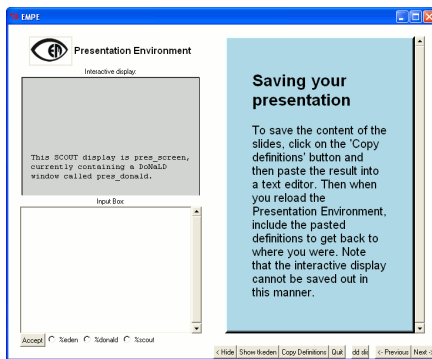
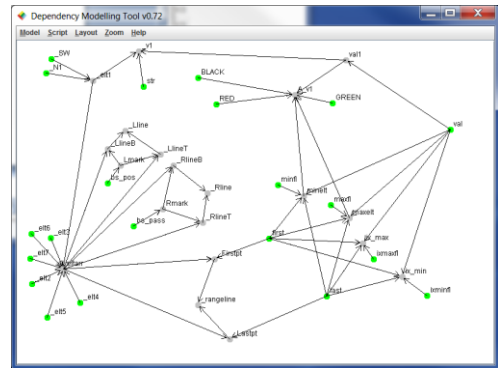
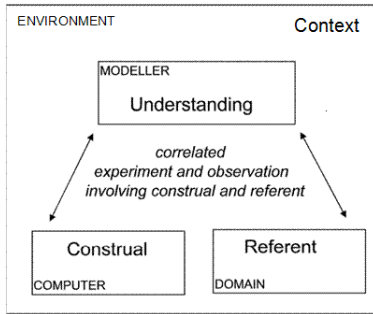
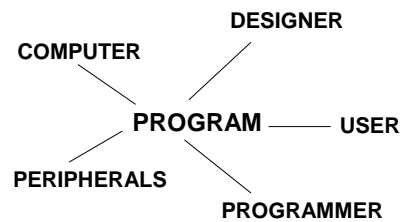
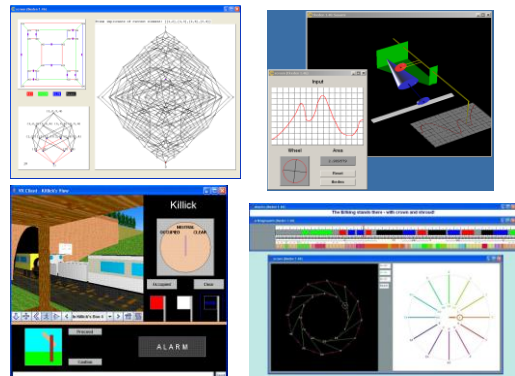


Empirical Modelling as Construction

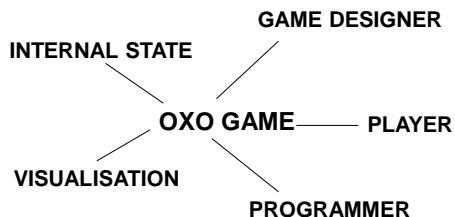


Sense-making in mathematics, in the physical world, social interactions and music ...



Diverse relations / representations in a traditional program

... compare this with the OXO laboratory



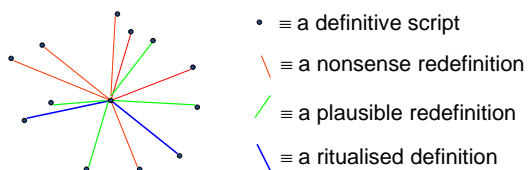
... Behaviour as **programmed** state change



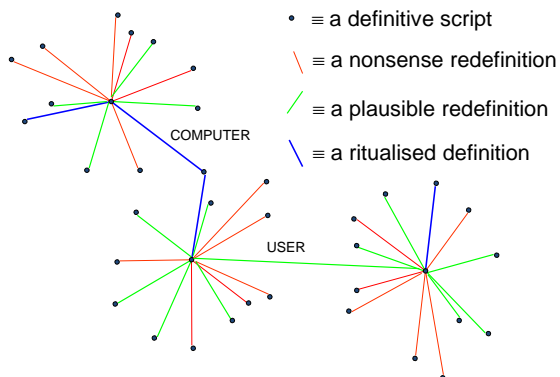
... all relations mediated by definitions

Static and **dynamic** elements of state

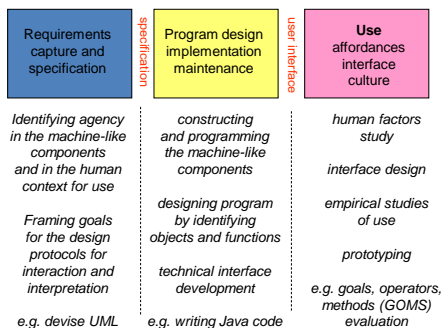
Definitive scripts as "furry blobs"



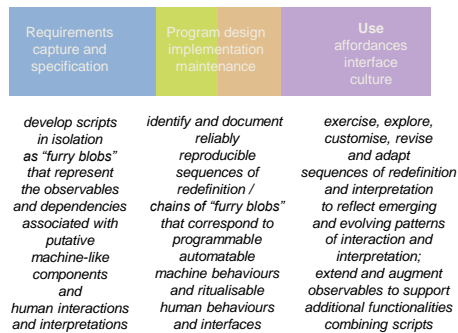
- Plausible** : *could* open the desk drawer
– note continuous spectrum of redefinitions
- Ritualised** : door *automatically* closes after being opened
- Nonsense** : opening the drawer makes the room smaller

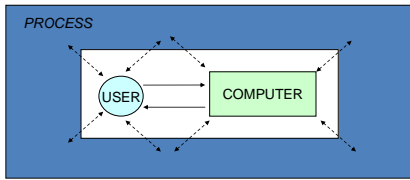


Traditional programming



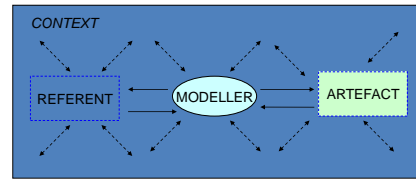
Empirical Modelling





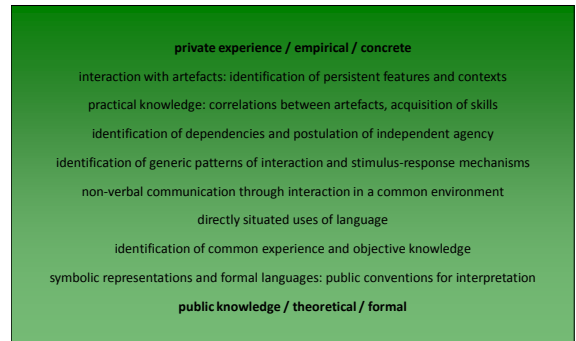
Conventional programs as embedded in *processes* of interaction with the world

Programs are understood in relation to processes in their surrounding environment



Artefacts and their referents as sculpted out of open interaction with the world

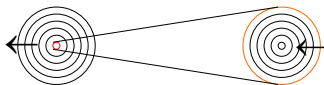
States of the referent and the artefact are connected through experience of interacting with the referent and the artefact



An Experiential Framework for Learning (EFL)

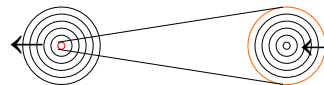
TEDC 2006

The Onion Metaphor

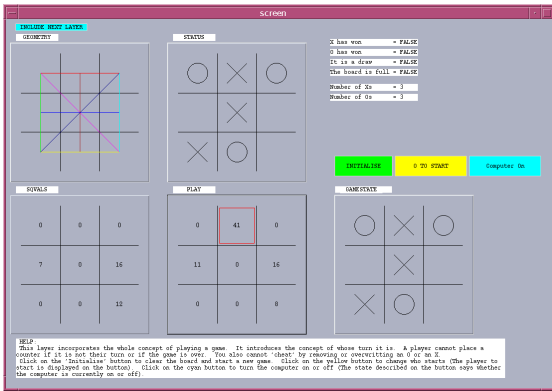


Theory building: "Quality" of knowledge		Experimental understanding: "Quantity" of interaction
core knowledge	innermost	least tested understanding
extending theory	↓ ↑	refining experiment
speculative knowledge	↓ ↑	most secure understanding
	outermost	

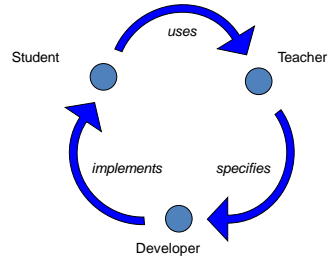
The Onion Metaphor



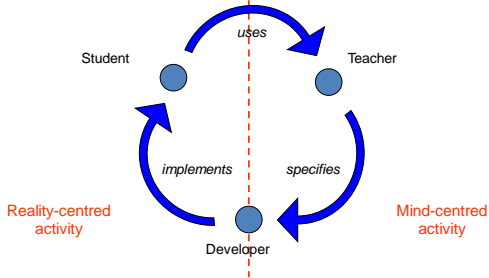
Theory building: "Quantity" of knowledge		Experimental understanding: "Quality" of interaction
least established theory	innermost	most refined interaction
extending theory	↓ ↑	refining experiment
most stable theory	↓ ↑	least restricted interaction
	outermost	



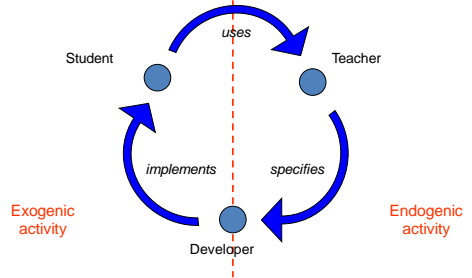
Developing educational software



Developing educational software



Developing educational software



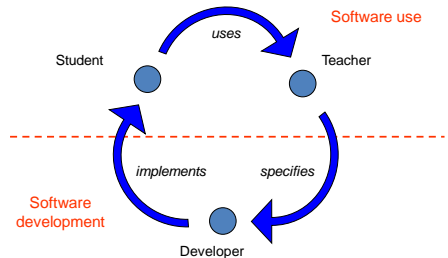
... subjectivity and objectivity are affairs not of what an experience is aboriginally made of, but of its classification.

William James: ERE p141

Exogenic activity

Endogenic activity

Developing educational software

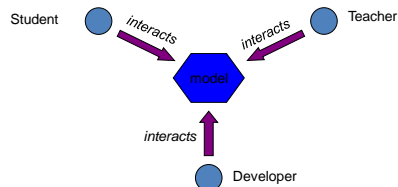


Perspectives of educational software

- Student vs teacher vs developer
 - Mind-centred vs reality-centred
 - Software development vs software use
- How can we bring together these different perspectives? Why?

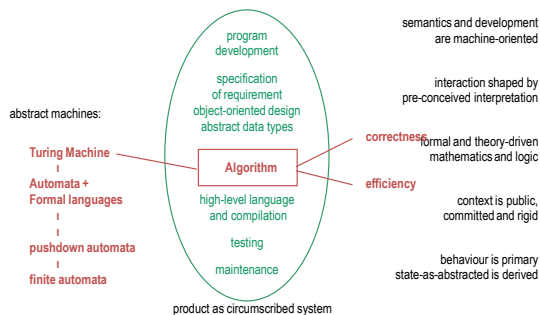
Empirical Modelling (EM)

- Offers a set of principles for model building in any of the student, teacher and developer roles:

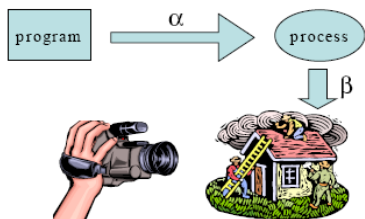


Focus of conventional Computer Science

computation = execution of algorithm (cf. mechanism + automation)



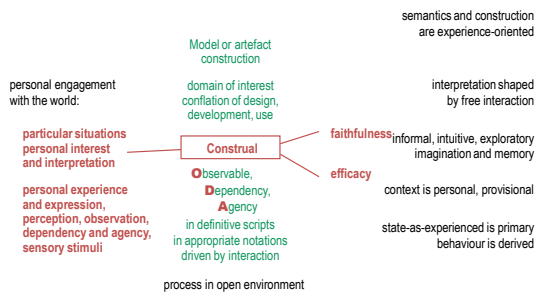
Semantic Relations (I)



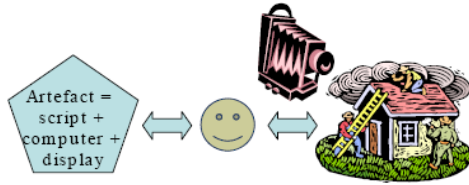
The semantics of a traditional program

Empirical Modelling: a broader view of computing

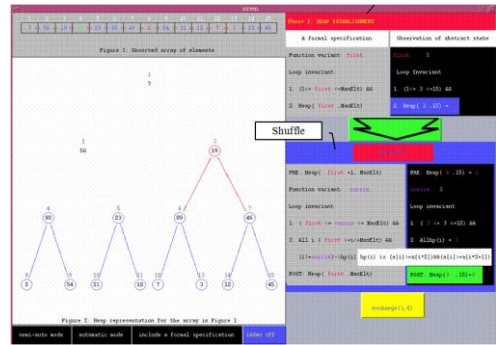
computation = making sense of phenomena and information processing (human computing)



Semantic Relations (II)



The semantics of a definitive program



"Formal specification from an observation-oriented perspective"

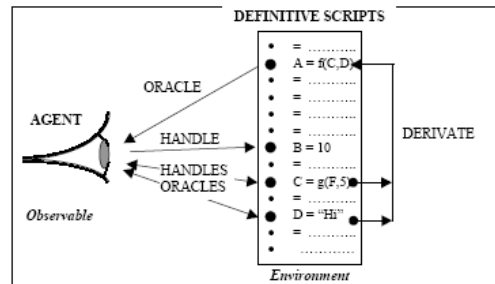


Figure 2-18: Definitive script as observer's model of state ('one-agent' modelling)

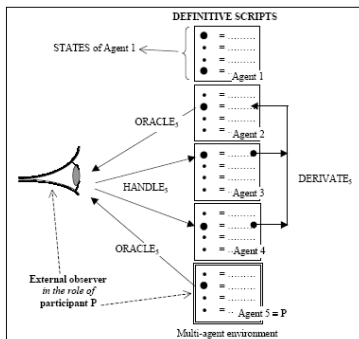
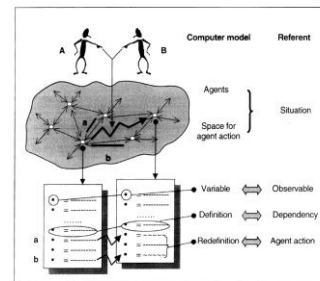
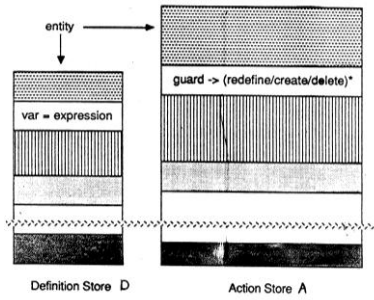


Figure 2-19: Definitive script as observer's model of state ('multi-agent' modelling)



Empirical Modelling for computer-based construals

The Abstract Definitive Machine: entity = definitions + actions



Linking LSD agents to ADM entities ...

