

Designing sustainable interactive technologies for smart learning environments

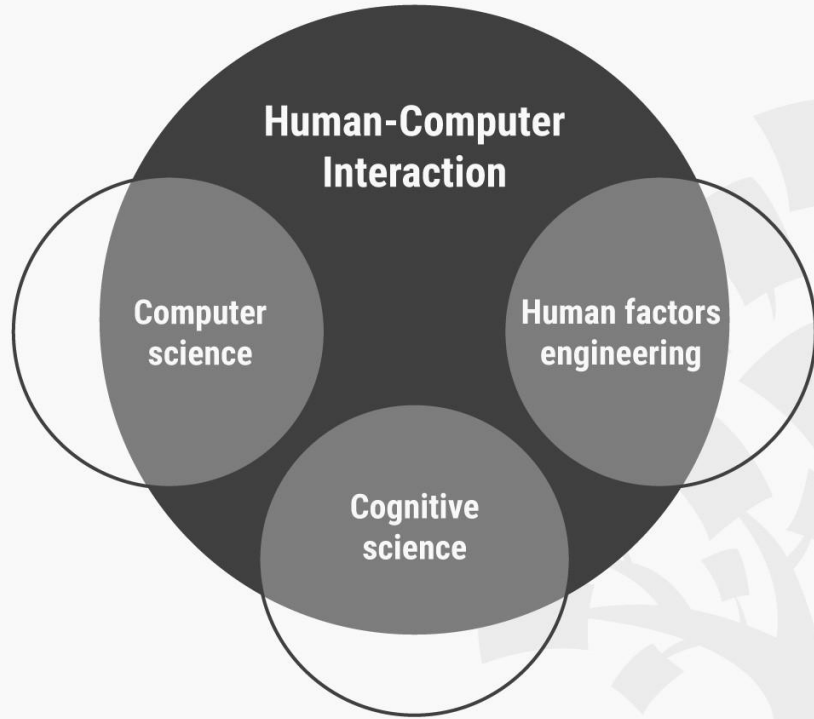
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Sustainable Future

The Multidisciplinary Field of HCI



Design

Interactivity



Information

Knowledge

Learning & Interactive Technologies

Sustainable Interaction Design

Learning

Learning is a process of **knowledge internalisation** based on meaning production and the development of new skills that can be expressed in terms of self-organisation and be presented and evaluated by the actor's performance and behaviour.

Types of Education

formal

non-formal

informal

Knowledge society

Social Development → Social Connections

**Education becomes the ground for the
development of social order**

- Adapt to multiple Contexts
- Live with Complexity
- Adopt Responsible Innovation

Types of Knowledge

Representational

Descriptive

Operational

Knowledge & Software

Information Processing & Knowledge

Knowledge - Knowledge Representation

Software is a form of:

‘operational knowledge representation’

**Often badly designed, with defects both in processing
data and in user interaction**

What if, **Software** is conceived
as **Art**

The three-schema approach

Or the Three Schema Concept, in software and system engineering:

- **External schemas** are representing user
- **Conceptual schemas** integrate external schemas in a logical structure
- **Internal schemas** define physical storage structures for knowledge and data.

**Learning has changed
Education is changing**

**Technology can be a way of
connecting Informal and
Formal learning**

Technology Enhanced Learning

ICT → Teaching and
Learning

Pedagogies are becoming Dynamic

TEL Tools and Platforms

- Massive Open Online Courses (MOOC)
- Learning Management Systems (LMS)
- Virtual Environments
- Physical Computing
- Interactive Technologies (e.g. whiteboards)
- Games (Serious)



Pedagogical Values

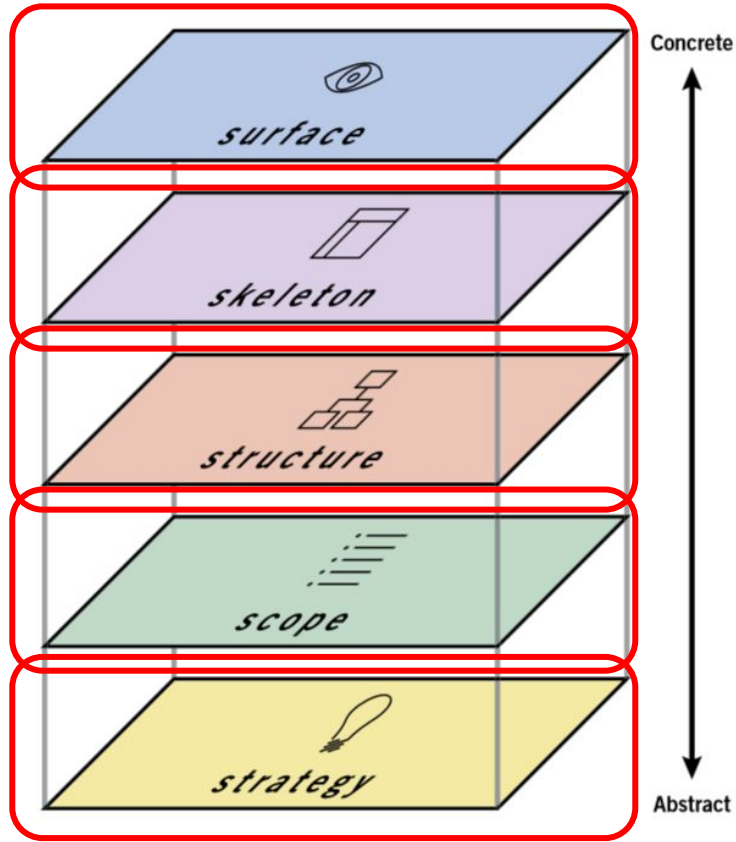
Curriculum Objectives

Bad Design
Learning Strategies

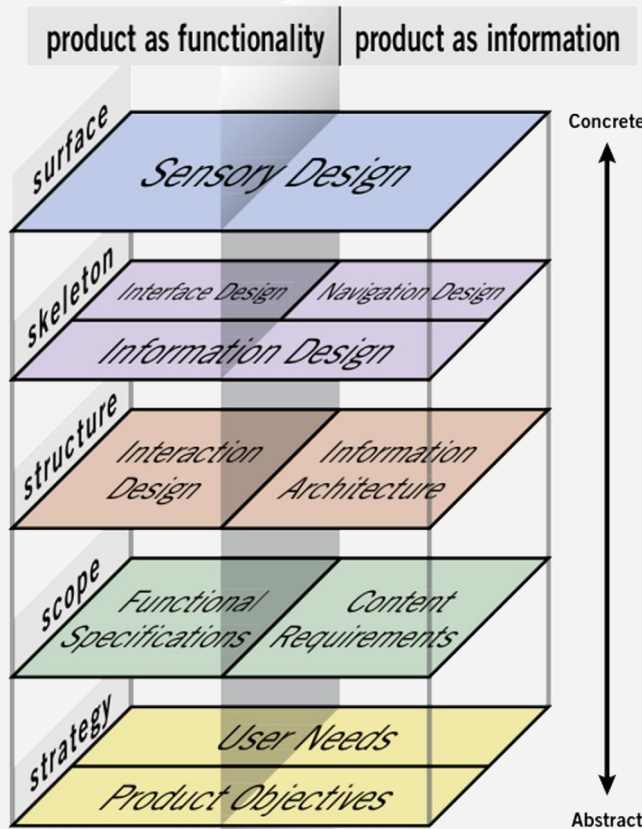
Cognitive & Social Aspects

Cultural Aspects





The process of designing



product as functionality

product as information

Sensory Design (visual, audible, tangible)

Information, Interface Navigation Design

Interaction Design & Information
Architecture

Requirements

Objectives & User Needs

User Experience (UX)

“Design Experiences”

An aerial view of a park area. A person in a dark jacket and jeans is walking away from the camera on a dirt path, carrying a red bag. To the right of the dirt path is a grassy area with a young tree. Further right is a paved walkway made of light-colored rectangular stones. In the background, there are more paved areas, benches, and trees. The scene is brightly lit, suggesting a sunny day.

User experience

Design

Interaction Design

“Interaction Design (IxD) defines the structure and behavior of interactive systems. Interaction Designers strive to create meaningful relationships between people and the products and services that they use, from computers to mobile devices to appliances and beyond.”

(IxDA: ixda.org)

Usability & Technology Enhanced Learning

Interaction



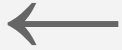
Before



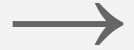
During



After



Learning



Usability

Sustainability

Products → Services

Experiences → Sustainable development

Sustainable Interaction Design

Designerly perspective

Values

Renovation and / or Reuse

Products and services should be **pleasant** and **meaningful**

Human Values → Meaning production →
Long term use

Human Values → Prioritisation → **Achieve Goals**

Focus on Values

Problem of Usability → **Does not consider values**

- Great Usability but not ethical
- Great Usability but Socially Rejected
- Privacy
- Data Manipulation and Safety
- Societal Values
- Ecological values
- Cultural Values

Focus on Values

- Contextual Values
 - Society e.g equality, justice etc
 - Era, Period, Time
 - Physical Environment
 - Organisation
 - Politics and Economy
 - Science, Philosophy, Religion

Sustainable Interaction Design in Education



Conclusions

- Sustainability informed Interaction Design is not only about Environmental Sustainability
- Sustainability values shared in design teams
- Identify stakeholders
- Methods used (e.g. persuasive technologies)
- Evaluation (long term projects, too broad)

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