biomouse – computer mouse concept

Focus: resistant materials

About the project

Biomouse is a project designed for Year 7 students with limited or no prior experience of working with sheet plastic. It uses the design style of biomorphism or organic design as its starting point for design, providing students with a strong approach and a rich source of ideas. The study of design styles also helps students to understand the built environment and to appreciate how designers have responded to needs and cultures. This project developing a variety of drawing skills particularly concept sketching.

New materials and processes dominate this project. Students will experience the use of blue styrofoam, used for modelling, and the process of vacuum forming for the production of the shell.

The suggested teaching programme is designed to allow for flexibility. Some of the tasks may need to be modified or even omitted depending on time constraints or how the project is sequenced into a schools programme of study.

Sequence of the unit

Biomouse is ideally sequenced early on in a Year 7 course. Concept sketching is considered to be an extension of a person thinking, a 'window on the mind'. This skill is imperative for designers, teachers and students to practice. It is probably the most valuable of our communication methods. Biomouse enables a free, loose and unihibited 'style' of sketching to emerge. The free flowing organic lines required for a biomorphic design are an ideal vehicle to hone valuable drawing skills.

This project is aimed at taking between 20-25 hours.

I.C.T. has the opportunity to support this project through the use of the more generic software such as MS Word, Excel and the Internet for information. CAD packages such as Rhino3D, AutoCAD, and 3D-Studio Max could be utilised in producing 3-D models. The organic nature of the Biomouse does not really lend itself to the production of engineering/working drawings.

Outcomes

At the end of the project

Students will develop knowledge and understanding in:

- properties of blue styrofoam and rigid polystyrene
- uses of blue styrofoam and rigid polystyrene
- ecological issues relating to blue styrofoam and rigid polystyrene
- how blue styrofoam and rigid polystyrene can be used to make products
- the biomorphic/organic design style and its cultural importance
- processes used in making the Biomouse
- safe working environments, habits and procedures

Students will develop skills in:

- designing their Biomouse according to a given brief
- producing their Biomouse by selecting the appropriate making processes
- evaluating their design according to set criteria
- communicating their ideas as design concepts and development drawings
- marketing by considering a target group for their product
- managing time and resources throughout the design process

Students will develop:

- an appreciation of the implication for the use of and blue styrofoam and rigid polystyrene
- a sense of responsibility for the use of materials
- an appreciation of the contribution made by themselves and that of others in the process of design.

Prior learning

Useful experience could include:

- selecting materials & processes, tools & equipment
- measuring and marking out accurately
- using sheet plastics
- identifying the usefulness of a design style to act as a catalyst for creativity
- modelling prototypes
- a working knowledge of appropriate CAD programmes
- managing a design project

Language used in the project

Throughout the project the comprehension and spelling of language will be addressed. Using strategies such as 'word of the day' and investigating it meaning/s and identifying its origin. Language of a technical nature should be discriminated.

INTUITIVELY, ACUTE, SUBTLE, TENETS, MUTED, REMINESCENT, PERMEATES,
PSYCHOLOGICAL, PARAMETERS,

Resources

Books:

Nature in Design

Design + Technology Foundation Course ,resistant materials systems and control, Collins, London, 1997. ISBN 00327352 0

J. de Noblet, Ed., Industrial Design, Reflections of a Century, Flarmmarion, Paris, 1993. ISBN 2-08013-539-2

These books are available from Designability.

Video:
Biomouse, Biomorphic computer mouse, Designability, 2002

CD ROM:
Exploring Materials CD ROM educational pack.
ISBN 1900747-10-3

Websites:
www.marc-newson.com/
www.io.tudelft.nl/public/vdm/fda/colani/
www.colani.ch/
www.philippe-starck.com/
www.noguchi.org/
www.columbia.edu/~eer1/branner.

Homework & Extension activities

Homework
See Homework Schedule within the programme.

Extension activities could include:

- Developing design work using CAD programs. Rhino3D is a tool that enables frame and surface modelling. It would be suitable as a development tool, although concepts can be developed.
- Photoshop can be utilised by taking a digital photos and then this can be manipulated, shape colour and texture.
- More accurate perspective work could be investigated. The introduction of airbrush work lends itself well to the organic nature of the form.

Links with other subjects

English: Vocabulary – descriptive terms.

Visual Art: Organic sculpture – Henry Moore

C	Sheet	Text	Teaching material	Teaching Content	Student Activity	Homework
1	2 3 4 5 6		• **Video:** Biomouse • Project notes	• Show video (20 mins) discussing issue raised. Make notes on the white board for student reference. • Read through information sheets 3,4 and discuss.	• View video and take notes • Read through information sheet • Discuss issues	• Answer questions 1-4
2	7 8 9 10		• Project notes • Rulers	• Read through information sheet on anthropometrics and ergonomics, sheet 7,8 • Explain the need of designers to be aware of these considerations for designing. • Identify five motions of the hand form sheet 8. Explain what is required. • Introduce the brief and show an example of a completed project. • Discuss the requirements and how to be creative using biomorphic information and imagery.	• Read through sheet 7,8. Discuss issues. • Complete sheet 8 on anthropometric data. • Read through the brief and make notes on it from any discussion	• Answer questions 5-8 • Complete the anthropometric worksheet • Define the meaning of vocab select 5 listed from the intro to this programme. • Product reference
3	11 12 13		• Demo area • Fineliner • Grey marker • Coloured pencils	• Demonstration of concept sketching using a fineliner. Use construct firm and shade techniques, Use coloured pencils and grey marker. Demonstrate the effect when grey marker is applied over coloured pencil. • Encourage loose, fast sketches.	• Commence concept sketches of a range of ideas. Use design sheets provided.	• Study for a class test on biomorphism. • Continue with a range of concept sketches.

C	Sheet	Text	Teaching material	Teaching Content	Student Activity	Homework
4	13 14 15		• Demo area • All tools necessary for making • Vac former • Class set of materials	• Students sit class test • Mark and go through the answers • Check design work and support students where necessary. Help with conceptual thought as well as practical aspects of sketching. • Demonstrate techniques to individuals or small groups. • Demonstration of working with bsf and ps, sheet 15 • Demonstrate finishing as a separate process. Discuss safety issues, masks and ventilation when spraying.	• Class test • Mark papers • Continue with concept work • View demonstration of working with bsf and ps and take notes • Students should have the opportunity to experience the making processes with sample pieces of material. Encourage this during and after the demo. • Students test the materials for their working characteristics.	• Concept sketches
5	16 17 18 19 20		• Demo area • Class set of materials • Video: biomouse – cued to making section	• View making section on video -discuss • Check concept work, offer advice on possible modifications. • Demonstration on producing a freehand perspective of the biomouse using a two planes, top perspective and sectional plane perspective. • Demonstration on rendering four solid forms. Discuss that objects are made up of these basic four. • Reinforce orthogonal drawing from prior experience. A freehand drawing is fine with a few overall dimensions. The final product is fairly fluid. It will be difficult to obtain more than height, width & length when making.	• View video - discuss • Continue with concepts. Modify where required • Complete a freehand perspective. • Rendering exercises • Render perspective drawing – photocopy master drawing, enlarge image if required. A full A4 size image is easier to render. • Complete a freehand ortho - drawing of the biomouse	• Photocopy perspective to a rendering size discussed in class.
6	21 22		• Demo area • All tools necessary for making • Vac former • Class set of materials	• Reinforce flow diagrams from prior experience. • Commence making – reinforce initial stages of making.	• Complete a flow diagram describing the making of the biomouse. Use sheet 21 • Commence making on completion of design work	• Complete any unfinished work in the project notes.

C	Sheet	Text	Teaching material	Teaching Content	Student Activity	Homework
7			• Demo area • All tools necessary for making • Vac former • Class set of materials	• Supervise making • Reinforce making techniques and safety issues. •	• Continue making	• Complete any unfinished work in the project notes
8	22		• Demo area • All tools necessary for making • Vac former • Class set of materials	• Supervise making • Reinforce making techniques and safety issues. • Discuss evaluation	• Continue making	• Commence evaluation questions on sheet 22
9	24		• Digital camera • Printer	• Supervise making • Reinforce making techniques and safety issues.	• Continue making • Take a digital image of the biomouse and print out. Stick on sheet 24	

Contents.
This is simply is a list of the worksheets, homework sheet and information sheets. Each sheet should be identified as such in the content listing and as a subtitle on the actual page. The content should identify the sheet with a page number. The contents page is the most helpful way for students to collate all their sheets at the end of a project. It helps them become familiar to the idea of presenting a folio.

Design Brief & Project Overview.
The merits of a well defined brief cannot be under estimated. The 'brief' statement itself maybe very simple but its supporting information is vital to tie the project together.
Introduction statement related to design catalyst, materials, and design focus
Brief (Statement)
Parameters (restriction or guidelines)
Submission (what the students need to complete for assessment)
The Project Overview is directly related to the Design Brief. It will visually explain the project using graphics such as perspective view, mini orthographic views, or exploded views. A parts list will be included.

Video notes.
The video notes help students focus on important parts of the video by providing space for notes to be taken. Someitmes there are discussion questions to help the teachers and the students reinforce what they have seen. This also prevents that silence at the end of a video allowing a flow to the next activity.

Design Catalyst.
Most Designability projects use a design catalyst as a way of inspiring the teachers and students. A design catalyst such as Functionalism or Biomorphism provide a reason for designing a chosen form or overall aesthetic. This information is crucial. It is always difficult to start designing without some kind of stimulation. A design catalyst ensures that students aren't left staring at a blank sheet when the time to draw some concepts comes.

Product Reference.
The collection of images is the process where students will become familiar with a design style or a material. It will also develop research skills. It is often best to insist that students label all images with the name of the object and the name of the designer and when it was designed, and even the primary material it is made of. Books in the library should be the main source of imagery but with careful selection there many good websites with excellent images which naturally makes this aspect of the project very easy – it can be accomplished as in school work or as homework. Some care must be taken with websites so that students aren't lured to sites which merely advertise products as these sites will not have the extra required information.

Materials.
Designability projects use resistant materials, metal, plastics, wood, electronics and will eventually use textiles, food, and new and interesting materials yet to be considered. This information is vital early on in the project as this can be considered whilst designing. Design possibilities can be considered with a good understanding of physical and mechanical properties.

Concepts.
A worked example of concept sketches is provided for each project. It encourages good practice by providing a role model. This page should be used as an OHT whilst student are in the concept stage of their project. Encourage students to follow instructions on the use of the fineliner.

Design Sheets
These are formatted sheets with a title block for drawing. Encourage students to fill in the title block as this will help their overall presentation.

Working with.
One the features of Designability projects is the Working with sheet. This information is related to the materials and processes aspect of the project. Each project will be introducing new skills and techniques and this sheet enables students to listen to a practical demonstration and write down the notes that are provided. The Working with sheet is most often a table identifying the stages of making as rows and identifying equipment, how to use and safety as columns. Students can fill this sheet in during demonstrations or as revision after demonstrations.

Main Process.
An information sheet is provided on the main making process.

Flow Diagram. The flow diagram is a standard template that enables students to predict or record their making activities. The sequence for this is provided by the Working with sheet.

Designer Focus.
There are opportunities in Designability projects to have a designer focus so students not only learn about a design styles or philosophy but is familiar with one designer and his/her work. The Design Focus could be used as part of any extension work.

Drawing Focus.
Drawing as way of communicating ideas is considered to be a vital part of any Designability project. Each project will focus on one or two important drawing skills which will then be built upon in future projects.

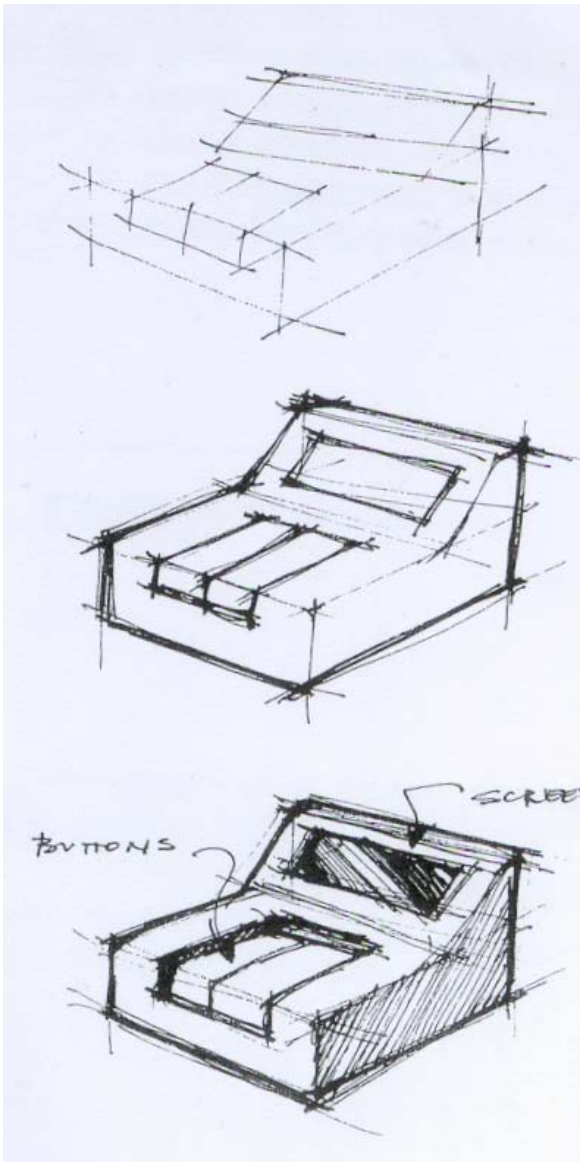
Homework Questions.
These relate to the content of design catalyst, materials, and making processes. These questions can also form the basis of Class Tests.

Class Tests.
One or two class tests per project is normal and these are formulated from homework questions and notes made during the project. These questions can form the basis of examinations. There is plenty of scope for teachers to provide additional class test from the supplied material.

Evaluation.
It is important for student sto reflect not only on how they have gone about the project, but also to evaluate their design according to the design parameters. A series of questions is provided to do this.

Concept sketches are done in the *ideas stage* of the design process.

- Concept sketches are always freehand and drawn quickly.
- Use a fineliner (not pencil).
- Never scribble or cross out what you think are bad ideas.
- Show various views (perspective, orthogonal, sectional and detail views)
- Use colour
- Use your fineliner in the following way



1. Construct your overall shape,
- Light lines are drawn quickly
- Start with a box and then modify it
- Lines are long
- Some lines will be incorrect

2. Firm in the correct lines
- Go over them more slowly
- Lines are long
- Make an outline extra dark

3. Shade in a chosen vertical face
- Use light, fast diagonal lines

4. Annotate by adding notes on various aspects of your design
- Words help people understand your ideas

Using the information from the demonstration fill in the following table. Include additional safety information to suit local situations.

	Equipment	Use	Safety
Marking out bsf	▪ Steel rule ▪ Fineliner pen ▪ Card template ▪ Soft pencil	▪ Draw around template on top view of bsf. ▪ Mark on side view after first cut	▪ Return tools to rack or drawer as soon as you have finished with them
Marking out ps	▪ Steel rule ▪ Fineliner pen ▪ Try square ▪	▪ Measure vacuum former opening to establish size required. ▪ Check handbook or measure using rule/tape	Return tools to rack or drawer as soon as you have finished with them
Cuttting bsf	▪ Clarke Hot wire cutter ▪ Reciprocating saw ▪ Coping saw	▪ Cut out top view first then mark on the side view –cut side view	▪ Do not touch hot wire during or after cutting ▪ Keep finger at side of blade whilst cutting ▪ Safety glasses ▪ Use vice whilst cutting
Cutting ps	▪ Stanley knife ▪ Bandsaw **(preferred option)** ▪ Recprocating saw	▪ Best to precut prior to forming by staff not students. Use 'Stanley' type knife or in batches use a bandsaw with fence set to required dimensions. ▪ Cut buttons and other forms. Mark a line on prior to cutting	▪ Safety glasses ▪ Use a safety rule as a guide when using a Stanley knife ▪ Keep hands at side of blade whilst cutting
Shaping bsf	▪ Surform ▪ Coarse files ▪ Sandpaper ▪ Cork block ▪ Formers – dowel offcuts	▪ Shape form using the combination of equipment. ▪ Start with coarse tools and work to a fine finish ▪ Use former to assist the shape	▪ Keep fingers clear of sharp edges- surform/files ▪ Dusk mask
Forming ps	▪ Clarke Vacuum Former	▪ Place a small piece of MDF (3mm) under mouse – non protruding at edge. ▪ Heat ps for 20 secs and form	▪ Keep hands clear of heating element ▪ Do not leave machine unattended
Finishing bsf	▪ Fine sandpaper	Smooth bsf to blend form and shape	▪ Dusk mask
Finishing ps	▪ Holts Dupli-Colour sprays	▪ Spray light coats of paint in a well ventilated area	▪ Safety glasses Well ventilated area Dust/spray mask

Week	Sheet	Task
1		• Answer questions 1-4
2		• Answer questions 5-8 • Complete the anthropometric worksheet • Define the meaning of vocab select 5 listed from the intro to this programme.
3		• Study for a class test on biomorphism. • Continue with a range of concept sketches.
4		• Concept sketches
5		• Photocopy perspective to a rendering size discussed in class.
6		• Complete any unfinished work in the project notes.
7		• Complete any unfinished work in the project notes
8		• Commence evaluation questions on sheet 27

Name: _____ Class: _____

Answer the following questions in the spaces provided.

1. What makes Biomorphism similar to the Gothic style? (2 marks)

2. What make Biomorphism different to the Gothic style? (2 marks)

3. Why are people attracted to biomorphic designs? (2 marks)

4. Objects with curves are likely to be biomorphic. Name two other design features are also being used?. (2 marks)

5. Name two designers who have used biomorphic ideas. (2 marks)

6. In the space below draw one of their designs and name it. (5marks)

Name: Answers

Answer the following questions in the spaces provided.

1. What makes Biomorphism similar to the Gothic style? (2 marks)

They both refer to nature

2. What make Biomorphism different to the Gothic style? (2 marks)

The Gothic style refers to nature in a very obvious and literal way, whereas biomorphic objects don't actually look like anything from nature, but they have used some design features to remind people of natural forms.

3. Why are people attracted to biomorphic designs? (2 marks)

We al have an innate ' biophilia' - a desire to relate to the natural world.

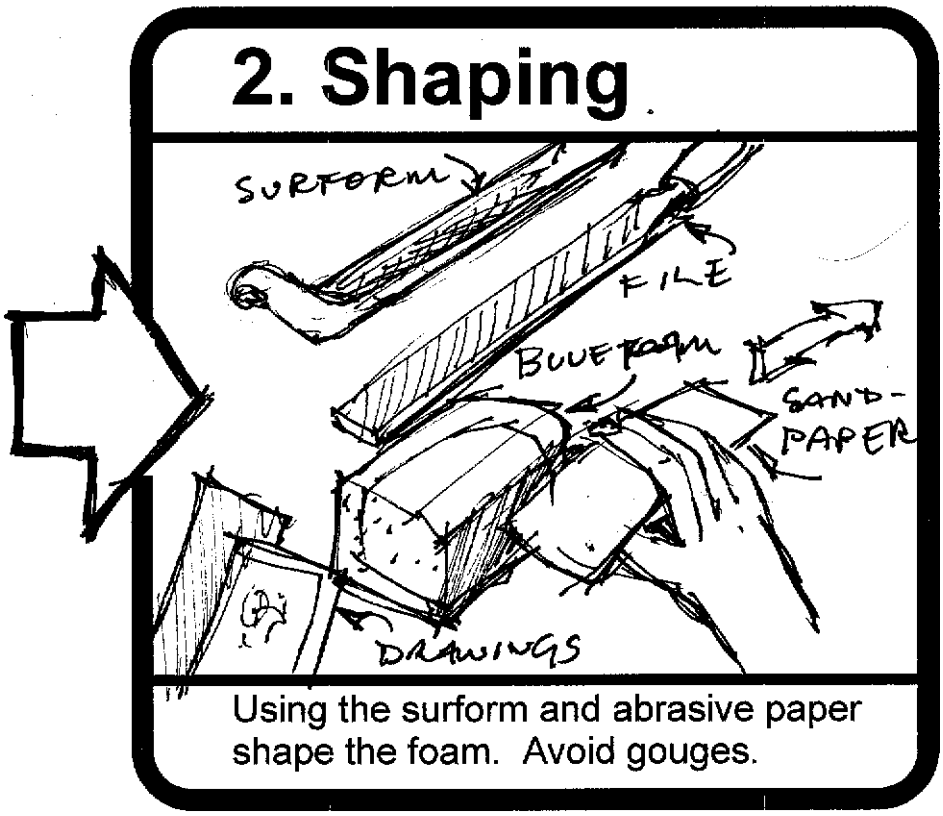
4. Objects with curves are likely to be biomorphic. Name two other design features are also being used?. (2 marks)

Soft feel, transparency, layers

5. Name two designers who have used biomorphic ideas. (2 marks)

Colani, Newson, Harris, Starck

In the space below draw one of their designs and name it. (5marks)



1. Number section and complete a title, eg 4 FORMING
2. Draw the process and label tools and equipment
3. In point form describe the process – include any safety issues