

Design Thinking and Innovation Curriculum for Grade 9

Contents:

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| | 1.0 | Design Sensitivity Skills | Semester 1 Fundamentals of Documentary Photography | 18 hours | 18 credits | 7 |
| | 2.0 | Design Sensitivity Skills | Fundamentals of 2D | 18 hours | 18 credits | 12 |
| | 3.0 | Design Thinking Sensitivity | Introduction to Observation + Problem Identification | 18 hours | 18 credits | 24 |
| | 4.0 | Design Thinking Projects | Design Project 1 with focus on Communications and emphasis on Problem Identification | 27 hours | 27 credits | 30 |
| | | | Semester 2 | | | |
| | 5.0 | Design Sensitivity Skills | Fundamentals of Sketching for Ideation | 18 hours | 18 Credits | 37 |
| | 6.0 | Design Sensitivity Skills | Fundamentals of 3D | 18 hours | 18 Credits | 44 |
| | 7.0 | Design Thinking Sensitivity | Introduction to Problem Understanding + Analysis | 18 hours | 18 credits | 51 |
| | 8.0 | Design Thinking Projects | Design Project 2 with focus on Products and emphasis on Problem Analysis and Mappings | 27 hours | 27 credits | 57 |
| | 9.0 | | Assessment + Feedback Forms | | | 63 |
| | | | Total Hours and Credits | 162 hours | 162 credits | |

Design Thinking and Innovation Task-book for Grade 9

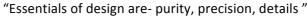
Introduction:

0.1.1

What is Design?



"Design is solution to a problem" -John Maeda, Designer and Teacher



-Prof Sudhakar Nadkarni, Designer and Teacher





'Design is thinking made visual" -Saul Bass, Graphic Designer

"Design is plan for arranging elements in such a way

-Charles Eames, Designer and Film Maker





"Design is not just what it looks like and feels like. Design is how it works."

-Steve Jobs, Designer and Businessman

In a nutshell, design is about understanding needs and being sensitive to issues, identifying problems that need to be solved, creating innovative appropriate solutions, and considering aspects of sustainability such that it makes a positive difference to life in our universe.

0.1.2 Who is a Designer?

A designer is a highly creative person who enjoys solving problems. The reason why they enjoy being creative is that they are sensitive to the needs of people and understand the extent of the issues in society. This sensitivity allows a designer to be intuitive and to think of opportunities that enhance the lives of people. It makes them appreciate the intricate aspects of a problem or a situation to help better it through creative designs. (Ref: 2)

Design being an important part of the creative industry has many options for you to pursue, such as Communication/Graphic Design, Product Design, Animation Design, Automobile Design, Architecture Design, Environmental Design, Digital Design, Textile/Fashion Design, and such.

So, if you are looking for something which will give your creative streak in you an outlet and also provide you with innovative problem-solving skills, design may be the option for you.

0.1.3 What is Design Thinking?

One can understand Design Thinking as a method to solve problems using a process. It is one of the most effective ways to create something new.

A process that first understands users, identifies and analyses a problem or need, and researches relevant information, after which ideas are explored and analyzed, until an appropriate innovative solution to the problem or need is arrived at.

Hence Design Thinking could be viewed as the process that translates an idea into a blueprint for something useful, whether it's a vehicle, a building, a graphic, a service or a system. (Ref: 2)

0.1.4

Who is a Design Thinker?

A Design Thinker is a person who applies the Design Thinking process to solve problems and find creative innovative solutions in any field or domain. For example, you could apply Design Thinking to solve problems in arts, social sciences, law, medicine, engineering, business, etc. It could even be applied to solve problems at home or in your neighbourhood or in your place of work. Whether it is a simple problem or a complex problem, a design thinker finds creative ways to tackle them.

If everyone could adopt this method to solve problems then we would be moving towards a creative society that finds solutions to many of its problems.

0.1.5

What is the Design Thinking Process?

It involves the following five phases in the process of solving a problem: Phase 1. Observe/Empathise/Research,

- The first phase helps you to identify needs and locate issues to be solved through observation and empathy

Phase 2. Understand/Analyse/Define,

- The second phase of the process helps you to understand, define and analyse the problem area

Phase 3. Ideate/Alternate/Create,

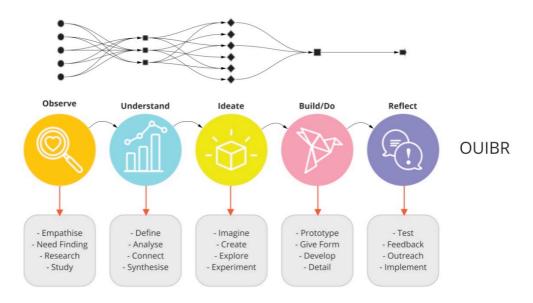
- The third phase helps you to come out with several alternate creative innovative solutions to the problem

Phase 4. Build/Prototype/Detail and

- The fourth phase helps you to actualize the solution by building mock-ups, creating scenarios, and then prototyping and detailing

Phase 5. Reflect/Feedback/Implement

- The last fifth phase is to get feedback through evaluation so that the suggestions can be implemented in the final solution.



1.1.6

What is Innovation?

Innovation involves the implementation of something new and replacing or reframing the existing mindset. It is about translating a concept, idea, thought, or invention into artefacts and services that create value in life. It is the process of transforming ideas into commercial reality. Innovation plays a major role in society. It helps us cater to the needs of people that arise from constant physical and emotional changes. It helps identify the crucial applications of technology and scientific inventions.

As compared to Innovation, Invention happens once in a while. However, each Invention may produce millions of Innovative Products – like the invention of Wheel has produced and continues to produce Innovative Products for the benefit of mankind. Innovation is in how an invention can be used to solve problems. Hence, Design pursues Creativity of Innovation.

1.1.7

What is the overall vision and aims of Design Thinking and innovation Curriculum?

The overall vision of DT&I curriculum is to be able to instill the following in the students:



 Explore student's sensory abilities, cognitive abilities and social abilities



 Create awareness in the students through observation, discovery, analysis, experience, collaboration and reflection



• Nurture their curiosity and enhance their explorative abilities



• Foster creativity and innovation in students



 Identify problems and be able to find solutions
 Apply Design Thinking process and methods to solve various problems



• Learn the fundamentals/essentials of the creative design discipline

In addition, DT&I will promote socially responsible practice through enlightening the students with ways to solve problems within the Sustainable Development Goals as mentioned by the United Nations. The course also helps students derive culturally-rooted understanding of design from information documented under the Indian Knowledge Systems.

References:

questions

Reference 1: https://dsource.in/resource/quotes

 $Reference\ 2: \underline{http://designindia.net/institutions/design-information/design-informati$

Design Thinking and Innovation Task-book for Grade 9

Overview:

0.2

Modules for grade 9

Semester 1















Documentary Photography

Fundamentals of 2D

Problem Identification/ Empathy

Design Project 1 with focus on Communication

Semester 2













Sketching for Ideation

Fundamentals of 3D

Problem Analysis + Mappings

Design Project 2 with focus on Products

0.3

Overall Vision for Grade 9

- Learn/practice of Design Skills
- Learn Fundamentals of Design
- Focus on Design Concerns and Building Empathy
- Understanding of Problem Space
- Building Empathy with Analysis
- Application of Design Process and Methods

0.4

Overall Learning Objectives

- Fundamentals of Documentation through Photography
- Fundamentals of 2D and 3D
- Fundamentals of Sketching for Ideation
- Introduction to Problem Identification, Analysis and Visualisation
- Application of Design Thinking Process to simple Problem Solving

0.5

Additional Competencies

- Enhance Observation and Analytical Skills
- Develop Concerns for Design Issues
- Improve Communication and Presentation skills

0.6

Matching SDG Goals















Design Thinking and Innovation Task-book for Grade 9

Overview:

0.7 **Grading**

| Grade Awarded | Grade | Points |
|------------------|-------|-----------------------|
| | | |
| Outstanding | 0! | 1.0 (or Extra Points) |
| Above Excellent | AA | 1.0 |
| Excellent | AB | 0.9 |
| Above Proficient | BB | 0.8 |
| Proficient | BC | 0.7 |
| Above Promising | CC | 0.6 |
| Promising | CD | 0.5 |
| Above Developing | DD | 0.4 |
| Developing | DE | 0.3 |
| Above Beginning | EE | 0.2 |
| Beginning | EF | 0.1 |

0.8 **Assessment**

- Define the criteria for assessment for this Module (mentioning the factors for grading/assessment preferably on a Matrix)

| Beginning | Developing | Promising | Proficient | Excellent |
|-------------|------------|------------|------------|------------|
| FF-EF-EE | DE-DD | CD-CC | BC-BB | AB-AA |
| 0.0-0.1-0.2 | 0.3-0.4 | 0.5-0.6 | 0.7-0.8 | 0.9-1.0 |
| Criteria 1 | Criteria 1 | Criteria 1 | Criteria 1 | Criteria 1 |
| | Criteria 2 | Criteria 2 | Criteria 2 | Criteria 2 |
| | | Criteria 3 | Criteria 3 | Criteria 3 |
| | | | | |
| | | | | |

Final Credits for this Module = Grade x Credits

0.9

Validation/Feedback

- The task done needs to be validated with feedback from both students as well as teachers (so that this can become an input for making changes in the next year)

0.10

References

- References are mentioned at the end of each task
- As much as possible, these should be made accessible to both students and teachers

0.11

Exhibition/Presentation

- As most of the design tasks have a visual output, the class is encouraged to put up the tasks as an exhibition (for a short period) in the classroom / in common areas of the school or as a group presentation for others in the school to see.





18 hours (12 in school and 6 at home) = 18 credits







Exposure 1 Exposure 2

Exposure 3

Exposure 4

- Basics of photography

- Examples of photography by well known photographers

- Application of Photography

- Demonstration of shooting a product or subject

Overall Task

Task 1.1 (at School)

Task 1.2 (at School + Home)

Task 1.3 (at School + Home)

Final Output

Understanding Documentary Photography

- Points of View. Document through photography different points of view

- Capture Expressions – capture different expressions from your environment and in human interactions.

- Photograph in series to tell/narrate a story of something that you really care about or that you find interesting.

- Make a presentation of your documentation

+ Reflections, Self Assessment and References

1.0 Module 1

Observation through Documentary Photography





18 hours (12 in school and 6 at home)



Introduction

As part of the Design Thinking and Innovation process, the students observe, study and understand the problem space. The documentation of your observations through photography helps to record and serves as a reference for further analysis and interpretation. It could be regarding the users, their environment, artifacts that they use, tools that they use, cultural activities, events, etc.

This module on learning the fundamentals of documentary photography will be helpful in this regard as well as introduce you to the creative field of photography.

Aim of the Module

To expose school students in Grade 9 to basic fundamentals of photography. It should create an interest in this field, nurture their sense of curiosity, motivate them to explore and discover this creative field.

At the end of this module, the students should be able to use photography for documentation purposes.

Place:

Place: Task 1.1a, Task 1.2a, Task 1.3a – done at both school and at home





Equipment:

Equipment: Smart Mobile phone with Camera, Sketchbooks for sketching and taking notes

Grouping:

Grouping: Class tasks are done in groups of 3-4 and Home tasks are individually



Exposures:

Exposure1: Basics of photography explained - Light and lens, Aperture, Shutter speed and lighting, framing, Compositions, Rule of thirds, Role of symmetry,

Exposure 2: Documentary Photography

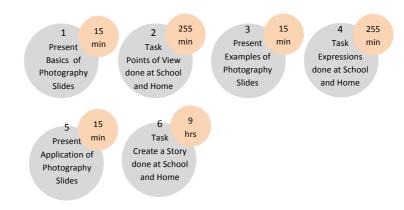
Exposure 3: Examples of photography by well-known photographers

Exposure 4: Application of Photography - Wildlife, Nature, Sports, Press, Fashion,

Events, Art, etc.

Task Sequence:

Task 1.1a + Task 1.1b + Task 1.1c



Design Thinking & Innovation Process involvement:

This task involves the following phases of the DT&I Process:

Phase 1. Observe/Empathise/Research (observation of people, places, context)

Phase 2. Understand/Analyse/Define (what to photograph?)

Phase 3. Ideate/Alternate/Create (photo shoot creative alternatives)

Phase 4. Build/Prototype/Detail (making a presentation)

Phase 5. Evaluate/Reflect/Implement (feedback from others)

Mapping SDG Goals:

The following SDG goals need to be considered while solving this task. While documenting people and events, do think of gender equality and reduced inequalities and concern for life on our planet.











Task 1:

Task 1 = 1.1 + 1.2 + 1.3:

School Hours: 12, Home hours: 6



Task 1.1a



Task 1.1a:

School Hours: 3, Home hours: 1.5

Done in groups of 3-4 at School and individually at Home

Topic title:

Points of View

- Shoot and select 6 photos from the below mentioned 6 points of view:
- Do consider these important aspects/principles of photography play of light and shadow or focus on a particular subject or the composition of the photograph
- Shoot at least 3 alternatives for each of them and select what you feel is the best one out of them:
- 1. Extreme close-up (could be a shot of ants)
- 2. Close-up in black and white (example: could be a Portrait)
- 3. Mid Shot (example: could be a group of friends)
- 4. Long Shot (example: could be your school/home building)
- 5. Extreme long shot (example: setting sun or morning rising sun)
- 6. From an unusual angle (example: could be looking up or looking down) (Please note: The first 4 could be done at school and the last 2 at home)

Task 1.2



Task 1.2:

School Hours: 3, Home hours: 1.5

Done in groups of 3-4 at School and individually at Home

Topic title:

Capture Expressions

Shoot and select 6 photographs to capture 6 of these expressions.

Do remember that the play of light and shadow, composition and focus on a subject are important for photography.

Shoot at least 3 alternatives for each of them and select what you feel is the best one out of them:

- 1. A happy Photograph
- 2. A sad Photograph in black and white
- 3. A funny photograph
- 4. An action photograph that captures something moving and dynamic
- 5. A photograph of a visual pattern
- 6. Depict hierarchy or importance by means of composition of the elements in the photograph

(Please note: Any 4 could be done at school and the rest 2 at home)

Task 1.3



Task 1.3:

School Hours: 6, Home hours: 3

Done in groups of 3-4 at School and individually at Home

Topic title:

Capture a Story

Shoot 10 pictures in series to tell/narrate a story of something that you really care about or that you find interesting.

- It could be a documentation of an activity or a process of making something, an event, a celebration, etc.
- the essential elements of the story the character/s, environment/surrounds/ feelings/expressions/ interactions need to be captured with care
- Do remember the principles of photography and make use of these in the story through images. It is recommended that you shoot at least 3 alternatives for each of the 10 pictures and select what you feel is the best one out of them Arrange the 10 photos in a sequence such that it would tell/narrate/document a story and make a presentation of your documentation.

Reflection:



Questions to ponder:

Beginning

- Would you like to document events / happenings and share them with others?
- Would you like to tell stories about your experiences through photos?
- Can you make an album of interesting photos for each year?

Assessment:



| Assessment | Criteria (| (Task 1.1 | + 1.2 + | 1.3) – | Assess | yourself |
|------------|------------|-----------|---------|--------|--------|----------|
| | | (- 0.0 | | , | | , |

Developing

| - Captured well d | lifferent 'Points of | · View' through p | ohotography. (Gi | oup + |
|-------------------|----------------------|----------------------|------------------|-------|
| Individual Assess | ment, Task 1.1) | | | |
| | | | | |

- The task of capturing 'Expressions' through photography was done well. (Group

Promising

Proficient

Excellent

| + Individual Assessn | nent, Task 1.2) | | |
|----------------------|-----------------|-----------|--|
| | | | |
| Reginning | | Promisina | |

- 'Story' through photography came out well. (Group + Individual Assessment,

| Task 1.3) | | |
|-----------|-----------|-----------|
| | | |
| Beginning | Promising | Excellent |

Other References:

Other suggested References:

- 1. The art and science of capturing images through photography https://dsource.in/course/photography
- 2. Light and Photography

https://dsource.in/course/light-and-photography

3. Classroom Ideas for Photography – National Geography https://www.youtube.com/watch?v=tLyOAp3XLLY&t=276s

2.0 **Module 2**

Fundamentals of 2D:

18 hours (12 in school and 6 at home) = 18 credits





Exposure 1
Exposure 2

Exposure 3

Exposure 4

- Elements of Design and Expressions

- Principles of Design: Positive-Negative Space + Symmetry

- Structure in Design

- Graphicalisation + Symbols

Overall Task

- 2.1 Task (at School + Home)
- 2.2 Task (at School + Home)
- 2.3 Task (at School + Home)
- 2.4 Task (at School + Home)

Exploring Fundamentals of 2D Shapes

- Elements of 2D Design and Expressions
- Principles of 2D Design Symmetry and Negative and Positive Spaces
- Structure and Patterns in 2D Design
- Visual Graphicalisation and developing an Icon

Final Output

- A presentation and exhibition of all the works
- + Reflections, Self Assessment and References

2.0 Module 2

Fundamentals of 2D:



Design

Sensitivity

(0)

18 hours (12 in school and 6 at home) = 18 credits



Introduction

Understanding the fundamentals of 2D forms the basis for learning the visual language. This in turn forms the foundation for Communication Design. This module gives an exposure to visual elements points, lines, planes, and volumes and their features colour, shape, texture, position, orientation, and size. You will learn how to apply principles like balance, hierarchy and proportion and be able to create patterns, layouts and applications for communications. The outcome could be in the form of graphics, illustrations, signage, visualization, photography, print and publishing, web design, animation, etc.

The learning from the previous module on 'Documentary Photography' on compositions, layout, expressions can be made use of in solving tasks in this module.

Aim of the Course

To expose school students (Grade 9) to fundamentals and principles of 2 dimensional design. It should create an awareness and sensitivity towards compositions in two-dimensional spaces. The students should be able to use basic principles to understand, analyse and create 2D applications.

Place:

Place: Task 2.1, Task 2.2, Task 2.3 and Task 2.4 – done at both school and at home



Grouping:

Grouping: Done as an individual exercise/assignment



Equipment:

Sketchbooks for sketching, Stationary (Pencils, Pens, Colours, Tracing paper, Black Ink and brush or brush pen, colour pens), students may use digital devices like computers or tablets (if available, but not necessary)

Exposures

Exposure 1 (prerequisite): Elements of Design - Point, Line, plane,

volume, Colour, Position, Orientation, Texture, Basic Shapes

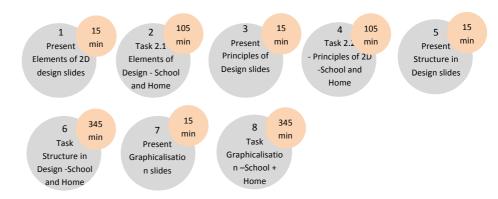
Exposure 2 (before task 2): Positive-Negative space explained with examples **Exposure 3** (before task 3): Principles of Design demonstrated - Balance, Rhythm,

Emphasis, Unity, Proportion, etc. **Exposure 4** (before task 4): Structure in design - Symmetry - Asymmetry,

Centricity - eccentricity, Golden ratio, Grids, Patterns **Exposure 5** (before task 5): Visual Graphicalisation

Task Sequence:

Task 2.1 + Task 2.2 + Task 2.3 + Task 2.4



Design Thinking & Innovation Process involvement:

This task involves the following phases of the DT&I Process:

Phase 1. Observe/Empathise/Research (observation of Design Elements)

Phase 2. Understand/Analyse/Define (Fundamentals and Principles)

Phase 3. Ideate/Alternate/Create (trying creative alternatives)

Phase 4. Build/Prototype/Detail (making a presentation)

Phase 5. Evaluate/Reflect/Implement (feedback from others)

Mapping SDG Goals:

The following SDG goals need to be considered while solving this task. While documenting elements and expressions, do think of gender equality and reduced inequalities and concern for life on our planet.











Task 2.0

Task 2.0 = 2.1 + 2.2 + 2.3: + 2.4

School Hours: 12, Home hours: 6



Task 2.1:

Done at School + Home



Task 2.1 = 2.1a + 2.1b + 2.1c:

2 hours at School + 1 hours at Home, Done individually

Topic title:

Elements of 2D Design:

The elements of 2D design are points, lines, planes, textures, etc. (2D stands for 2 dimensional).

Here are a few tasks to understand some of these.

Exposure 1 (prerequisite): Elements of Design in 12 slides - Point, Line, plane, volume, Colour, Position, Orientation, Texture, Basic Shapes

Task 2.1a (done in School)



Task 2.1a

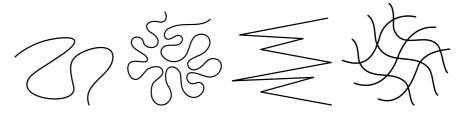
School hours: 1, Done individually

Topic title:

Line and Expressions:

In this task, you'll try to express feelings with the shape of lines.

- 1. Draw a continuous long and winding black line to fill up the space (4-5 compositions) on an A4 size paper (horizontal format) to express any of the following and
- 2. Give a name/title for this composition Examples of different types of lines:



Clue: Try expressing – a line taking a walk, a happy line, an angry line, a cute line, a playful line, a mischievous line, a friendly line, etc.

Output 2.1a: 4 to 5 compositions of lines with different expressions

Task 2.1b

(done in School)



Task 2.1b

School hours: 1, Done individually

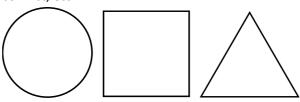
Topic title:

Planes and Expressions:

Create expressions with the basic design elements – circles, squares and triangles. Do note that the circle is soft and smooth, a square is rigid and solid and a triangle is active and playful.

You could use multiple numbers of these elements, vary their size, change their orientation and overlap them.

Clue: Try expressing – friendship/togetherness, anger, imbalance, heaviness, conflict, etc.



- 1. Make a composition of the elements to express any emotion or feeling on an A4 size paper (horizontal format)
- 2. You can make use of coloured paper cut-outs or draw the basic element characters and colour them

Output 2.1a: 4 to 5 compositions of planes with different expressions

Task 2.1c (done at Home)

Task 2.1c

Home hours: 1, Done individually

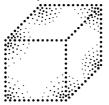
Topic title:

Observing Forms with Points:

Observe at home any object that ends up as a point. You could locate points when 3 surfaces meet. You could locate objects that end up with as a point.

- 1. Note down the list of objects where you can identify points
- 2. Create a representation of any one of the objects by making tiny dots using a black pen repeatedly such that the form of the object is created.
- The process of doing this task is called Stippling

Example of a cube created with dots:



3. You could use pencil to draw the outline and use the pen to make the dots **Output 2.1c:** Draw this on an A4 size sheet in horizontal format

Topic title:

Surfaces with parallel Lines:

Observe at home any object that ends up as a line. You could locate lines when 2 surfaces meet. You could locate objects whose surfaces end up as lines.

- 1. Note down the list of objects where you can identify lines
- 1. Draw parallel lines such that there is a small variation each time you draw the line. This change in direction of the line will result in a new visible surface.



- oxdot examples
- the lines could be straight or curved or angular.
- 2. Try out any of the following options: A square, a circle, a wave, a star, a diamond, a face, etc.

Output 2.1c: Make 2-3 compositions on A4 sheets in horizontal format

Task 2.2:
Done at School + Home



Task 2.2 = 2.2a + 2.2b

2 hours at School + 1 hours at Home, Done individually

Topic title:

Principles of Design:

The principles of design include Balance, Negative and Positive spaces, Rhythm, Emphasis, Unity, Proportion, etc. Here are the tasks to understand some of these.

Exposure 3: Principles of Design - Balance, Rhythm, Emphasis, Unity, Proportion, etc.

Task 2.2a:
Done at School



Task 2.2a

School hours: 2, Done individually

Topic title:

Identify Negative Shapes in the Environment:

Draw a Tree or a Plant – but instead of drawing its branches, draw the spaces (shapes) in between the branches.





1. Choose a tree to represent

2. Make 2 compositions. In one draw the tree/plant in black colour (positive shape) and in another fill the left out spaces with black (negative shape)

Output 2.2a: Make two compositions on A4 size sheets in horizontal format

Task 2.2b (done at Home)

Task 2.2b

Home hours: 1, Done individually

Topic title:

Observe Objects and Spaces with Symmetry

Observe at home objects and spaces that are symmetrical. Can you also identify the type of symmetry?

These are the types of symmetry:

Reflection: elements reflected across an axis







Rotational: elements rotated around a point







Translational: elements are repeated by shifting or sliding its position







- 1. Note down the list of 10 objects or spaces in your home surroundings that you can identify the above-mentioned types of symmetry
- 2. Take an A4 size sheet of paper. Fold it any manner, 3 to 4 times. Take a scissors and make cuts in it (any type of cut). Open the paper and identify the types of symmetry that you have created.
- 3 Try out 2 to 3 variations.

Output 2.2b: Examples of Symmetry at Home + cut out in paper

Task 2.3:

Done at School + Home



Task 2.3 = 2.3a + 2.3b:

2 hours at School + 1 hours at Home, Done individually

Topic title:

Structure in Design:

The principles of structure in design include the following - Symmetry - Asymmetry, Centricity - eccentricity, Golden ratio, Grids and Patterns

Exposure 4: Rule based design - Symmetry - Asymmetry, Centricity - eccentricity, Golden ratio, Grids

Task 2.3a (done in School)



Task 2.3a

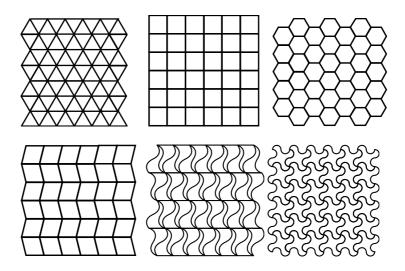
School Hours: 4, Done individually

Topic title:

Tessellating Patterns:

In this task you'll learn to create tessellations.

- In a tessellation, a shape is repeated again and again such that there is no gaps or overlaps between the repeated shapes. Tessellations are also a form of tiling.
- Triangles, squares, rectangles and hexagons can be repeated to form tessellations. You can also use combinations of them to form tessellations.



- 1. Make one tessellation pattern using triangles, squares or rectangles and hexagons
- 2. Make another tessellation pattern using variations of triangles, squares or rectangles and hexagons something like the patterns shown above in the second row
- 2. The basic unit can be around 30mm or 3 cm in width
- 3. After you fill up the sheet, colour them using at least 2 contrasting colours.

Output 2.3a: Draw the two tessellations on A4 size sheet in horizontal format

Task 2.3b (done at Home)



Task 2.3b

Home Hours: 2, Done individually

Topic title:

Golden Ratio:

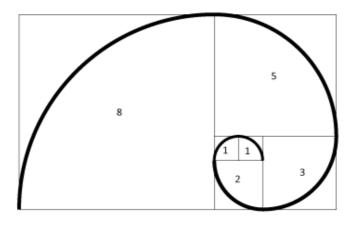
The golden ratio rooted in mathematical principles helps one create balanced pleasing proportionate designs.

- the golden ratio is generated by the Fibonacci Sequence, which is a series of numbers created with the addition of previous 2 numbers.

Fibonacci Sequence: 1, 1, 2, 3, 5, 8, 13, 21, 34, etc. If you divide the larger number by its previous number you get the golden ratio = 1.618 which is also called as Phi

- if you draw and place squares with these numbers as its side, and connect the diagonals with a curve, it results in a spiral. This spiral is called as the golden spiral.
- you can notice this spiral in nature the spiral in sea shells, sunflower seeds, eye of the storm, etc. and designers use the proportion of the golden ratio while creating their designs.

Output 2.3b: Take an A4 sheet of paper and draw a Golden Spiral as shown below.



Task 2.4:
Done at School + Home

Task 2.4 = 2.4a + 2.4b:

4 hours at School + 2 hours at Home, Done individually

Topic title:

Visual Studies and Graphicalisation:

In this task, you study a state symbol, which could be a state animal, state bird, state tree or a state flower. You visually explore through sketching its variations from different points of view and then simplify the form and create a graphical visual of the state symbol.

Exposure 4: Visual Graphicalisation and developing an Icon

Task 2.4a

(done at Home)



Task 2.4a

Home Hours: 2, Done individually

Topic title:

Visual Studies:

- 1. Select a state symbol from any state in India could be a state animal, state bird, state tree or a state flower.
- 2. Study the form of the chosen state symbol
- 3. Sketch variations of it from different angles or view-points (could also be front view, side view, in action, close-ups, etc.)
- 4. Select 3 of these sketches and draw them as lines

Output 2.4a: 3 variations of the chosen state symbol as sketches in line format on 3 A4 size sheets

Task 2.4b (done at School)



Task 2.4b

School Hours: 4, Done individually

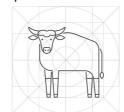
Topic title:

Designing a Graphical Icon/Symbol:

An Icon or Symbol represents a graphical or visual representation of a concept in a simple easily identifiable manner.

The task is to graphically represent as an Icon the chosen state symbol.





examples

- 1. You have 3 variations of the chosen state symbol as sketches in line format (from previous task 2.4a)
- 2. Redraw it to make it simplified (you can make the lines smooth, equal thickness and make it align to an axis) reducing it to its essentials
- 3. Draw the icons as black coloured thick lines of uniform thickness (3 to 5mm)

Output 2.4b: 3 variations of the chosen state symbol as icons in line format on 3 A4 size sheets

Task 2.4 References: Graphicalisation Example References:

Indian Elephant:

https://www.dsource.in/case-study/2d-form-exploration-elephant

Peacock:

https://www.dsource.in/case-study/2d-form-exploration-peacock

Swan:

https://www.dsource.in/case-study/2d-form-exploration-swan

Questions to ponder: Reflection: - Can you discover elements and principles of design in nature and built the environment surrounding you? - Would you like to arrange objects around your house based on the principles of design? - Based on the principles of Visual Graphicalization, can you create a symbol for one of your activities? Assessment Criteria (Task 2.1a + 2.1b + 2.1c) – Assess yourself: **Self-Assessment:** Elements of 2D Design: - The task of capturing 'Expressions' with the shape of 'Lines' was done well. (Individual Assessment, Task 2.1a) **Beginning** Developing **Promisina Excellent** - The task of capturing 'Expressions' with the shape of 'Planes' was done well. (Individual Assessment, Task 2.1b) **Beginning Promising** Excellent - 'The task with of exploring 'Points' or 'Lines' came out well. (Individual Assessment, Task 2.1c) **Beginning Promising** Excellent **Principles of 2D Design:** - The 2 compositions of representing 'Negative Spaces' in the environment was done well. (Individual Assessment, Task 2.2a) **Beginning** Developing **Promising** - Listing of examples of Symmetry at Home + the cut-out in paper was done well. (Individual Assessment, Task 2.2b) - xxxx **Beginning Promising** Excellent

2.3b)

- The exploration of 2 tessellating patterns was done well. (Individual

Beginning Promising Excellent

- The drawing of a Golden Spiral was done well. (Individual Assessment, Task

Promising

Developing

Structure 2D Design:

Assessment, Task 2.3a)

Beginnina

| Visual Studies an - The 3 variations (Individual Assess Beginning | of the chosen st ment, Task 2.3a) | ate symbol as sl | | one well. Excellent |
|---|--------------------------------------|------------------|-----------------|-----------------------|
| - 3 variations of the (Individual Assess Beginning | | • | /Symbols were o | done well. Excellent |
| Other suggested 1. Elements of De https://dsource.in | sign | of_design/ | | |
| 2. Fundamentals https://www.you | • | • • | | nce: |
| 3. Principles of Dehttps://www.you | - | ?v=ZK86XQ1iFV | <u>''s</u> | |
| 4. Fibonacci Serie https://www.sciesequence/?utm_s | ncefocus.com/so | cience/what-is-t | he-fibonacci- | |
| 5. Designed by Aphttps://www.you | • | • | • | |
| 6. Patterns in Nat | ure: | | | |

Other References:

https://www.youtube.com/watch?v=g2MdUhk9QWw



3.0 **Module 3**

Introduction to Observation, Problem Identification and Empathy:

18 hours (12 in school and 6 at home)





Exposure 1

Exposure 2 Exposure 3

Exposure 4

- Basics of user studies - primary research vs secondary research

- Basics of planning for conversations with users

- Basics of documentation methods

- Referencing and writing acknowledgements

Overall Task

Observation and Problem Identification

Task 3.1 (at School)

- Ask Questions

Task 3.2 (at School)

- Primary Research

Task 3.3 (Home)

- Secondary Research

Task 3.4 (at School)

Collating

Final Output

- Make a presentation of your documentation

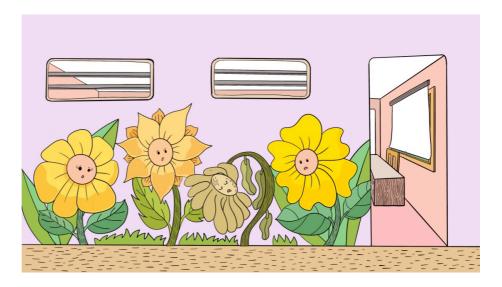
+ Reflections, Self Assessment and References

3.0 **Module 3**

Introduction to Observation, Problem Identification and Empathy:



18 hours (12 in school and 6 at home) = 18 credits



Introduction:

This module introduces the students to the beginning of the design thinking process. This being an important stage in the design process and involves the following aspects: Observation, Empathy with the User needs, Requirement finding, Investigation, Research and Study.

Aim of the Course:

To expose school students (Grade 9) to basic fundamentals of being able to identify or locate a problem to solve with the user in focus. The students will use basic research methods to observe, understand and empathize with the issues faced by the users in order to gain insights. The module will introduce the students to the basics of primary research and secondary research, making conversations, methods of documentation and doing field studies.

Place:

Place: Task 3.1, Task 3.2, Task 3.4 done at School and Task 3.3 done at home



Grouping:

Grouping: Class tasks are done in groups of 3-4 and Home tasks are individually



Equipment: Equipment: Smart Mobile phone with Camera for documenting and recording +

sketchbooks for sketching and taking notes.

Exposures Exposure 1: Basics of user studies - primary research and secondary research

Exposure 2: Basics of planning for conversations with users

Exposure 3: Basics of documentation methods

Exposure 4: How to do references and write acknowledgements

Design Thinking & Innovation Process involvement:

This task involves the following phase of the DT&I Process:

Phase 1. Observe/Empathise/Need Finding/Primary and Secondary Study and Research (Observation leading to Problem Identification)

Mapping SDG Goals:

The following SDG goals need to be considered while solving this task. While documenting elements and expressions, do think of gender equality and reduced inequalities and concern for life on our planet.











Task 3:

Task 3 = 4.1 + 4.2 + 4.3 + 4.4 + 4.5

School Hours: 12, Home hours: 6



Task 3



Overall Task (Task 3.1 + Task 3.2 + Task 3.3):

Task Topic:

Waste in School environment

Investigate, document and prioritize **how all the waste generated in the school is disposed-off or converted into something useful**. The students work in groups of 2-3 and each group is allotted a different part of the problem space - users, places, products, communication methods, etc.

Task 3.1



Task 3.1:

School Hours: 2, Done in groups of 3-4 at School

Task Title:

Ask Questions:

- 1. Ask the following questions about the subject of waste disposal What? Why? How? Whom? Where? When? etc.
- 2. How would you go about finding answers to the above questions?
- 3. Make a mind-map of the problem space 'Waste Disposal in your School' with many branches and connections

Output 3.1: Mind-map of the topic 'Waste Disposal in School'

Task 3.2



Task 3.2:

School Hours: 6, Done in groups of 3-4 at School

Task Title:

Primary Research:

The Primary research involves the following:

- 1. Identify all the users primary and secondary users
- 2. Converse with the people involved with this activity to get a better understanding (take down notes), try to understand the activity from the user's point of view (empathize with the user)
- 3. Identify all the places/environment where this happens and go to the place and investigate (document these),
- 4. Identify the objects that are involved and understand how it works (document these)
- 5. Identify the communication methods that are used to convey information (document these)
- 6. Document through photography or sketching the different aspects of the problem being solved
- 7. Collate all the information and order it according to priority/importance
- 8. Identify issues or problem areas that can be solved

Output 3.2: Make a summary presentation involving images and short text in form of a report or slides (around 6 to 10 pages or slides)

Task 3.3



Task 3.3:

Home hours: 6, Done individually at Home

Task Title:

Secondary Research:

Secondary research as the name indicates is collection of information from secondary resources. These could be from books, publications, newspapers, talking to experts and the internet. As someone else has written or spoken about the subject, you need to keep note down the reference details.

- 1. Analyze your topic into sub-topics and take-up one of these for further research and understanding. It could be based on the type of waste, how waste is converted to useful material, about its life-cycle, etc.
- 2. Search for information on a media that is accessible to you. Take down notes as points. Mark important aspects.

Output 3.3: Collate the information involving images and short text in form of a report or slides (around 6 to 10 pages or slides)

Task 3.4



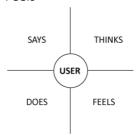
Task 3.4:

School hours: 4, Done in groups of 3-4 at School

Task Title:

Collating:

- 1. Collate all the information gathered from Primary and secondary research
- 2. Prioritise the different aspects that you discovered about the Waste Disposal according to their importance
- 3. Make an empathy Mapping (optional) according to user Says, Thinks, Does, Feels



Output 3.4: Make a combined presentation of around 12 slides to explain your documentation along with the findings

- Add 2 more slides to describe the way forward in solving the problems connected to waste disposal at school.

Reflection: Questions to ponder: - Which of these methods are you confident about using - Observation, Conversing, Documentation, Primary Research and Secondary Research? - Will you use some of the methods to identify problems at home and in your neighbourhood? - Will you share the methods of identifying problems with others? Assessment Criteria (Task 3.1 + 3.2 + 3.3 + 3.4) - Assess yourself: **Assessment:** - The Mind-map was well done with several branches and connections (Group task 3.1) **Beginning Promising Proficient** Developing Excellent - The presentation of the Summary points of the Primary Research was done well (Group task 3.2) **Proficient** Excellent **Beginning** Developing **Promising** - The summary report/slides of the Secondary Research documentation was done well (Individual task 3.3) **Beginning** Developing **Promising Proficient** Excellent - The collation/summary of the different stages of this module was presented

Other References:

Other suggested References:

well (Group task 3.4)

Beginning

1. Design Thinking Process - explained with an example:

https://www.youtube.com/watch?v=uRtAzzitBmA

Developing

Promising

2. Design Thinking Framework - a short video:

https://www.youtube.com/watch?v=LhQWrHQwYTk

Excellent

Proficient

4.0 **Module 4**

Design Project:

with focus on Observation,

Problem Identification

and Empathy

27 hours (18 in school and 9 at home)





Exposure 1

- Introduction to Design Thinking Process for communication
Design

Exposure 2

- Introduction to making a process/ time/journey Map

Exposure 3

- Fundamentals of effective Presentation Techniques

Task 4.1 (at School + Home)

- Analysis of the Problem to be solved

Task 4.2 (at School + Home)

- Mapping – Mind-map and Life Cycle Map

Task 4.3 (at School + Home)

- Ideation and Creative Alternatives

Task 4.3 (at School + Home)

- Design Solution Prototyping

Task 4.4 (at School + Home)

- Make a presentation of your Solutions

Final Output

+ Reflections, Self Assessment and References

4.0 Module 4

Design Project: with focus on Observation, Problem Identification and Empathy





(18 hours at school + 9 hours at home)



Introduction

In this module the students make use of the design thinking process to solve a Design problem. The aim is to be able to study and understand the problem space so that it can be further analyzed resulting in possible creative solution to the identified problems.

Aim of this Module

The aim of this module is to let students follow the first stages of the Design Thinking process and be able to use it in solving a problem located in their School Environment. The students should get the confidence to be able to identify problems, understand user requirements, study existing knowledge on the subject, suggest creative alternatives and be able to present this at the end of the module.

Place:

Place: Task 4.1, 4.2, 4.3, 4.4, and 4.5 done at School and at home





Grouping:

Grouping: Class tasks are done in groups of 3-4 and Home tasks are individually





Equipment: Sketchbooks for sketching and taking notes. Students may use

digital devices like computers or tablets to collate information and make

presentations (if available, but not necessary)

Exposures Exposure1: Introduction to Design Thinking Process

Exposure 2: Introduction to making a Process/ Time/Journey Map **Exposure 3:** Fundamentals of Effective Presentation Techniques

Design Thinking & Innovation Process involvement:

This task involves the following phases of the DT&I Process:

Phase 1. Observe/Empathise/Research (Observation and Study of Problem

Space)

Phase 2. Understand/Analyse/Define (Fundamentals and Principles of Analysing

Information)

Phase 3. Ideate/Alternate/Create (trying Creative Alternatives)

Phase 4. Build/Prototype/Detail (making Mock-ups and seeking Feedback)

Phase 5. Evaluate/Reflect/Implement (Summary and Presentation)

Mapping SDG Goals:

The following SDG goals need to be considered while solving this task. While documenting elements and expressions, do think of gender equality and reduced inequalities and concern for life on our planet.











Task 4:

Task 4 = 4.1 + 4.2 + 4.3 + 4.4 + 4.5

School Hours: 20, Home hours: 12



Task 4.



Overall Task (Task 4.1 + Task 4.2 + Task 4.3):

Task Topic:

Waste in School environment (continue with this topic)

In your previous classes you have investigated, documented and prioritized **how** all the waste generated in the school is disposed-off or converted to something useful.

You'll re-look at this problem area, analyze the research + data collected and derive inferences from it and spot opportunities for design

The students work in groups of 2-3 and each group works on a different part of the problem space - users, places, products, communication methods, etc.

Task 4.1



Task 4.1

School Hours: 2 and Home hours 1

Task Title:

Analysis of the problem to be solved:

- 1. Analyse the problems using sticky notes to classify and categorise them into buckets of problems to be solved
- 2. Make a list of them according to priority and write them down on sticky notes with priority numbers

Output 4.1: Make a list of the problems according to priority

Task 4.2



Task 4.2

School Hours: 2 and Home hours 1

Done in groups of 3-4 at School and individually at Home

Topic title:

Make (a) Mind map of the problem space and (b) Life Cycle Process Map of one of the Waste materials:

Task A can be done in school and Task B at home

- 1. Make a mind map of the different categories and sub-categories of the problem space
- 2. Make a Life Cycle Process map of the Waste materials in the school step by step process of how the material comes into being and what becomes of it as waste

Output 4.2: Make a sequence map of the activities mapping it on the space available on the mobile vehicle

Task 4.3



Task 4.3

School hours: 6 and Home hours: 3

Done in groups of 3-4 at School and individually at Home

Topic title:

Design Solution Possibilities and Ideation

- 1. Ideate on possible solutions by sketching these
- 2. The solutions could involve the following medias or outputs as possibilities:
- a. Poster campaign to create awareness
- b. An illustrated storybook on the subject to create awareness
- c. A simple card or board game to create awareness
- d. Identity for the Waste System to make it easily noticeable & identifiable
- e. Redesign of the packaging for Waste handling
- f. Redesign of the containers for storing and transporting waste
- 3. Ideate at least 3 alternative solutions and short-list them according to their effectiveness and ease of implementation

Output 4.3: Make a presentation of these in 3-6 slides (alternate sketches + short-listed idea)

Task 4.4



Task 4.4

School hours: 6 and Home hours: 3

Done in groups of 3-4 at School and individually at Home

Topic title:

Design Solution Prototyping

- 1. Select the best one out of your ideation and finalise it with details.
- 2. The final concept could involve any of the following:
- 2D/3D design Sketches + Physical Prototyping + Visualisation + 3D Models
- 3. Make a mock-up of your final idea a scaled version.
- 4. Show the mock-up to potential users and get feedback
- 5. Incorporate suggestions from the feedback in your design
- 6. Make the final prototype

Output 4.4: Make a presentation of these in 3-6 slides (mock-up + feedback + details)

Task 4.5



Task 4.5

School hours: 4 and Home hours: 2

Done in groups of 3-4 at School and individually at Home

Topic title:

Design Solution Final Presentation and Documentation

- Select the best one out of your ideation and

Presentation Details of points mentioned above:

Task 1: Prepare a presentation (of 6-8 minutes duration) to include all the stages of your project:

- a. Title of the System Design Project or Problem Statement
- b. Team members
- c. Summary/content listing of your presentation
- d. Insights from Primary and Secondary Research

- e. Major design opportunities
- f. Restatement of the problem / Design Objectives / Design Goals
- g. Alternate Concepts (sketches + quick scenarios + concept models)
- h. Final Concept and its unique features
- i. Process, Form or Interface development and detailing
- j. Prototype /Mock-up (optional)
- k. User feedback on your final solution
- I. Future steps and suggestions
- m. Full References (Learn how to do references)
- n. Acknowledgments to all who have helped

Output 4.5: A presentation (6-8 minutes – roughly 15 to 25 slides) explaining the Project outcome along with Process

Reflection:



Questions to ponder:

- Do you feel you can use the first phase of the Design Thinking process in trying to identify other problems to be solved?
- Can you apply what you learnt by solving design problems starting at your home or neighbourhood?
- Will you share this information on the use of the Design Thinking Process with others like your friends and cousins?

Self Assessment:

Assessment Criteria (Task 4.1 + 4.2 + 4.3 + 4.4) - Assess yourself:

| 0 | - Analysis of the d assigning prioritie Beginning | | | th proper category Proficient | orisation and Excellent |
|----------|---|--------------------------------------|-----------------------------|--|--------------------------|
| | - Making of the M (Group + individual Beginning | • | as the Lifecycle Promising | Process map wa Proficient | es done well. Excellent |
| | - Came out with co (Group + individual Beginning | | re several altern Promising | ate ideas along of the state of | with sketches Excellent |
| | - The mock-up of the tincorporating feet to the tincorporating feet to the tincorporation feet to the | | • | | Excellent |
| | - The final present done well (Group Beginning | _ | | ss and the final s | Excellent |
| erences: | Other suggested I 1. Design Thinking https://www.yout | g Process - explai tube.com/watch | ?v=uRtAzzitBm <i>A</i> | • | |

Other References:

2. Design Thinking Framework - a short video:

https://www.youtube.com/watch?v=LhQWrHQwYTk

5.0 **Module 5**

Fundamentals of Sketching for Ideation:

18 hours (12 in school and 6 at home)











Exposure 1

Exposure 2

Exposure 3
Exposure 4

- Sketching by Inventors and Designers

- Drawing from the Rightside of your Brain

- Simple Rendering Techniques

- Principles of Perspectives

Task 5.1 (at School + Home)

- Sketching Creative Alternatives

Task 5.2 (at School + Home)

- Doodling with Images for Ideation

Task 3.3 (at School + Home)

- Sketching Viewpoints

Task 3.4 (at School + Home)

- Sketching in 3D

Final Output

- Make a presentation of all your sketches

+ Reflections, Self Assessment and References

5.0 **Module 5**

Fundamentals of Sketching for Ideation





18 hours (12 in school and 6 at home) = 18 credits



Introduction

Sketching is a way of externalising your ideas and thoughts, making it visible and giving them shape and form.

Sketching involves imagination.

Sketching can be used for recording or documenting an idea or thought process. The sketching becomes an extension of thinking and makes visible what is in one's mind.

Aim of the Course:

To expose school students to fundamentals and sketching for ideation. The emphasis of sketching is mainly for the representation of different concepts as visual images.

Sketching becomes very useful for generating several creative alternate solutions. These sketches could be done very quickly – also known as Rapid Sketches.

In addition, the students will also learn the principles of representing 3D objects as sketches.

Place:

Place: Task 5.1, 5.2, 5.3 and 5.4 done at School and at home



Grouping:

Grouping: Class tasks are done in groups of 3-4 and Home tasks are individually



Equipment: Sketchbooks for sketching, Stationary (Pencils, Pens, Colours,

Tracing paper, Black Ink and brush or brush pen, colour pens), students may use

digital devices like computers or tablets (if available, but not necessary)

Exposure 1 (prerequisite): Sketching by Inventors and Designers (L Da Vinci,

Edison, Einstein, Le Carbusier, Hussain, etc.,

Exposure 2: Drawing from the Rightside of your brain (excerpts from the book

by Betty Davis)

Exposure 3: Principles of Perspective **Exposure 4:** Simple Rendering techniques

Design Thinking & Innovation Process involvement:

This Module involves the following phases of the DT&I Process:

Phase 1. Observe/Empathise/Research (Sketching Observations)

Phase 2. Understand/Analyse/Define (Sketching Mappings)

Phase 3. Ideate/Alternate/Create (Sketching creative alternatives)

Phase 4. Build/Prototype/Detail (Sketching Scenarios)

Phase 5. Evaluate/Reflect/Implement (Sketching for Presentation)

Mapping SDG Goals:

The following SDG goals need to be considered while solving this task. While documenting elements and expressions, do think of gender equality and reduced inequalities and concern for life on our planet.











Task 5

Task 5 = 5.1 + 5.2 + 5.3 + 5.4

School Hours: 12, Home hours: 6



Task 5.1



Task 5.1:

School hours: 2 done individually

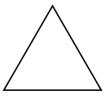
Task Title:

Sketching Creative Alternatives

Here the students will try creative explorations of shapes through sketching







Task 5.1 Fill up a shape with similar shaped objects

- 1. Chose one of these shapes a Circle / a Square / or a Triangle
- 2. Draw and repeat 10 circles in pencil of dimension 5cm on an A4 size sheet
- Circle with diameter 5cm, Square and Triangle with the sides as 5cm
- 3. Draw objects that are similar in shape with the chosen shape
- for example: a clock inside circle, a dice inside square, a tent under triangle, etc.
- 4. Draw 10 different objects in the 10 shapes
- 5. Use pencil 2B or 0.5 black ink pen to do these drawings

Output 5.1: Sketches of 10 alternatives inside the chosen shape

Task 5.2



Task 5.2:

Home hours: 3, done individually

Task Title:

Doodling with Images for Ideation

Task 5.2: Doodle your idea of an alien /friendly monster

- 1. Make a sketch of an Alien or a friendly Monster based on inspiration from the form and structure of an **Insect**
- Creating these are fun, because you can choose any number of eyes, ears, noses, mouths, heads, hands, bodies and legs
- 2. Choose an insect
- 2. Study and make sketches of the structure and body parts of the insect
- 3. Map/Combine the features of the insect with that of Alien/friendly Monster
- 4. Draw it using 0.5 black ink or using a 2B pencil on an A4 size paper

Output 5.2: Sketch of the Alien/friendly Monster

Task 5.3

Task 5.3:



Home hours: 3 done individually

Task Title:

Sketching Viewpoints

Here the students will try sketching from different pots of view. When one changes one's point of view (physically) with regard to an object or situation, different features are perceived and the focus and hierarchy in the composition may change.

Task 5.3 Fisherman and the boat viewpoints

Given below is a sketch of a fisherman on a boat

- 1. Redraw this sketch from these points of view (any 3 of them)
- A. As a fish under the water sees it
- B. As seen by a bird flying above
- C. As seen by the fisherman
- D. As seen by an ant crawling on the boat
- E. As seen by the cat on the boat
- 2. Use Soft pencil like 2B and above to do the sketching on A4 size sheets

Output 5.3: 3 Sketches showing different viewpoints of the fisherman on a boat

Task 5.4



Task 5.4:

School Hours: 10, done individually

Task title:

Sketching in 3D

The students will learn the basics of representing objects in three dimensions. These drawings are important for understanding the shape of the object and then to making or constructing it.

Task 5.4a: 2D Drawings of a 3D shape

School Hours: 4, done individually

Terminologies: what are Plan, Elevation and Section

Plan: refers to the object as seen from above

Elevation: view of the object from its side (front view, right side view, left side

view and back view)

Section: view of the object when it is cut

- 1. Take a simple 3D objects like a pencil box/ a table Clock and a Mango fruit/apple fruit
- 2. Draw the different points of view Plan, Elevation and a Section of the object as outline drawings
- The Elevation can be any of these: front view, right side view, left side view and back view
- You could consider a cross section in the middle of the object
- 3. Mark the dimension of the object in centimeters/inches

Output 5.4a: Drawing of the Plan, Elevation and Section of the chosen object

Task 5.4b: Perspective in 1 point and 2 point

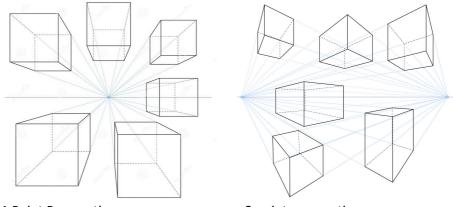
School Hours: 6, done individually

Terminologies: 1 point perspective and 2 point perspective

1 Point Perspective: one point perspective has one vanishing point placed on the horizon line.

2 Point Perspective: two-point perspective has two vanishing points placed on the horizon line.

Examples of 1 Point Perspective and 2 Point Perspective:



1 Point Perspective

- 2 point perspective
- 1. Take a cube and draw its outline in one point and two point perspective
- 2. Refer to the exposure slides to construct each one of these
- 3. Take a simple 3D objects like a pencil box/ a table Clock
- 4. Draw it in both 1 point as well as 2 point perspective

Output 5.4b: Drawing of One Point and Two Point Perspective of the cube and of the chosen object

References:

1 and 2 Point Perspective:

https://www.dsource.in/course/product-drawing/perspective https://www.youtube.com/watch?v=aFjSG5G-FxA

https://www.youtube.com/watch?v=gY-2iUdm9Cc

Reflection: Questions to ponder: - Will you start a sketchbook to note down the ideas that you think of? - Will you try doing multiple sketches to come out with alternate ideas? - How about doing a visual narrative through sketches of a journey that you undertake? Assessment Criteria (Task 5.1 + 5.2 + 5.3 + 5.4 + 5.5) – Assess yourself: **Self Assessment:** - The sketching of 10 creative alternatives of the shape is done well. (Individual Assessment, Task 5.1) Beginning Developing **Promising** Proficient Excellent - The Sketch of the Alien/friendly Monster is done well. (Individual Assessment, Task 5.2) Beginning **Promising** Excellent - The sketches showing different viewpoints of the fisherman is done well. (Individual Assessment, Task 5.3) Beginning **Promising** Excellent - The drawing of the Plan, Elevation and Section of the chosen object is done well. (Individual Assessment, Task 5.4a) Beginning Excellent Developing **Promising** Proficient - The drawing of One Point and Two Point Perspective of the cube and of the chosen object is done well. (Individual Assessment, Task 5.4a) Beginning **Promising Excellent** Other suggested References: Other References: 1. Product Drawing https://www.dsource.in/course/product-drawing 2. Introduction to Drawing Basics + Advanced:

https://www.dsource.in/course/introduction-drawing-basics https://www.dsource.in/course/introduction-drawing-advanced

6.0 Module 6

Fundamentals of 3D:

18 hours (12 in school and 6 at home)







Exposure 1

Exposure 2 Exposure 3

- Basics of 3D volumes
- Platonic Solids and its Construction
- Form and Expressions

Task 6.1 (at Home)

- Observation and Analysis of Objects around Home

Task 6.2 (at School + Home)

- Rectilinear Forms and its Proportion

Task 6.3 (at School + Home)

- Curvilinear Volumes

Task 6.4 (at School + Home)

- Platonic Solids

Task 6.5 (at School + Home)

- Form and Expression

Final Output

- Make a presentation of all your Form Explorations
- + Reflections, Self Assessment and References

6.0 Module 6

Fundamentals of 3D





(12 hours at school + 6 hours at home)



Introduction

Understanding the fundamentals of forms in three dimensions are essential for design of objects that we hold and carry, objects that we sit and move, objects at home and objects that we live in.

Form has expression and gives meaning to the object and have a relation to the function of the object. The form can indicate how we interact with the object. Forms give shape to the man-made world.

Aim of Course

Aim of the course:

To expose school students (Grade 9) to basic fundamentals of 3D Volumes, proportions and Surface development for the understanding of spatial relationships. It will help to create an interest in the field of 3D Culture, proportions and sensitivity towards 3D Objects constructions by using daily used materials. It will enhance the culture of exploring and making with three dimensions.

Place:

Place: Task 5.1, 5.2, 5.3 and 5.4 done at School and at home





Grouping:

Grouping: Class tasks are done in groups of 3-4 and Home tasks are individually



Equipment:

Equipment: Sketchbooks for sketching, Stationary (Pencils, Pens, Colours,

Tracing paper, Black Ink and brush or brush pen, colour pens),

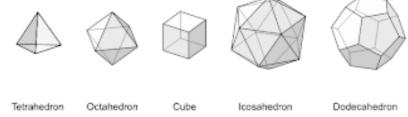
Chart papers (three colors), cutter, steel ruler, stick (match stick) Rubber band (cycle tube valves), PVA Glue (Fevicol), Scotch Tape, Clay, Chalk and Sand paper

(60 grades)

Exposures:

Exposure1: Basics of Volumes – Rectilinear Volumes and Curvilinear Volumes (Rectilinear volumes such as, Cube, Rectangular Cuboid (V= W x L X H), understanding Proportion by varying W, L and H. Curvilinear Volume such as Cylinder, Sphere, Cone, Ellipsoid, Hemisphere and Paraboloid.)

Exposure 2: Platonic Solids and its construction by using Sticks and Rubberband and paper by developing surfaces as shown in figure below.



Exposure 3: Form and Expressions

Exploration of expressions and meaning in 3D.

Design Thinking & Innovation Process involvement:

This Module involves the following phases of the DT&I Process:

Phase 1. Observe/Empathise/Research (Sketching Observations of 3D)

Phase 2. Understand/Analyse/Define (Understanding 3D)

Phase 3. Ideate/Alternate/Create (3D Explorations)

Phase 4. Build/Prototype/Detail (Making 3D forms)

Phase 5. Evaluate/Reflect/Implement (Presentation of Models)

Mapping SDG Goals:

The following SDG goals need to be considered while solving this task. While documenting elements and expressions, do think of gender equality and reduced inequalities and concern for life on our planet.











Task 6

Task 6 = 6.1 + 6.2 + 6.3

School Hours: 12, Home hours: 6



Task 6.1 (done at Home)

Task 6.1:

Home hours: 2, done individually

Topic Title:

Observation and analysis of 3D objects at home:

- 1. Select 6 different 3D objects of daily use at home (these could range from mobile phones, to watches, to mixers to a fridge)
- 2. Study these 3D objects and look at its visible visual features and other properties: shape/form, colours, textures, symmetry, softness/hardness, usefulness, expression, material, recyclability, cost, etc.
- 3. Make a chart (A4 size) with the 6 objects on one axis and their features and its properties on the other axis
- 4. Mark the ones that you like the most for each of the properties/features
- 5. Can you simplify and draw the simplified form? (optional)

Output 6.1: Submission of the Chart with analysis of the observed objects

Task 6.2 (done in Home)

Task 6.2:

Home hours: 4, done individually

Topic Title:

Rectilinear Volumes and its proportion:

Construct a rectangular cuboid of size 10cm length X 5 cm depth x 5 cm height by using a single sheet of chart paper. Incorporate a slanting roof so as to make a house. Optional: integrate doors and windows that are openable. (cutting is allowed)

The above tasks would involve the following:

- 1. Development of the plan of the cuboid of dimension 10x5x5 cm when it is flattened out on a 2d surface of the chart paper
- 2. You could draw the outlines or make a crease in the paper by folding
- 3. Exploration of joining two flat surfaces
- 4. Explore Joining three surfaces
- 6. Discussion on the sticking flaps that go inside the cube
- 7. Application of Glue and managing the flaps
- 8. Construct the 3D object with clean edges (as much as possible)
- 9. YouTube video would be useful to understand the making of cuboid or you could explore your own version

https://www.youtube.com/watch?v=boCTmO71-Qs

Output 6.2: Model of the Cube or Rectangular cuboid with a slanting top

Task 6.3 Done at School

Task 6.3:

School Hours: 4, done individually

Topic Title:

Curvilinear Volume:

Demonstrate and construct a curvilinear volume viz. Cylinder, cone and sphere by using either (A) chalk as basic material or (B) Clay as the material

(A) Chalk as basic material

Size: for Cone and Cylinder 10mm diameter and 20 to 30 mm length.

For Sphere, hemisphere or Diameter = 10

For Ellipsoids Major axis =15 mm and minor axis=10 mm.

- 1. Planning with dimensions by drawing the volume in front, top and isometric views
- 2. Carving on chalk by using cutters/knife
- 3. Exploration working with chalk to achieve the goal as per planning.
- 4. Surface smoothening by using sandpaper or

(B) Clay as the material:

Size: for Cone and Cylinder 20mm diameter and 40 to 50 mm length.

For Sphere, hemisphere or Diameter = 20

For Ellipsoids Major axis =30 mm and minor axis=20 mm.

- 1. Planning with dimensions by drawing the volume in front, top and isometric views
- 2. Shaping clay by using fingers
- 3. Exploration working with clay to achieve the goal as per planning.
- 4. Smoothen the surface as much as possible

Output 6.3: Models of the three curvilinear volumes

Task 6.4
Done at School

Task 6.4:

School Hours: 4, done in groups of 3-4

Topic Title:

Platonic Solids:

Platonic Solids: the cube, the octahedron, the tetrahedron, the icosahedron, and the dodecahedron











Tetrahedron

Octahedron

Cube

Icosahedron

Dodecahedron

Understanding the relationship between 5 platonic solids in terms of Faces, edges and vertices and its representation with 5 elements.

Understanding the development drawing of each platonic solids Construction any one of them

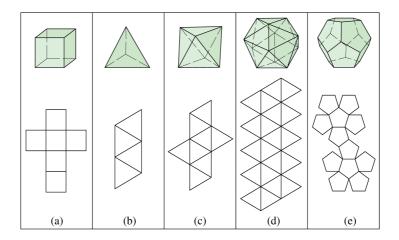
A. Construction of an Open Platonic solid:

- 1. Selection of material such as bamboo/match-stick/straws/broom sticks/used pencils/used ballpen refill and Cycle-tube valves/rubber band
- 2. Cutting of sticks as per size by using cutter

- 3. Cutting of rubber valves
- 4. Construct a volume by joining sticks at the corner using rubber valve/band.
- 5. The overall size of the volume is as such that it will fit to the 6x6x6 cm cube or

Construction of a closed Platonic Solid:

- 1. Selection of Material Chart paper of any color and PVA Glue.
- 2. Draw a development drawings on the paper and cut accordingly



3. Construct the solid by folding and sticking the open edges.

Output 6.4: Construction of either Open or Closed Platonic Solids

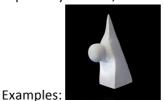
Task 6.5:

School Hours: 4, Done individually

Task Title:

Form and Expression:

In this task you will explore change of form with its ability to express a meaning. For example, curvilinear forms could express softness, sharp forms could express dynamism, solid rectangular forms could express sturdiness, etc.



Dynamic Form,



Transforming form

- 1. Choose 2 opposing expressions that you would like to explore could be comfort and discomfort, love and hate, light and heavy, fast and slow, progress and regress, natural and machine-made, organic and synthetic, etc.
- 2. On A4 size paper sketch forms to represent the chosen expressions
- 3. Take 2 sets of clay of roughly the size 5cm x 5 cm x 5 cm)
- 4. Taking the sketches as reference, transform clay to represent the meaning of the chosen two expressions in 3 dimensions
- 5. Show it to others and get feedback on whether they are able to make out the expression

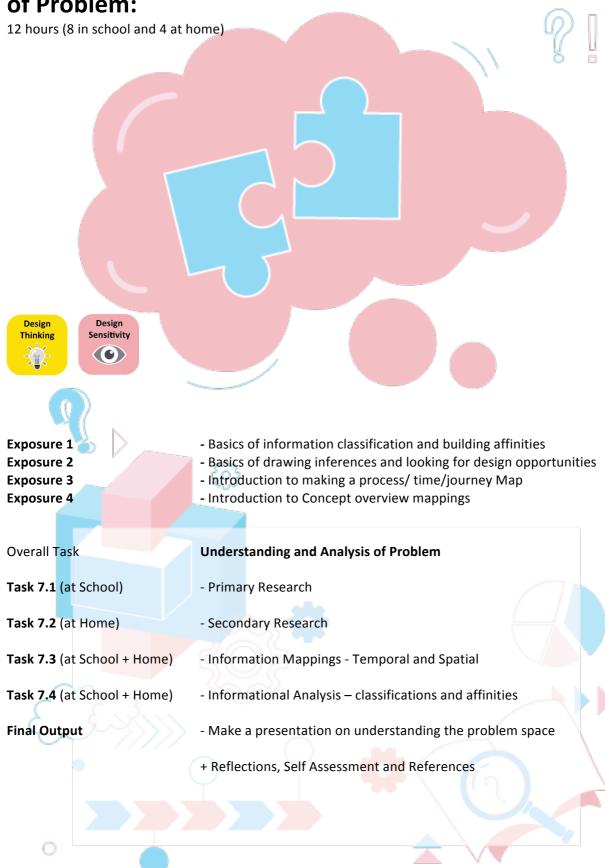
Output 6.5: Two sets of opposing expressions represented in 3 Dimensions using clay



| Reflection: | Questions to ponder: Do you feel you can try visualizing artifacts in 3 dimension? Can you apply what you learnt of understanding 3D principles to select artifacts for your home? Will you make a list of the most interesting 3D objects? | | | | | |
|-------------------|--|--|-------------------------------------|-----------------------|---------------------|--|
| Self Assessment: | Assessment Crite | ria (Task 6.1 + 6. | 2 + 6.3 + 6.4 + 6 | 5.5) - Assess you | rself: | |
| 0 | - Observation and task 6.1) | Analysis of the | objects at home | were done well | . (Individual | |
| | Beginning | Developing | Promising | Proficient Proficient | Excellent | |
| | - Construction of top was done wel | | | igular Cuboid wi | th a slanting | |
| | Beginning | Developing | Promising | Proficient | Excellent | |
| | - Models of curvil (Individual task 6. | | . Cylinder, cone | and sphere were | e done well | |
| | Beginning | Developing | Promising | Proficient Proficient | Excellent Excellent | |
| | - The construction (Group task 6.4) | of either Open | or Closed Plator | nic Solids were d | one well | |
| | Beginning | Developing | Promising | Proficient | Excellent | |
| | - The two sets of were done well (I | | • | ed in 3 Dimensio | ns using clay | |
| | | Developing | | Proficient | Excellent | |
| Other References: | Other suggested 1. Film featuring 'Fallingwater', http://www.you 2. Design Thinking https://www.you | g the Frank Lloy by Cristóbal Vil utube.com/wat g Framework - a | a: cch?v=9CVKU3E short video: | <u>ErrGM</u> | erpiece | |

7.0 **Module 7**

Introduction to Understanding and Analysis of Problem:



7.0 **Module 7**

Introduction to Understanding and Analysis of Problem



(8 hours at school + 4 hours at home)



Introduction:

This stage of the design process in understanding and analysis of the problem space comes after one has done primary and secondary research on the subject of study (described in Modules 3.0 and 4.0). In this module, redesign of an object in the primary classroom is taken as a task to uderstand its importance in the design process.

Aim of the Module:

To expose school students (in Grade 9) to basic fundamentals of being able to analyse a problem in order to get a better understanding of the problem to solve. Analysis is done on the information collected after the primary and secondary research. This module will introduce the basics of classifying observations, seeking inferences and insights, methods of mapping this information and making recommendations /locating opportunities for design.

Place:

Place: Task 7.1 & Task 7.2 done at School and Task 7.3 done at home



Grouping:

Grouping: Class tasks are done in groups of 3-4 and Home tasks are individually



Equipment:

Equipment: Sketchbooks for sketching and taking notes. students may use digital devices like computers or tablets to collate information and make presentations (if available, but not necessary)

Exposure 1: Basics of information classification and building affinities

Exposure 2: Basics of drawing inferences and looking for design opportunities

Exposure 3: Introduction to making a process/ time/journey Map

Exposure 4: Introduction to Concept overview mappings

Design Thinking & Innovation Process involvement:

This task involves the following phases of the DT&I Process:

Phase 1. Observe/Empathise/Research (Primary and Secondary Research)

Phase 2. Understand/Analyse/Define (Analysis of Findings)

Phase 3. Ideate/Alternate/Create (trying creative alternatives)

Phase 4. Build/Prototype/Detail (making the prototype and the presentation)

Phase 5. Evaluate/Reflect/Implement (feedback from others)

Mapping SDG Goals:

The following SDG goals need to be considered while solving this task. While documenting elements and expressions, do think of gender equality and reduced inequalities and concern for life on our planet.











Task 7:

Task 7 = 7.1 + 7.2 + 7.3 + 7.4

School Hours: 12, Home hours: 6



Task 7.0:



Overall Task (Task 7.1 + Task 7.2 + Task 7.3 + Task 7.4):

Task Topic:

Understanding and Analysis of Problem: Re-design of Objects in Primary Classrooms

Investigate, document and study all the Objects in Primary Classrooms in your school. The aim is to redesign one of them and make it better.

For this, you'll need to understand its limitations and problems and find appropriate innovative solutions. The student's work in groups of 3-4 and each group can choose one of the objects in the primary classroom to work with.

Task 7.1:



Task 7.1:

School Hours: 4, done in groups of 3-4

Primary Research (covered in Module 3):

- 1. Visit the primary grade classes and do primary research (Observe the objects, environment and how children/teacher makes use of these, converse with them and try to understand their needs)
- 2. Ask the following questions about your subject What? Why? How? Whom? Where? When? etc.
- 3. Make a list of all the objects and the environment and issue connected with these
- 4. Document through photography or sketching the different aspects of the problem being solved

Ouput 7.1: Make a presentation involving images and short text in form of a report or slides (around 6 to 10 pages or slides)

Task 7.2:



Task 7.2:

Home hours: 4, Done individually at Home

Task Title:

Secondary Research (covered in Module 3):

- 1. Analyze your topic into sub-topics and take up one of these for further study and understanding. It could be based on the objects that you have in the Primary Classroom.
- 2. Do Secondary research by referring to existing information on objects for the Primary Classroom by referring to information on the internet.
- 3. Search for information on media that is accessible to you. Take down notes as points. Mark important aspects.

Output 7.2: Summarize the information collected along with visuals and short text in form of a report or slides (around 6 to 10 pages or slides)

Task 7.3:



Task 7.3:

School Hours 2, done in groups of 3-4 and Home Hours: 2, done individually

Task Title:

Information Mappings - Temporal and Spatial

Task 7.3a: Temporal Mappings

- 1. Note down all the activities that happen in the Primary Classroom from morning to evening on any given day of the week. These could include lectures, classwork, working in groups, play/drawing activities, having tiffin or lunch, etc.
- 2. Note down on a timeline starting from morning till evening the sequence of the activities (you could drawings to represent some of them)
- 3. Note down the time taken to do the different activities

Output 7.3a: Time Map of the activities in the primary Classroom represented on an A3 size sheet

Task 7.3b: Spatial Mappings

- 1. Note down all the Objects, facilities, and movement in the Primary Classroom with regard to the space in the Primary Classroom
- 2. Draw a layout of the classroom on an A3 size sheet
- 3. Sketch on it the objects that are in the classroom
- 4. Mark the position of entry and exit points, and the path of movement of the students and teacher in the classroom

Output 7.3b: Space Map of the Objects in the primary Classroom represented on an A3 size sheet

Task 7.4:



Task 7.4:

School Hours: 6, done in groups of 3-4

Task Title:

Information Analysis (classification and affinities):

Task 7.4a: Information Sorting (Affinity Mapping)

- 1.Summarize information from primary research as points and write this on separate sticky notes (or on sheets of paper cut to size $10 \text{cm} \times 10 \text{cm}$). These are part of your **observations**.
- 2. Classify the sticky or paper notes related in some way into different categories (some may fit in multiple categories so replicate them)
- 3. Priorities the sticky notes within the categories according to its importance **Output 7.4a:** Classification of data collected and sorted according to its importance

Task 7.4b: Relational Link Connections

- 4. Find connections (links) between the different groups of sticky notes and these could be your **inferences and insights** from your study
- 5. Begin discussion within your group on the relevance of these inferences and see if they provide or indicate **opportunities for design** intervention to solve some of the problems

Output 7.4b: Make a chart of classifying the information collected according to the following:

| Observations | Inferences/Insights | Design Opportunities |
|--------------|---------------------|----------------------|
| 1. | | |
| 2. | | |

and make a presentation of these in 10 slides

| Refl | ectio | on: |
|------|-------|-----|
| | | |

Questions to ponder:



- Which of these methods are you confident about using Information Sorting, Affinity Mapping, Link Connections, Temporal Mapping or Spatial Mapping?
- Will you use some of the methods to analyse problems at home and in your neighbourhood?
- Will you share the methods of analyzing problems with others?

Assessment:

| Assessment Crite - The presentation (Group task 7.1) | | = = = = = = = = = = = = = = = = = = = | • | is done well |
|--|-------------------|---------------------------------------|-----------------------------|---------------|
| Beginning | Developing | Promising | Proficient Proficient | Excellent |
| - The summary re well (Individual ta | • | e Secondary Res | earch document | ation is done |
| | | Dro policin s | Destisions | Excellent |
| Beginning - The Information | , 5 | Promising s and Link Conne | Proficient ections are done | |
| task 7.3) | | | | |
| Beginning | Developing | Promising Promising | Proficient Proficient | Excellent |
| The Temporal ar | nd Spatial Mappir | ngs were done w | vell (Group task | 7.4) |
| Reginning | Develonina | Promisina | Proficient | Excellent |

Other References:

Other suggested References:

- 1. Design Thinking Process explained with an example:
- https://www.youtube.com/watch?v=uRtAzzitBmA
- 2. Design Thinking Framework a short video:
- https://www.youtube.com/watch?v=LhQWrHQwYTk

8.0 Module 8

Design Project with focus on Products and focus on Problem Analysis and Mappings

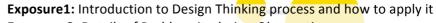
27 hours (18 in school and 9 at home)











Exposure 2: Details of Problem Analysis – Observations,

Inferences/Insights and Design Recommendations/Opportunities

Exposure 3: Mappings and Visualisation of Problem Space

Overall Task

Exposure 2

Exposure 3

Problem Analysis and Mappings

Task 8.1 (at School + Home)

- Redefining the problem to be solved:

Task 8.2 (at School + Home)

- List of materials and processes

Task 8.3 (at School + Home)

- Design Solution Possibilities and Ideation

Task 8.4 (at School + Home)

- Design Solution Prototyping

Task 8.5 (at School) and Final Output

- Design Solution Final Presentation and Documentation

+ Reflections, Self Assessment and References

8.0 Module 8

Design Project with focus on Products and emphasis on Problem Analysis and Mappings

(18 hours at school + 9 hours at home)



Introduction

In this module, redesign of an object in the primary classroom is taken as a task to understand its importance in the design process.

The students are encouraged to make use of their learning from the previous modules on Sketching for Ideation and Fundamentals of 3D to solve this problem.

Aim of this Module

The aim of this module is to make students understand the importance of understanding and analysis of a problem as part of the design process in solving and finding an appropriate innovative solution.

The students will make use of classifying observations, seeking inferences and insights, methods of mapping this information, making recommendations and locating opportunities for design in order to ideate and come out with solutions.

Place:

Place: Task 8.1, 8.2, 8.3, 8.4, and 8.5 done at School and at home





Design

Thinking

Projects

Grouping: Grouping: Class tasks are done in groups of 3-4 and Home tasks are individually

A - 222/2222 A - 2

Equipment: Sketchbooks for sketching and taking notes. students may use digital

devices like computers or tablets to collate information and make presentations

(if available, but not necessary)

Exposures Exposure1: Introduction to Design Thinking process and how to apply it

Exposure 2: Details of Problem Analysis – Observations, Inferences/Insights and

Design Recommendations/Opportunities

Expsoure 3: Mappings and Visualisation of Problem Space

Design Thinking & Innovation Process involvement:

This task involves the following phases of the DT&I Process:

Phase 1. Observe/Empathise/Research (Primary and Secondary Research)

Phase 2. Understand/Analyse/Define (Analysis of Findings)

Phase 3. Ideate/Alternate/Create (trying creative alternatives)

Phase 4. Build/Prototype/Detail (making the prototype and the presentation)

Phase 5. Evaluate/Reflect/Implement (feedback from others)

Mapping SDG Goals:

The following SDG goals need to be considered while solving this task. While documenting elements and expressions, do think of gender equality and reduced inequalities and concern for life on our planet.











Task 8:

Task 8 = 8.1 + 8.2 + 8.3 + 8.4 School Hours: 12, Home hours: 6



Task 8.1:

À

Task 8.1

School Hours: 2

Done in groups of 3-4 at School

Task Topic:

Redefining the Problem to be Solved: Re-design of Objects in Primary Classrooms

You have already done the analysis of the problem in the previous Module.

1. Redefine your problem statement after the inputs from analysis. The problem statement could be more specific with further details.

Output 8.1: Redefinition of the Problem Statement

Task 8.2:



Task 8.2

Home Hours: 2, done individually

Task Topic:

Make a list of materials and processes used

Task a can be done in school and Task b at home

- 1. Make a list of existing objects in the classroom.
- 2. Chose the one that your group would like to redesign
- 3. Make a list of all the different materials used for the object
- 4. Make a list of processes that are required to make the object
- 5. Discuss if the change of materials (towards being more sustainable?) and the method of making it could make the object better

Output 8.2: List of Materials and processes used for the Object

Task 8.3:



Task 8.3

School hours: 6 and Home hours: 2

Done in groups of 3-4 at School and individually at Home

Topic title:

Ideation on Creative Innovative Design Solution Possibilities + Shortlisting of Ideas

- Ideate on possible solutions by sketching these
- 1. Your group could brainstorm, Ideate on possible creative innovative solutions and sketch these out + number or name these ideas

2. Collate all the good ideas together and short-list them according to their product effectiveness and ease of implementation

Output 8.3: Make a presentation of these in 3 slides (alternate concept sketches + short-listed idea)

Task 8.4:

Task 8.4

School hours: 6 and Home hours: 2

Done in groups of 3-4 at School and individually at Home

Topic title:

Design Solution Mock-ups + Prototyping

- 1. Select the best one out of your ideation and finalise it with details.
- 2. The final concept could involve any of the following:
- 2D/3D design Sketches + Physical Prototyping + Visualisation + 3D Models
- 3. Detail out the final selected solution: the details could be about its layout, form, colours, material selection, listing of advantages/disadvantages and how to produce.
- 3. Make a mock-up of your final idea a scaled version.
- 4. Show the mock-up to potential users and get feedback
- 5. Incorporate suggestions from the feedback in your design
- 6. Make the final prototype

Output 8.4: Make a presentation of these in 3 slides (mock-up + feedback + details)

Task 8.5:

Task 8.5

School hours: 4 and Home hours: 2

Done in groups of 3-4 at School and individually at Home

Topic title:

Final Presentation and Documentation

Prepare a presentation (of 6-8 minutes duration) to include all the stages of your project:

- a. Title of the Design Project or Problem Statement
- b. Team members
- c. Summary/content listing of your presentation
- d. Insights from Primary and Secondary Research
- e. Major design opportunities
- f. Restatement of the problem / Design Objectives / Design Goals
- g. Alternate Concepts (sketches + quick scenarios + concept models)
- h. Final Concept and its unique features
- i. Process, Form or Interface development and detailing
- j. Prototype /Mock-up
- k. User feedback on your final solution

- I. Future steps and suggestions
- m. Full References (Learn how to do references)
- n. Acknowledgments to all who have helped

Output 8.5: A presentation (6-8 minutes, roughly 15 to 25 slides) explaining the Project outcome along with Process

Questions to ponder: **Reflection:** - What are the most interesting methods of the Design Thinking process that you found useful in solving the above problem? - Can you apply what you learnt by redesigning products and artifacts around your home and neighbourhood to make them better? - Will you collaborate and make use of the Design Thinking Process with others like your friends and cousins to solve problems? Assessment Criteria (Task 4a + 4b + 4c + 4d) - Assess yourself: Assessment: - Redefines a specific, appropriate and well-framed problem statement with inputs from analysis of previous Module (Group task) **Beginning** Developing **Promising Proficient** Excellent - Makes an appropriate List of Materials and processes used for the selected Object (Individual task) Beainnina Developina **Promisina** Excellent - Comes out with creative innovative several alternate ideas along with sketches (Group + individual task) **Beginning** Developing **Promising** Excellent - The mock-up of the prototype of the final concept was done well +incorporating feedback from the users (Group + individual task) **Beginning** Developing **Promising** - The final presentation showing the business model, design process and the final solution was done well (Group + individual task) **Beginning** Developing **Promising Proficient** Excellent Other suggested References: **Other References:** 1. Design Thinking Process - explained with an example: https://www.youtube.com/watch?v=uRtAzzitBmA 2. Design Thinking Framework - a short video:

https://www.youtube.com/watch?v=LhQWrHQwYTk

Assessment Matrix:

Module 1.0: Documentary Photography

| Achievement Levels | 1-2 BEGINNING | 3-4 DEVELOPING | 5-6 PROMISING | 7-8 PROFICIENT | 9-10 EXCELLENT |
|--|--|---|--|--|--|
| Task 1.1 Points of View important aspects/principles of photography | The student: Is yet to show principles or elements. Displayed no efforts to make appropriate decisions while shooting. | The student: Hardly use any principles or elements. Made little effort in regard to decision making. | The student: Demonstrated few examples of principles and elements. Displayed some efforts in regard to decision making. | The student: Demonstrated fairly good examples of principles and elements. Displayed a decent effort in regard to decision making | The student: Demonstrated strong evidence of principles and elements. Displayed a clear effort in regard to decision making (Composition, Rule of third, interesting angles, etc.) |
| Task 1.2 Capture Expressions with composition and focus on a subject | Yest to photograph anything. Most compositions were not satisfactory and/or completed. | Images barely represented assignment focus. Some compositions were not satisfactory and/or completed. | Images somewhat represented assignment focus. A satisfactory composition that is creative and original. Most components of the task completed. | Images mostly represented assignment focus. A good composition that is creative and original. All components of the task completed. | All images clearly represented assignment focus. An Excellent composition that is creative and original. All components of the task completed with thoughtfulness and detail. |
| Task 1.3 Capture the essential elements of the story | Work displays minimal purposeful relationships between idea, imagery, form, media and skills. | Work shows sufficient capability in choosing appropriate imagery, form, media and techniques in support of creative intent. | Visual representation demonstrates a successful combination of imagery, form, media and techniques in support of creative intent. | Visual representation exhibits a distinctive blend of individual perspective, imagery, form, media and techniques in support of creative intent. | Visual representation embodies an excellent unity of original thought, imagery, form, media and techniques in support of creative intent. |
| Overview: Understanding and Knowledge of the topic | Less or no understanding and knowledge of their selected focus | Limited understanding and knowledge of their selected focus | Evidence of satisfactory understanding and knowledge of their selected focus | Evidence of good understanding and knowledge of their selected focus | Evidence of extensive understanding and knowledge of their selected focus |

Assessment Matrix:

Module 2.0: Fundamentals of 2D

| Achievement Levels | 1-2 BEGINNING | 3-4 DEVELOPING | 5-6 PROMISING | 7-8 PROFICIENT | 9-10 EXCELLENT |
|---|--|---|--|---|--|
| Task 2.1a, 2.1b. 2.1c Understanding the elements of 2D Design | The student: Needs to understand the basic elements of 2D design | The student: Possesses a vague understanding of the basic elements of 2D design | The student: Possesses a limited understanding of the basic elements of 2D design | The student: Possesses clear understanding of the basic elements of 2D design | The student: Possesses detailed understanding of the basic elements of 2D design |
| Task 2.2a, 2.2b Negative and Positive Spaces in Composition + Listing of Symmetry at home | The 2 compositions of representing 'Negative Spaces' in the environment as well as listing of symmetry at home are yet to be done. | The 2 compositions of representing 'Negative Spaces' in the environment as well as listing of symmetry at home were just about done. | The 2 compositions of representing 'Negative Spaces' in the environment as well as listing of symmetry at home was somewhat done. | The 2 compositions of representing 'Negative Spaces' in the environment as well as listing of symmetry at home were fairly done well. | The 2 compositions of representing 'Negative Spaces' in the environment as well as listing of symmetry at home were done well. |
| Task 2.3a. 2.3b Structure in 2D Design | The exploration of 2 tessellating patterns design process as well as the drawing of a Golden Spiral was done well. | The exploration of 2 tessellating patterns design process as well as the drawing of a Golden Spiral was just about done. | The exploration of 2 tessellating patterns design process as well as the drawing of a Golden Spiral was somewhat done. | The exploration of 2 tessellating patterns design process as well as the drawing of a Golden Spiral was fairly done well. | The exploration of 2 tessellating patterns design process as well as the drawing of a Golden Spiral was done well. |
| Task 2.4a. 2.4b Visual Studies and Graphicalisation | The 3 variations of the chosen state symbol as sketches as well as the 3 variations of the chosen state symbol as Icons/Symbols are yet to be done | The 3 variations of the chosen state symbol as sketches as well as the 3 variations of the chosen state symbol as Icons/Symbols were just about done | The 3 variations of the chosen state symbol as sketches as well as the 3 variations of the chosen state symbol as Icons/Symbols were somewhat done | The 3 variations of the chosen state symbol as sketches as well as the 3 variations of the chosen state symbol as Icons/Symbols were fairly done well | The 3 variations of the chosen state symbol as sketches as well as the 3 variations of the chosen state symbol as Icons/Symbols were done well |

Assessment Matrix:

Module 3.0: Introduction to Problem Identification and Empathy:

| Achievement Levels | 1-2 BEGINNING | 3-4 DEVELOPING | 5-6 PROMISING | 7-8 PROFICIENT | 9-10 EXCELLENT |
|-------------------------------------|---|---|--|--|---|
| Task 3.1 Ask Questions | The student asked is yet to ask questions and the Mind-map of the topic 'Waste Disposal in School' is yet to be done. | The student asked a few questions and the Mind-map of the topic 'Waste Disposal in School' was just about done. | The student asked some questions and the Mind-map of the topic 'Waste Disposal in School' was somewhat done. | The student asked questions and the Mind-map of the topic 'Waste Disposal in School' was done fairly well. | The student asked questions and the Mind- map of the topic 'Waste Disposal in School' was done very well. |
| Task 3.2 Primary Research | The presentation of the Summary points of the Primary Research is yet to be done | The presentation of the Summary points of the Primary Research was just about done | The presentation of the Summary points of the Primary Research was somewhat done | The presentation of the Summary points of the Primary Research was fairly done well | The presentation of the Summary points of the Primary Research was very done well |
| Task 3.3 Secondary Research | The presentation of the Summary points of the Secondary Research documentation is yet to be done | The presentation of the Summary points of the Secondary Research documentation was just about done | The presentation of the Summary points of the Secondary Research documentation was somewhat done | The presentation of the Summary points of the Secondary Research documentation was fairly done well | The presentation of the Summary points of the Secondary Research documentation was very done well |
| Task 3.4 Collating and Presentation | The collation/ summary of the different stages of this module is yet to be presented | The collation/ summary of the different stages of this module was presented just about well | The collation/ summary of the different stages of this module was presented somewhat well | The collation/ summary of the different stages of this module was presented fairly well | The collation/ summary of the different stages of this module was presented very well |

Assessment Matrix:

Module 4.0: Design Project 1 with focus on Communications and emphasis on Problem Identification

| Achievement Levels | 1-2 BEGINNING | 3-4 DEVELOPING | 5-6 PROMISING | 7-8 PROFICIENT | 9-10 EXCELLENT |
|---|---|--|---|---|---|
| Task 4.1 Analysis of the Problem to be solved | Analysis of the design problem is yet to be done with proper categorisation and assigning priorities. | Analysis of the design problem was just about done with proper categorisation and assigning priorities. | Analysis of the design problem was somewhat done with proper categorisation and assigning priorities. | Analysis of the design problem was done fairly well with proper categorisation and assigning priorities. | Analysis of the design problem was done very well with proper categorisation and assigning priorities. |
| Task 4.2 a) Mind-map of the Problem and b) Life Cycle Map | Needs to complete a mind map of the problem and the Life Cycle Map under consideration | Completes a basic sketchy mind map of the problem and the Life Cycle Map under consideration | Completes an average mind map and the Life Cycle Map, with few of inconsistencies, of the problem | Completes a good mind map of the problem and the Life Cycle Map under consideration | Completes an elaborate and detailed mind map of the problem and the Life Cycle Map under consideration |
| Task 4.3 Ideation of solutions by sketching | Needs to complete the sketch of the possible ideas for solution to the problem | Completes a basic sketch of the possible ideas for solution to the problem | Completes an average sketch of the possible ideas for solution to the problem | Completes a good sketch of the suitable ideas for solution to the problem | Detailed and well-presented sketch of the possible creative ideas for solution to the problem |
| Task 4.4 Solution prototype | Needs to complete the prototype of one of the problem solution ideas. | Completes a basic prototype of the problem solution idea by using - 2D/3D design Sketches/Physical Prototyping/ Visualisation /3D Models | Completes an average and limited prototype of the problem solution idea by using - 2D/3D design Sketches/Physical Prototyping/ Visualisation /3D Models | Completes a good and appropriate prototype of the problem solution idea by using - 2D/3D design Sketches/Physical Prototyping/ Visualisation /3D Models | Completes a detailed and creative prototype of the problem solution idea by usig - 2D/3D design Sketches/Physical Prototyping/ Visualisation /3D Models |

Assessment Matrix:

Module 5.0: Fundamentals of Sketching for Ideation

| Achievement Levels | 1-2 BEGINNING | 3-4 DEVELOPING | 5-6 PROMISING | 7-8 PROFICIENT | 9-10 EXCELLENT |
|--|--|--|---|---|---|
| Task 5.1 Drawing circles with circular objects | The student: Has not followed the instructions specifying number and size of circles. Needs to complete 1-2 circles. | The student: Has followed the instructions specifying number and size of circles. and completed 3-4 circles. | The student: Has followed the instructions specifying number and size of circles. and completed 5-6 circles. | The student: Has followed the instructions specifying number and size of circles. and completed 7-8 circles. | The student: Has followed the instructions specifying number and size of circles. and completed 9-10 circles. |
| Task 5.2 Sketch of Alien Monster | Has not followed instructions and the sketch of the Alien Monster is not done well based on inspiration from the form and structure of an Insect | Has jst about followed instructions and the sketch of the Alien Monster is just about done based on inspiration from the form and structure of an Insect | Has somewhat followed instructions and the sketch of the Alien Monster is somewhat done based on inspiration from the form and structure of an Insect | Has mostly followed instructions and the sketch of the Alien Monster is done fairly well based on inspiration from the form and structure of an Insect | Has followed instructions and the sketch of the Alien Monster is done well based on inspiration from the form and structure of an Insect |
| Task 5.3 Sensitivity towards sketching from a different point of view | Needs to understand the concept of redrawing sketches from a different point of view. | Understands the basic concept of redrawing from a different point of view and completes 1 out of the required 3 | Understands the basic concept of redrawing from a different point of view and completes 2 out of the required 3 | Creates all 3 sketches but with few inconsistencies in the given points of view. | Creates all 3 sketches clearly showcasing the understanding of sketching from different points of view. |
| Tasks 5.4 Sketching in 3D a) Plan, Elevation and Section b) 1point and 2 point Perspective | a) The drawing of the Plan, Elevation and Section is yet to be done. b) The drawing of One Point and Two Point Perspective is yet to be done. | a) The drawing of the Plan, Elevation and Section is just about done. b) The drawing of One Point and Two Point Perspective is just about done. | a) The drawing of the Plan, Elevation and Section is somewhat done. b) The drawing of One Point and Two Point Perspective is somewhat done. | a) The drawing of the Plan, Elevation and Section is fairly done. b) The drawing of One Point and Two Point Perspective is fairly done. | a) The drawing of the Plan, Elevation and Section is done well. b) The drawing of One Point and Two Point Perspective is done well. |

Assessment Matrix:

Module 6.0: Fundamentals of 3D

| Achievement Levels | 1-2 BEGINNING | 3-4 DEVELOPING | 5-6 PROMISING | 7-8 PROFICIENT | 9-10 EXCELLENT |
|---|--|--|--|---|---|
| Task 6.1 Fundamentals of 3D | Observation and Analysis of the objects at home need to be done. | Observation and Analysis of the objects at home were just about done. | Observation and Analysis of the objects at home were somewhat done well. | Observation and Analysis of the objects at home were fairly done well. | Observation and Analysis of the objects at home were done well. |
| Task 6.2 Fundamentals of 3D - model of the Cube or Rectangular Cuboid with a slanting top 6.2 | Construction of the model of the Cube or Rectangular Cuboid with a slanting top is not yet done. | Construction of the model of the Cube or Rectangular Cuboid with a slanting top was just about done. | Construction of the model of the Cube or Rectangular Cuboid with a slanting top was somewhat done. | Construction of the model of the Cube or Rectangular Cuboid with a slanting top was fairly done well. | Construction of the model of the Cube or Rectangular Cuboid with a slanting top was done well. |
| Task 6.3 Design and construction of the model of the Cylinder, cone and sphere | Needs to complete the construction | Completes one out of the three tasks 1,2,3 constructions | Completes two out of the three tasks 1,2,3 constructions | Completes all the three constructions but with some errors in dimension specification as per instructions | Completes all the three constructions in accordance with dimension specifications as per instructions |
| Task 6.4 The construction of either Open or Closed Platonic Solids | The constructions totally lacks the ability to hold on to its desired shape and dimensions | The constructions hold their shape but have loose connections | The constructions are fairly rigid but lack clean edges/vertices/faces | The constructions are strong with clean edges/ vertices/ faces | The constructions are very clearly defined and strong with clean edges/vertices/faces achieving the goals as per planning |
| Task 6.5 Constructing creative 3D objects with expressions | Displays poor sensitivity towards constructing creative 3D objects with expressions | Displays very limited sensitivity towards constructing creative 3D objects with expressions | Displays average sensitivity towards constructing creative 3D objects with expressions | Displays sensitivity towards constructing creative 3D objects with expressions | Displays heightened sensitivity towards constructing creative 3D objects with expressions |

Assessment Matrix:

Module 7.0: Introduction to Problem Analysis

| Achievement Levels | 1-2 BEGINNING | 3-4 DEVELOPING | 5-6 PROMISING | 7-8 PROFICIENT | 9-10 EXCELLENT |
|---|--|---|---|---|--|
| Task 7.1 Primary research Interaction and observation | The student: Needs to interact with the students/teach er and keenly observes the objects and environment | The student: Has limited interaction with the students/ teacher and observes very few of the objects and environment | The student: Has average interaction with the students/ teacher and observes some of the objects and environment | The student: Has good interaction with the students/ teacher and keenly observes the objects and environment | The student: Enthusiasticall y interacts with the students/ teacher and observes the objects and environment in detail |
| Task 7.2 Secondary Research | Needs to complete summary of information collected along with visuals and short text in form of a report or slides | Completes a limited listing of summary of information collected along with visuals and short text in form of a report or slides | Completes an average listing summary of information collected along with visuals and short text in form of a report or slides | Completes a good listing of summary of information collected along with visuals and short text in form of a report or slides | Completes detailed listing summary of information collected along with visuals and short text in form of a report or slides |
| Task 7.3 Information Analysis, Observation and classification | Needs to summarize information from primary research and classify into different categories and affinities | Limited summarizing of information from primary research and its classification into different categories and affinities | Average summarizing of information from primary research and its classification into different categories and affinities | Completes summarizing of information from primary research and its acceptable classification into different categories and affinities | Completes detailed summarizing of information from primary research and its accurate classification into different categories and affinities |
| Task 7.4 Information Mappings – Temporal and Spatial | The Temporal and Spatial Mappings are yet to be done | The Temporal and Spatial Mappings were just about done | The Temporal and Spatial Mappings were somewhat done | The Temporal and Spatial Mappings were fairly done well | The Temporal and Spatial Mappings were done well |

Assessment Matrix:

Module 8.0: Design Project 2 with focus on Products and emphasis on Problem Analysis and Mappings

| Achievement Levels | 1-2 BEGINNING | 3-4 DEVELOPING | 5-6 PROMISING | 7-8 PROFICIENT | 9-10 EXCELLENT |
|---|---|---|--|--|--|
| Task 8.1 Redefining the problem to be solved | The student: Needs to redefine the problem statement with inputs from analysis of the previous Module | The student: Redefines a basic sketchy problem statement with inputs from analysis of the previous Module | The student: Redefines a problem statement but with few inconsistencies from analysis of the previous Module | The student: Redefines a specific problem statement with inputs from analysis of the previous Module | The student: Redefines a specific, appropriate and well framed problem statement with inputs from analysis of the previous Module |
| Task 8.2 List of Materials and Processes | Needs to complete the list of Materials and processes used for the Object | Completes a basic sketchy list of Materials and processes used for the Object | Completes an average list of Materials and processes used for the Object | Completes a good list of Materials and processes used for the Object | Completes an elaborate and detailed list of Materials and processes used for the Object |
| Task 8.3 Ideation of solutions by sketching | Needs to complete the sketch of the possible ideas for solution to the problem | Completes a basic sketch of the possible ideas for solution to the problem | Completes an average sketch of the possible ideas for solution to the problem | Completes a good sketch of the suitable ideas for solution to the problem | Detailed and well- presented sketch of the possible creative ideas for solution to the problem |
| Task 8.4 Solution prototype | Needs to complete the prototype of one of the problem solution ideas. | Completes a basic prototype of the problem solution idea by using - 2D/3D design Sketches/Physic al Prototyping/Visualisation/3D Models | Completes an average and limited prototype of the problem solution idea by using - 2D/3D design Sketches/Physica I Prototyping/ Visualisation /3D Models | Completes a good and appropriate prototype of the problem solution idea by using - 2D/3D design Sketches/Physica I Prototyping/ Visualisation /3D Models | Completes a detailed and creative prototype of the problem solution idea by using - 2D/3D design Sketches/Physical Prototyping/ Visualisation /3D Models |

| Achievement Levels | 1-2 BEGINNING | 3-4 DEVELOPING | 5-6 PROMISING | 7-8 PROFICIENT | 9-10 EXCELLENT |
|---|--|---|--|---|--|
| Task 8.5 Final presentation and documentation | Needs to complete the presentation beyond title and team members | A limited presentation covering only a brief summary | An average presentation with lack of clarity in the flow of ideas and stages undertaken in the project | A good presentation with a logical structure of ideas and stages undertaken in the project. No mention of future suggestions. | A detailed and effective presentation covering all stages of the project including user feedback and future suggestions. |
| Sensitive towards major design opportunities | Displays poor sensitivity towards major design opportunities | Displays very limited sensitivity towards major design opportunities | Displays average sensitivity towards major design opportunities | Displays sensitivity towards major design opportunities | Displays heightened and creative sensitivity towards major design opportunities |

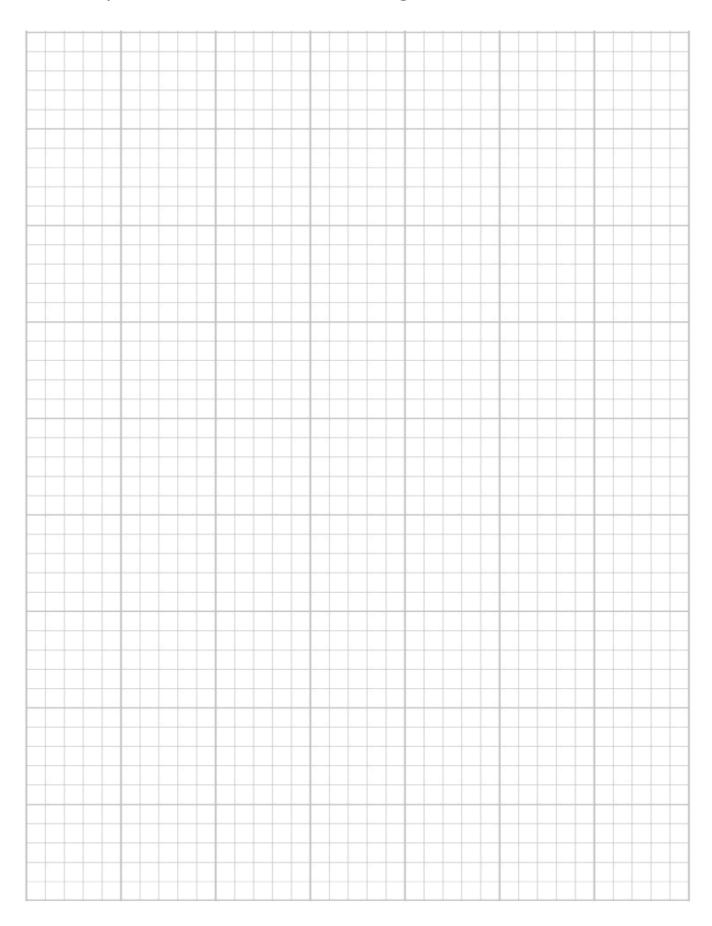
Student Feedback Form:

| NAME | CLASS | MODULE | TASK | ACTIVITY | DATE |
|---|----------------------|----------|---------|-----------|-------------------|
| | | | | | |
| Cincaration for each of the statement | - h - l | | | | |
| Give a rating for each of the statement - by placing a tick mark in the correspor | | | | | |
| | INADEQUATE | FAIR | GOOD | VERY GOOD | EXCEPTIONAL |
| Level of effort you put into activity | | | | | |
| Your level of knowledge at the start of the activity | | | | | |
| Your level of knowledge at the end of the activity | | | | | |
| Understanding of exposure slides/video | | | | | |
| | STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE |
| I enjoyed doing the activity | | | | | |
| I understood the design principles while doing the task | | | | | |
| I liked trying out different creative variations | | | | | |
| I can apply design thinking process to problem solving | | | | | |
| I enjoyed working in collaboration with my group | | | | | |
| Additional Comments: | | | | | |
| What I liked the most: | | | | | |
| What can be done better: | | | | | |
| | | | | | |
| What can be Added/Changed: | | | | | |
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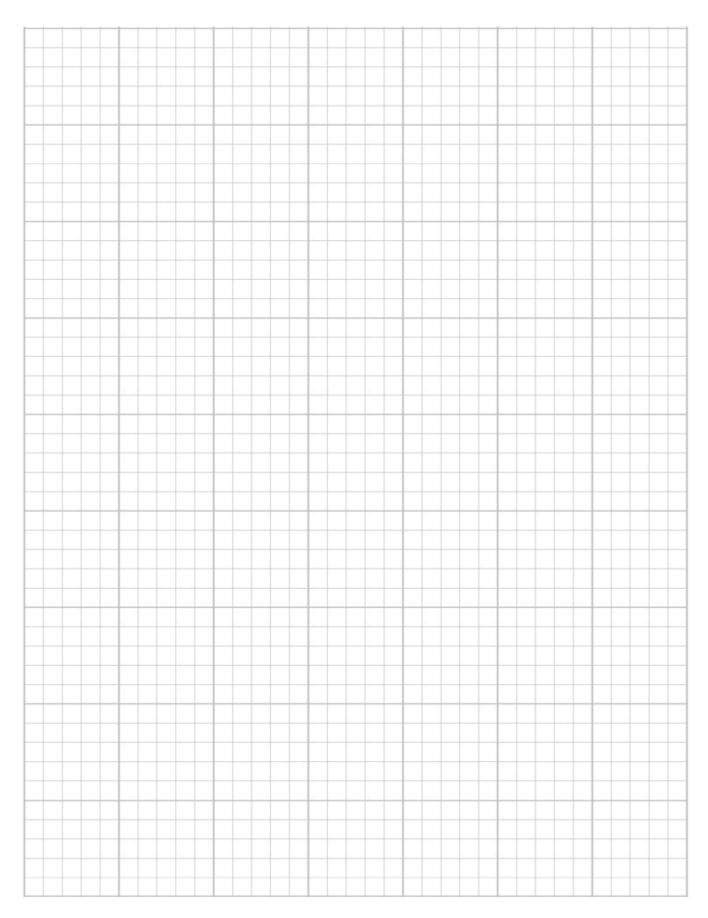
Teacher Feedback Form:

| NAME | CLASS | MODULE | TASK | ACTIVITY | DATE |
|---|----------------------|----------|---------|----------|-------------------|
| | | | | | |
| Comments: - place a tick mark in the corresponding | g box. | | | | |
| , , , , , , , , , , , , , , , , , , , | COMMENTS | | | | |
| It was easy to deliver the exposure modules: | STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE |
| Your comments: | | | | | |
| It was easy/satisfying/enjoyable to conduct the task activities: | STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE |
| Your comments: | | | | | |
| No issues were faced with regard to assessment of the task: | STRONGLY DISAGREE | DISAGREE | NEUTRAL | AGREE | STRONGLY AGREE |
| Your comments | | | | | |
| Common questions posed by the students: | | | | | |
| Suggestions for improving the task or suggestion of another task: | | | | | |
| Other suggestions, if any: | | | | | |

Grid layout for sketches and taking notes:



Grid layout for sketches and taking notes:



Credits

Acknowledgement and Credits:

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Smt. Anita Karwal, Secretary, School Education, N Delhi

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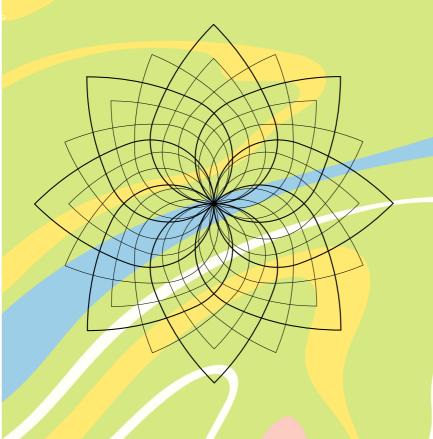


for Grade 9, Semester 1 and 2

Taskbook

2022

Hope you enjoyed the Tasks



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