Learning, Construction and Programming

Two words

Constructionism:
building structures 'in the world'

Constructivism:
building knowledge structures 'in the head'

Constructionism

Active role of learner

LOGO at MIT, 1960, Seymour Papert

Programming and problem-solving

Play with maths concepts before the formal concepts

Paradigm for teaching and learning

Problem

E-Muse : Olympic throwing events modelling

Difficulty of children building/modifying

Is level of interaction needed achievable on computers?

Constructionism and Programming

Active learning:
 mental processes more important than the product

Computer support: spreadsheet principles v. other paradigms

LOGO assumes process of program construction compatible
with domain learning - geometry and problem solving

Problems of Programming

Distractions and orientation

Programming language: commands, procedures, parameters
(not geometry or abstract thinking)

Orientation is in planning not exploration
(not iterative/experimental, but pre-conceiving behaviour)

Any other way …?

Must have building medium that is exploratory

Big distinction:
 artefact for active learning and a computer program

Program -> 'programmed computer' as artefact

Thoughts 1

While artefact building:

"What can I do now?"

"Will that always happen?"

"How can this interaction be interpreted?"

Thoughts 2

While program constructing:

"This is the right function"

"These are the interactions"

"These are how the responses should be interpreted"

Construal

Generally
Learning artefact is not a program

Consider computer support for **construal**, not program

LOGO not so much used in education (cf spreadsheet)

Learning

Subject versus skill
New historical discovery versus new personal discovery
Accumulation versus viewpoint
Instruction versus construction
Explicit knowledge versus implicit (tacit) knowledge
Teaching versus learning
Experiential versus representational
Active versus passive

Artefacts for Learning

Toys, tools, pets, pens and paper, games, ….

Qualities of interaction:openness of openness

Change of state and change of interpretation

Making meaning in the context of action (cf construal)

Interactive artefacts exploit the above ways of 'use'

Can interactive programs ever be interactive in this sense?

Focal points for Learning

Learning about learning ….

Conflation: roles of teacher, learner, developer (of artefact)

Flexibility: changing direction of development or use

Subtlety: making of meanings, personal and experiential

Flexibility: Beam detector

Motivating search for optimal length

Situating problem in computational geometry

Illustrating school geometry

Case study for geometry tools like Cabri