooding water



Fish



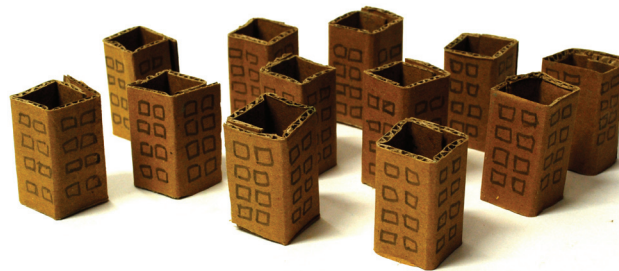
Turtle



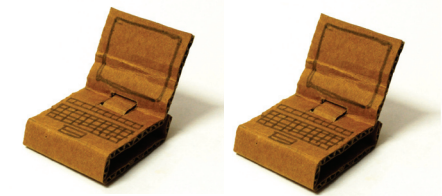
Medicine and apples



Cars



Buildings



Laptop



plastic PET bottles



Cell phones



Plastic bags



Drains

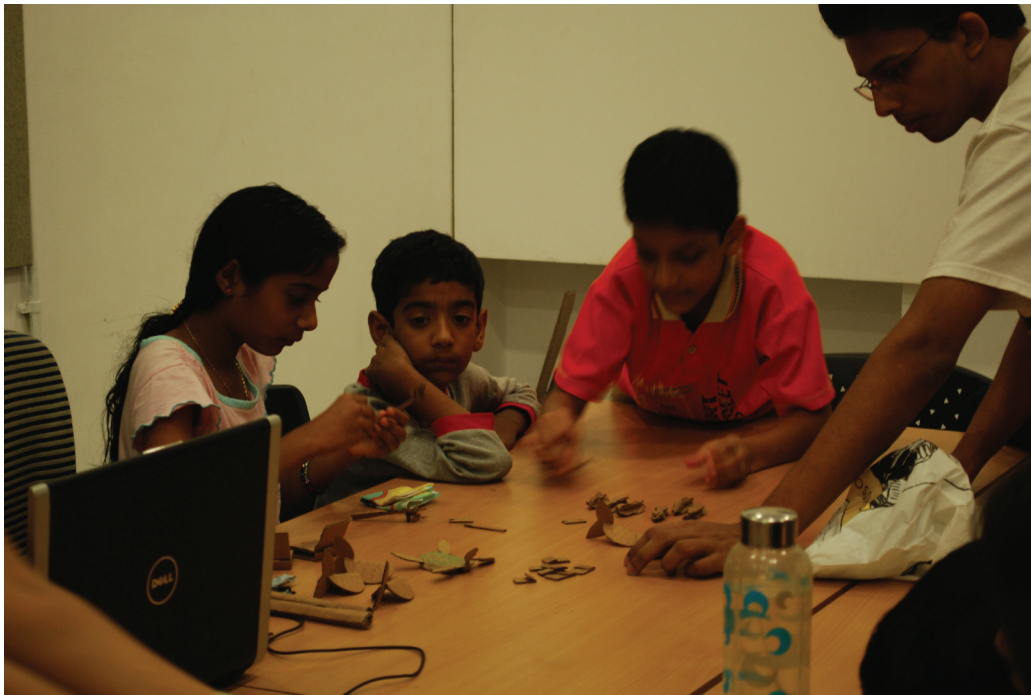


Chargers

Testing I

No of students- 9
grade- 4th and 6th

Step 1. making things



Step II. telling the story through the entities



Results of testing

Feedback

- activity of learning was an *enjoyable experience*
- *something* that were taught were *repetitive*

Observations

- *Difficult to keep the interest of children at regular intervals*
- The way of *making th elements was too simple*
- The *story was too simple*
- Large group of children are difficult to control
- *Long intervals of the story had less or no action on the board.*

Analysis

- The activity of making things should be more interesting
- There is a *need to develop interest at regular intervals*
- *Story needs to be more interesting and impactful*
- *Role playing needs to be enhanced*

Revised model- Version 3

- *message had to be clear*
- *enhanced role playing*

Story theme- Role of mangroves and mumbai floods

Values- conservation of nature, reuse and reduce and recycle, rain water harvesting

Medium of making the entities- corrugated sheets, packaging waste

Narrator- *Teacher + students*

Story structure

- Mumbai, mangrove, estuary, arabian sea, environmentalists are characters. There are also some governing bodies
- The characters tell their respective stories. They explaining their roles in mumbai and how they have changed over a period of time because of human intervention
- Building of the problem and their consequences
- Mumbai floods
- Environmentalists and their intervention

Moral of the story

- *Protection and conservation of mangroves*
- *Rain water harvesting*
- *Reusing, reducing the things they use like toys and clothes*
- *Seperation of waste*

Role playing

Narrators

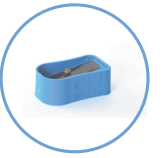
Teacher
Mumbai city
Arabian sea
The Estuary
Mr. Mangrove
Environmentalist

Groups

Arabian sea
Estuary
Mangrove
Environmentalists
Builders
Industrialists
Common man
Fisherman
Rain group

Things they make

Waves
Fish, turtles
Mangrove trees, butterflies, crab, flamingo,
Badges
Buildings, offices
Factories, laptop, cell phones, cars, TV, waste
Plastic bags, waste
Boat
Rain water



Making the entities



Turtle



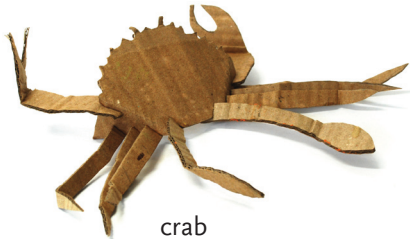
Snail



Butterfly



Trees



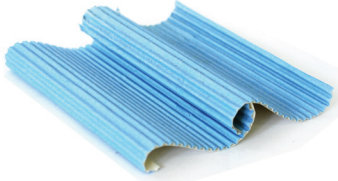
crab



Flamingo



Fish



Waves



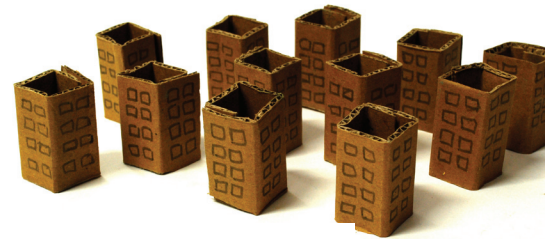
flooding water



Towers



Factory



Buildings



Cars



Boat



Laptops



Television



Fish



cell phones



plastic bags



Charger

Testing 2 No of children tested- 12



Step II. narrating the story with entities

Results of testing

Feedback

- Children found the activity to be enjoyable
- They *learnt new things*

Observations

- The *moral of the story was very bluntly told*
- there was problem with **accessibility of the board**
- some children had problems while reading
- some children sat idle while others had a stronger role
- *some entities like the waves take time to build*
- *narration by children shows better involvement*
- large group of children is difficult to manage

Analysis and insights

- the kit and its placement in the class needs to be reviewed
- language needs to be simplified
- *scale of the objects on the board needs to be checked*
- the distribution of tasks to children should be equal
- *moral of the story has to be interestingly told.* tell them realistic things they can do and how
- the *tasks need to be analysed on the basis of child's ability*

Revised model after Testing 2- Version 4

The basic structure of the story and the teaching model remains the same except the *moral of the story which is told a little differently* i.e. With appropriate relevant action on the board.

The *entities* which are a vital part of the learning experience were explored in order to *improve their expression using elements of design*.

Efforts were taken to have a *common language in aesthetics of the kit*. Illustration styles, graphic design, material, manufacturing process and form was used to achieve this result.

A *guide for teacher and a guide for children* where designed.

Packaging was designed to house the board, manuals, entities etc.

re^{act} diary was designed as a part of a *system which ensures and encourages children towards a more sustainable lifestyle*.

Exploring the entities



Crab



Turtle



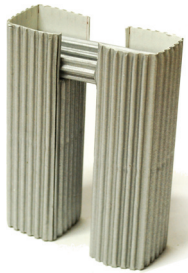
Butterfly



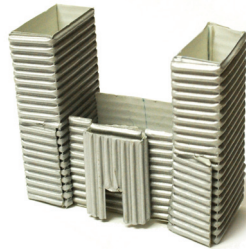
Turtle



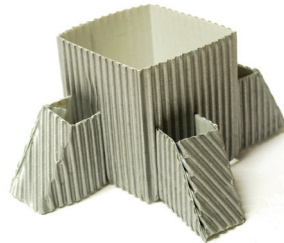
Bird



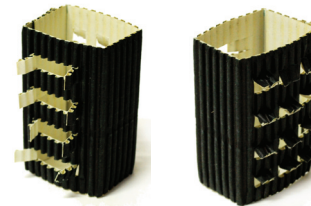
Twin Tower



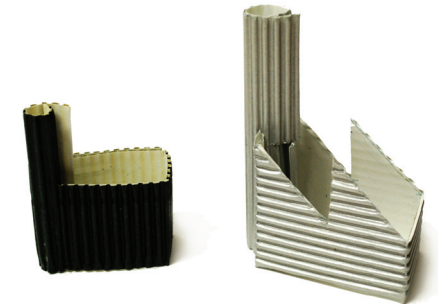
Office 1



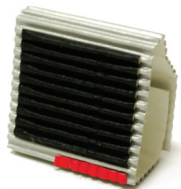
Office 2



Building



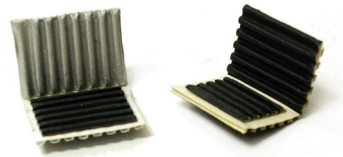
Factory



Television

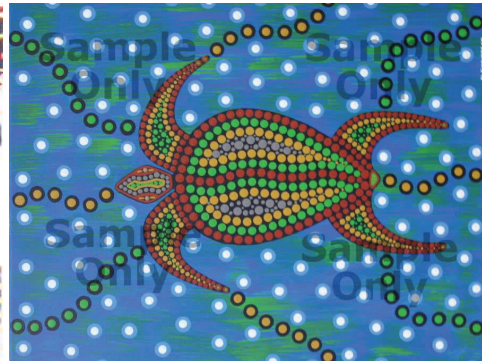


Car



Laptops

Certain existing illustration styles were studied.



Aboriginal art

Mata ni pachedi



"This place needs some cheering up!"
Barnacles declared as he pulled out his accordion and began playing a happy shanty.
In the warm glow of the ship's beams, flowers blossomed and the leaves turned wonderful colors. Curious shadows slowly came out to watch.



Maori art

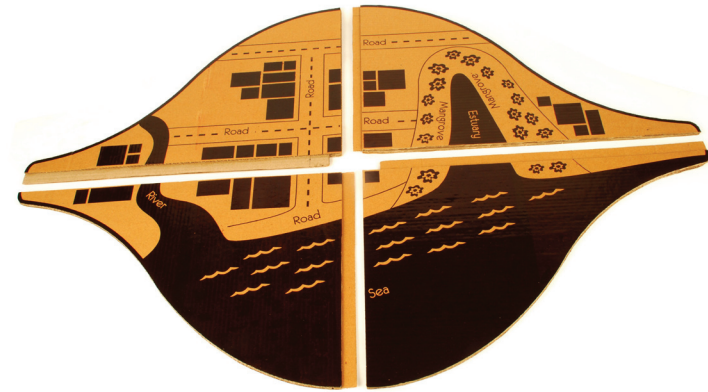
Madhubani

Prototyping

Material- *corrugated sheets*

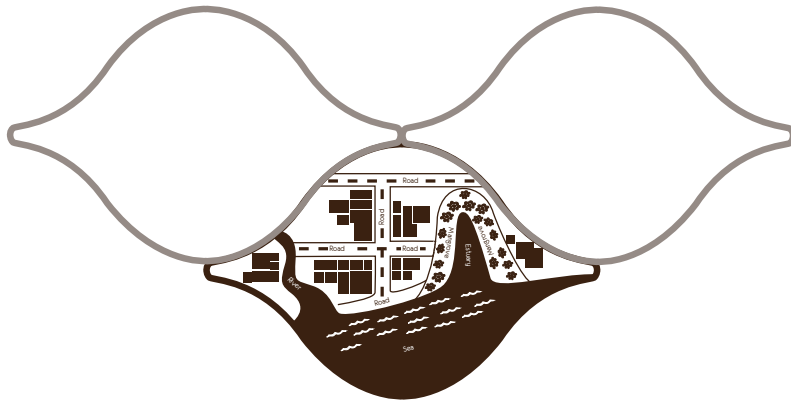
Printing technique- *screen printing*

Cutting- *die cutting, creasing*

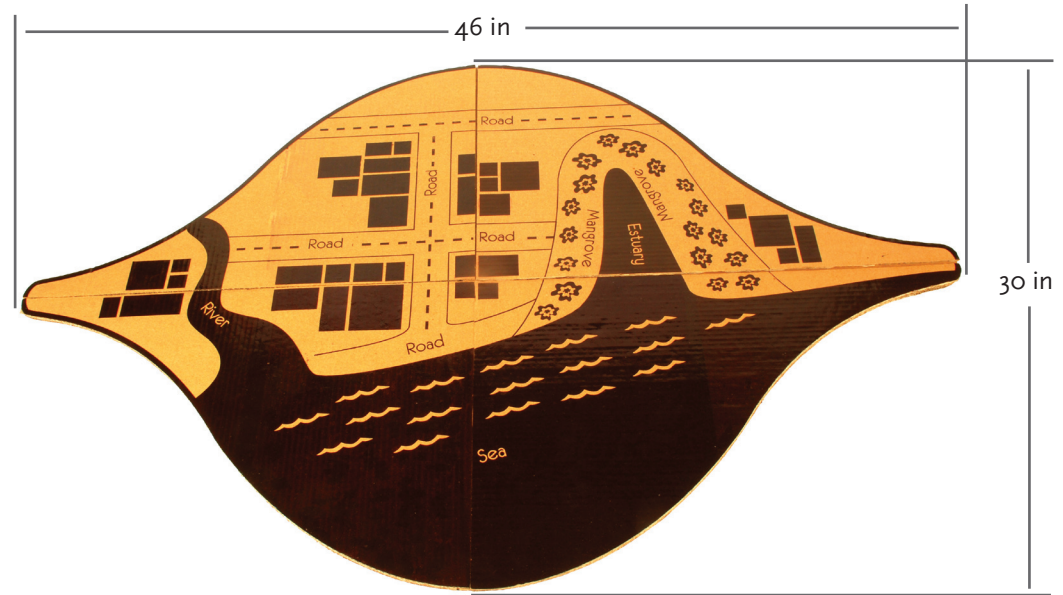


board made in 4 peices

Board



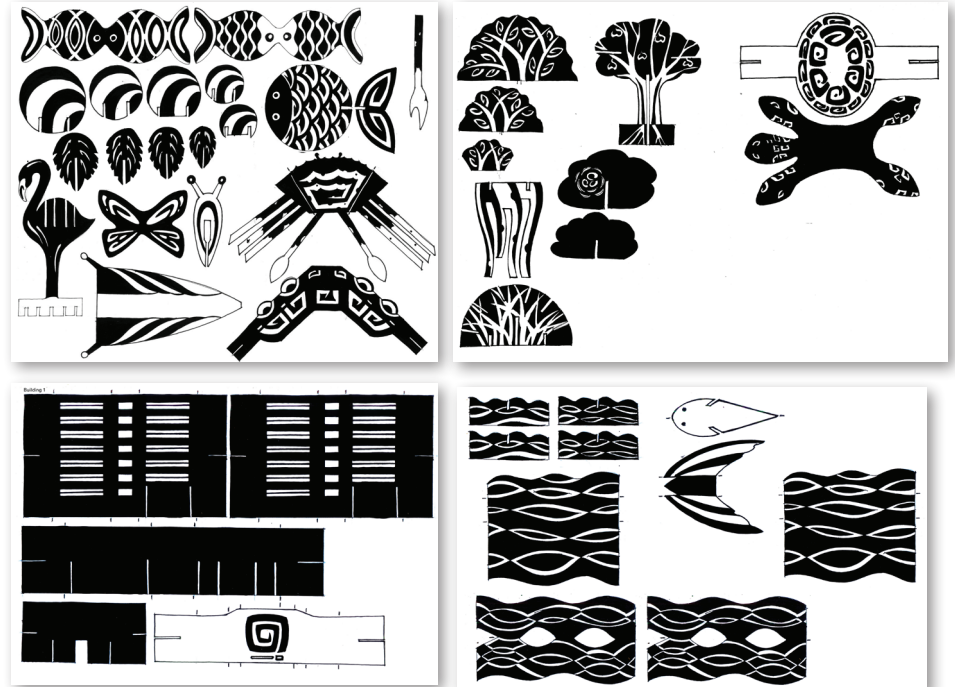
Multiple boards fit closely



4 board pieces assembled into 1



Entities



Drawings given to the screen printer



Mangrove



Tree



Turtle



Flood water



Waves



Bird



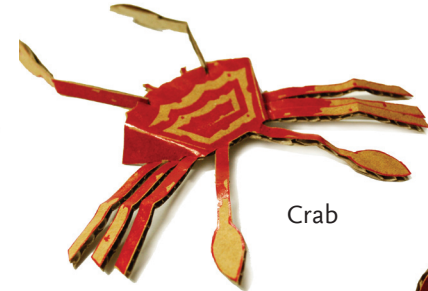
Fish



Butterfly



Snail



Crab



Twin Tower



Office



Car



Factory



Building



Flamingo



Laptops



Television



Plastic bag



Fishermans boat

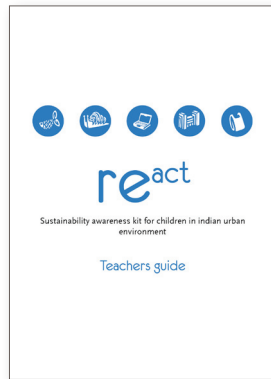
Naming the kit

The kit was named as **re^{act}**. 're' stands for following values of *Reduce*, *Reuse*, *Recycle*, *Realize*, *Responsibility*, *Respect*, *Restore*, *Revive*, *Retain*, *Repair*, *Recreate*, *Relive* and 'act' stands for acting upon all these values.

Packaging



Guide for Teachers



Guide for children

A set of cards is provided which gives the children clues about how to assemble the entities.





Expandable nature of the teaching model

Same entities and multiple stories can be used to teach more things to children.



Thank you...