



Developing Hierarchical thinking through sketching

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Background

- 01 Prescriptive approaches**
Towards iterative processes of design
- 02 Aiming for coherence**
Connecting scenario's with fit-for-purpose proposals
- 03 Purpose of representations**
From passive documentation to intentional tool



Ontology

How does design thinking look?



Epistemology

What counts as designerly knowledge?

Philosophy of design



Methodology

How do ways of designing look?



Axiology

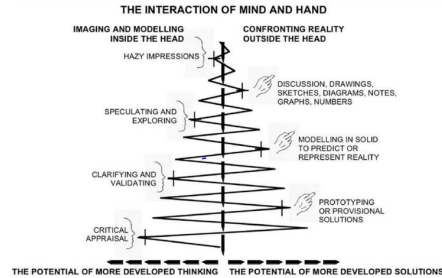
What do we value during designing?



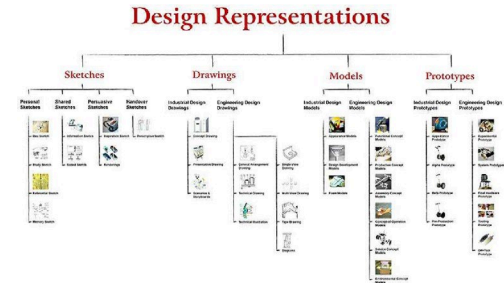
The need for pedagogical tools

Guiding the process and not
thoughts

Developing a framework



		<i>Implementation hierarchy</i>			
		Level 1	Level 2	Level 3	Level 4
<i>Part-whole hierarchy</i>	global+	conc	conc	conc	conc
	global	rete--	rete-	rete+	rete++
	detailed	Start			
	detailed+				



Iterative design

Kimbell et al. (1994)

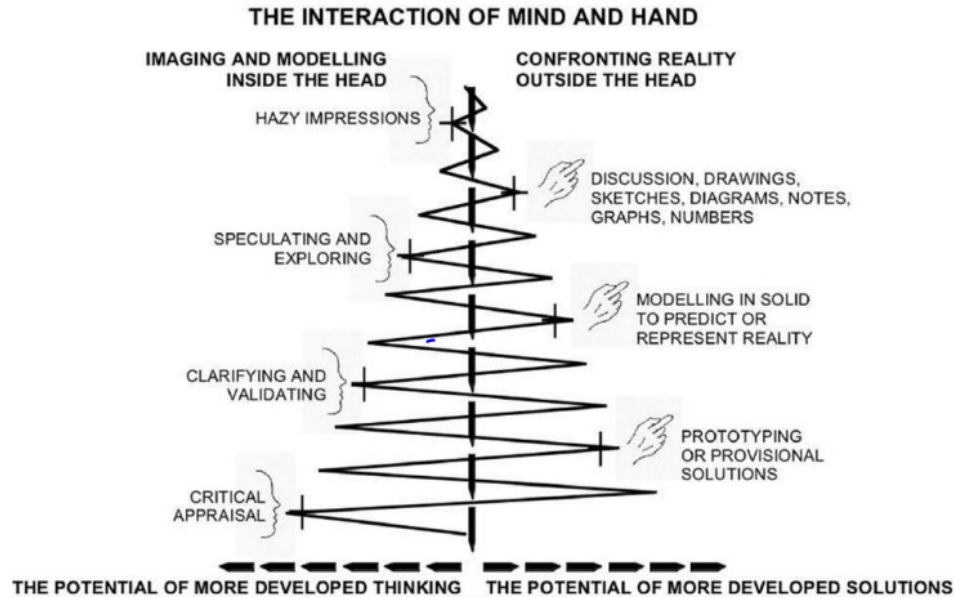
Hierarchical thinking

Visser (2006) & Haupt (2018)

Design representations

Pei et al (2022)

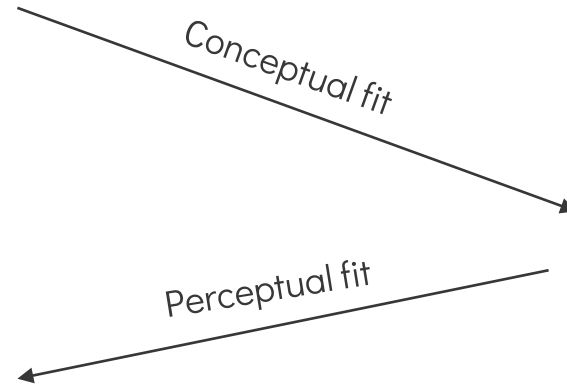
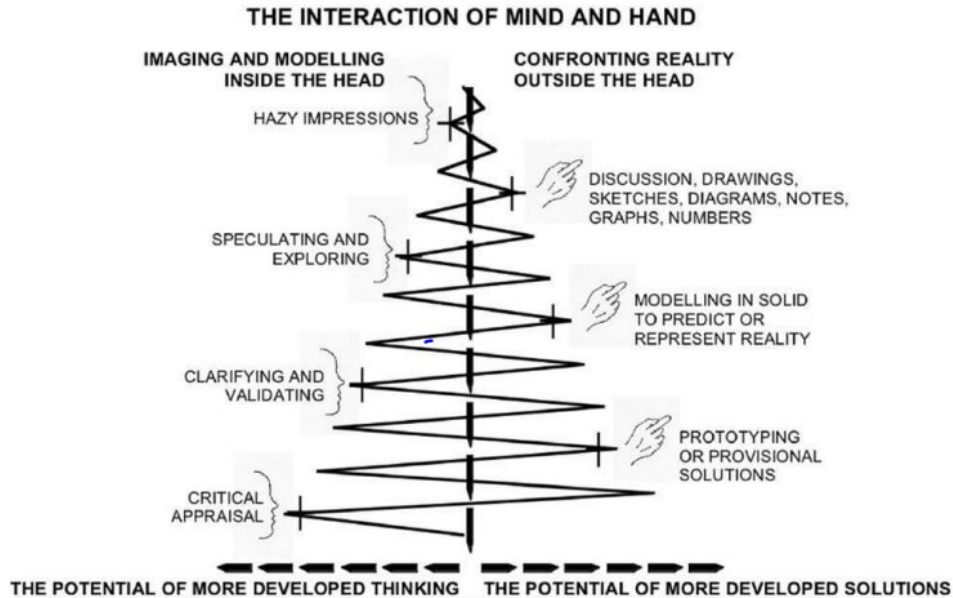
Developing a framework



Iterative design

Kimbell et al. (1994)

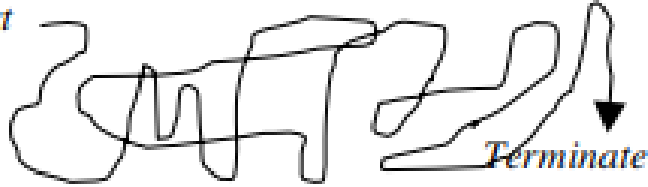
Developing a framework



Iterative design

Kimbell et al. (1994)

Developing a framework

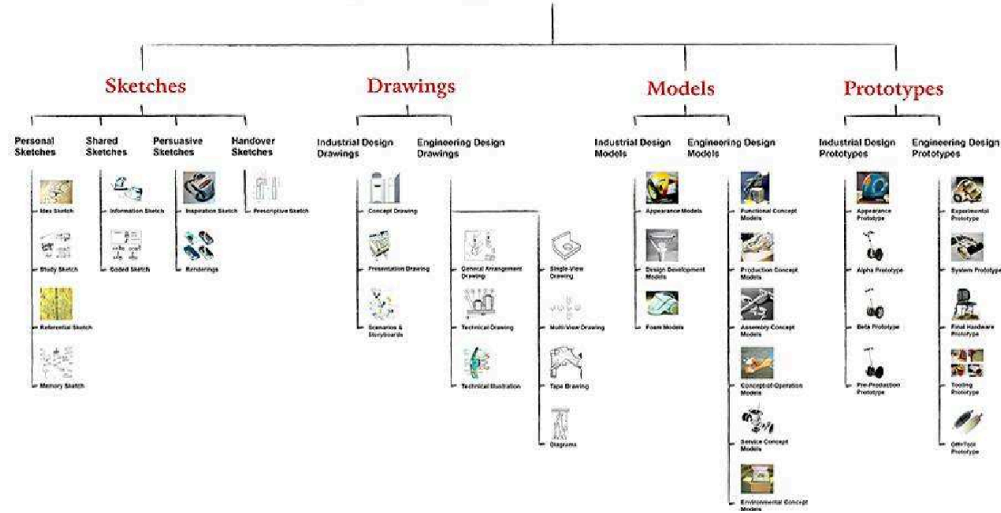
			<i>Implementation hierarchy</i>			
			Level 1	Level 2	Level 3	Level 4
			conc rete--	conc rete-	conc rete+	conc rete++
<i>Part-whole hierarchy</i>	global+ global detailed detailed+	level 1 level 2 level 3 level 4	<i>Start</i>  <i>Terminate</i>			

Hierarchical thinking

Visser (2006)'s Systematic decomposition approach & Haupt (2018)

Developing a framework

Design Representations

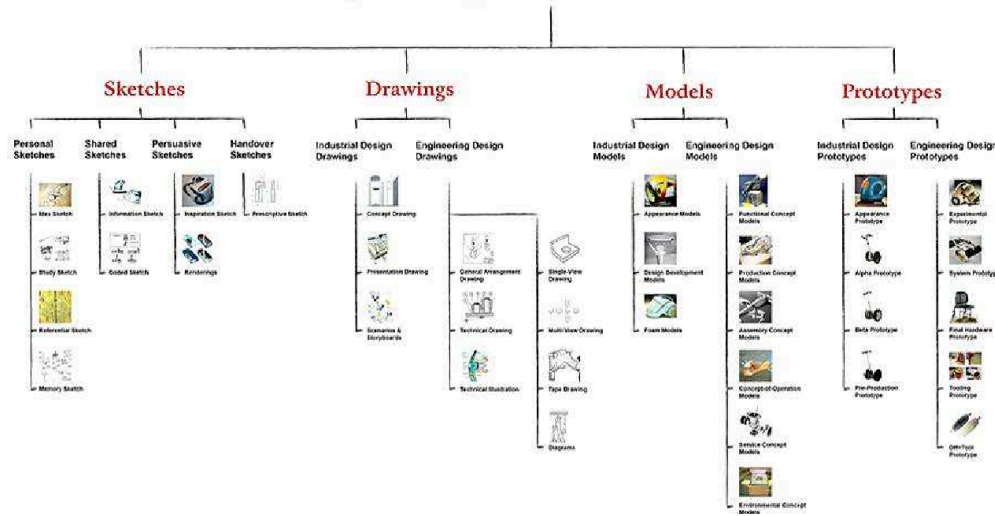


Taxonomy of Design representations

Pei & Self (2022)

Developing a framework

Design Representations



Taxonomy of Design representations

Pei & Self (2022)



Case study

**Pre - service
teachers**

N=89

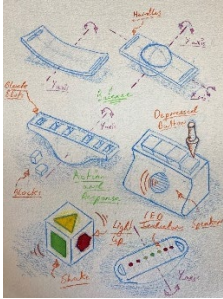
**Design an
assistive
device / toy**

Real life problem solving

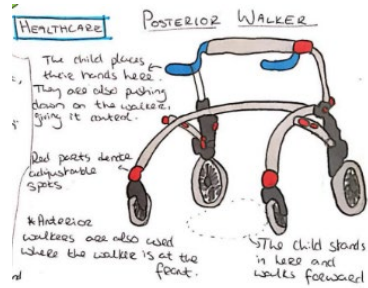
**Senior cycle
Design portfolio**

10 Design outputs

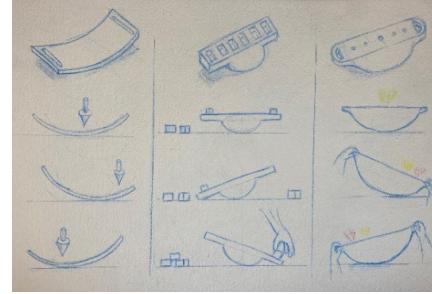
Idea sketches



Memory sketches



Study sketches

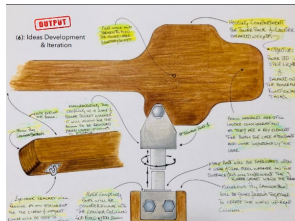


Coded sketches



Different types of sketches

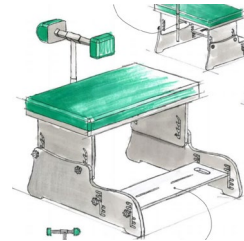
Information sketches



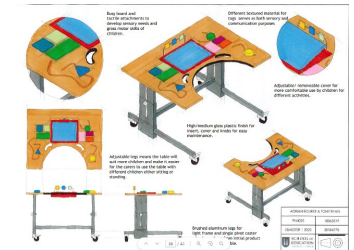
Referential sketches



Rendered sketches



Prescriptive sketches



Reflection tool for teachers/Lecturers

How do we implement the Lion King into our design?

The wire game?
We could change the wire in the game to outline a character

Jacks Favourite character = Pumba
Claran's Favourite character = Simba

Wire Representations
Shapes are too complex impossible to manufacture and solve when playing

Solution

HEALTHCARE **POSTERIOR WALKER**

The child places their hands here. They also push down on the walker, giving it context.

Red parts denote adjustable spots

Anterior walkers are also used where the walker is at the front.

The child stands in legs and walks forward

OUTPUT
(a) Ideas Development & Iteration

Prototype: Constructing the Snake Snake Automobile

Adjustable top means the table will not move backward and steps in space for the person to sit on table with reference children either sitting or leaning.

Hand-drawn diagrams showing various views and components of a table design, including a curved top and a motorized base.

Hand-drawn diagrams showing a table design with a motorized base and a curved top, with various annotations and a small table image.

Adjustable top means the table will not move backward and steps in space for the person to sit on table with reference children either sitting or leaning.

High-medium glass panels: built for safety, cover and holds for easy maintenance.

Adjustable removable cover for more comfortable use by children for different activities.

Different coloured material for legs: more so both sensory and communication purposes.

Hand-drawn diagrams of a table with a motorized base and a curved top, with various annotations and a small table image.

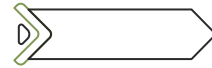
Properties

What are the properties and content of the representation?



Part - whole

Identifying if the representation emphasises global or specific



Implementation

Aspectual intentions, functional intentions, physical intentions or implementational intentions



Iterative design

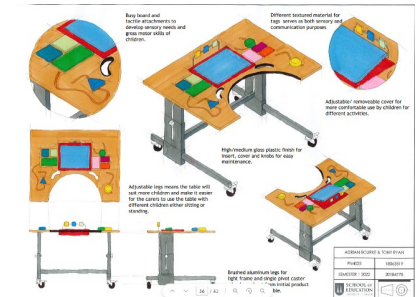
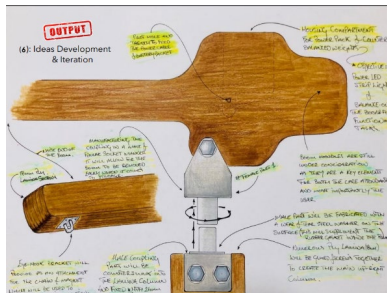
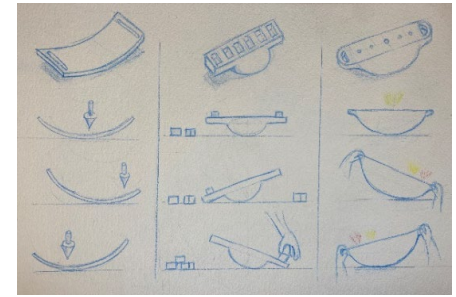
Mental phases: Having ideas, growing ideas, refining ideas

Part-whole

Implementation

HT matrix

Where in my process am I?





Complexity of design representations

Representational abilities

Intentionality of designing

Messy portfolios

Developing signature pedagogies in
modelling & Imaging

Future research needed

Cheers!

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