# Models and Technology for Open Structured Learning

Tele99
Technology in Learning Environments - The Learning Citizen
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http://tecfa.unige.ch/tecfa/talks/schneide/tele99/



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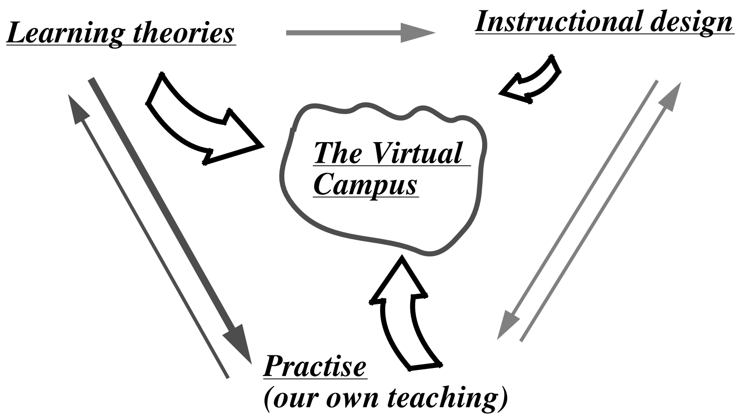
Slides and abstract:

http://tecfa.unige.ch/tecfa/talks/schneide/tele99/

# 1. A few words on teaching and learning as we see it

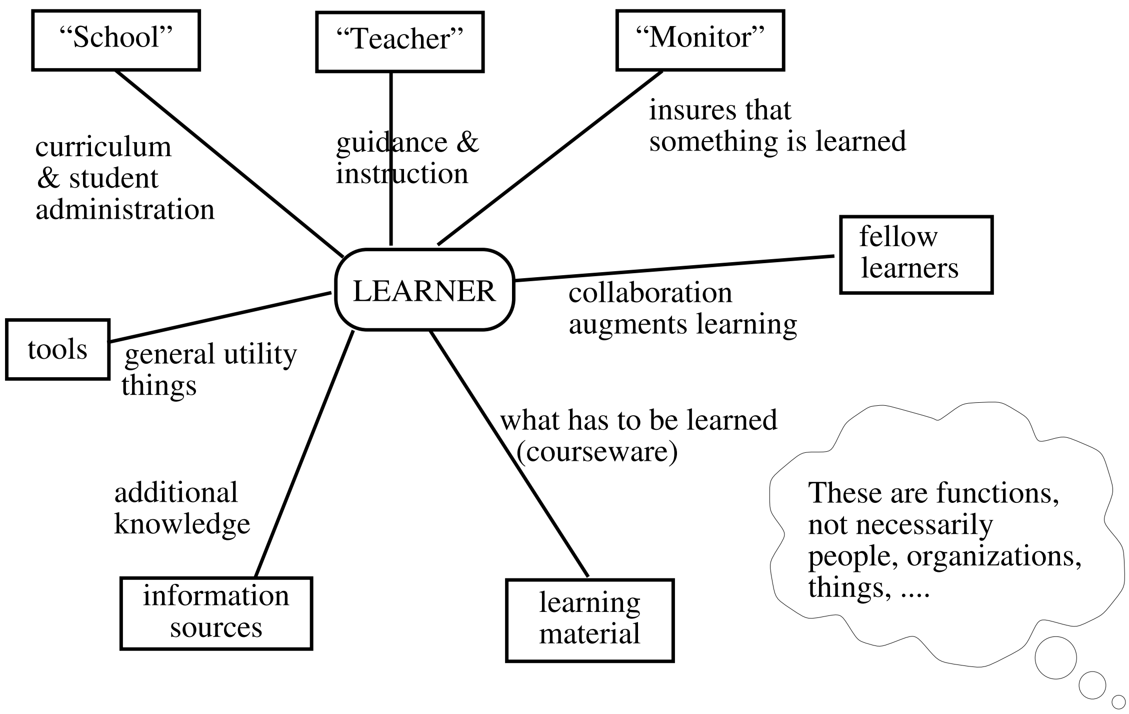
## 1.1 Main focus on Learning




- Using Internet for changing education
- Learner & activity centred



## 1.2 The Learning Environment



## 1.3 Acknowledgment of variety

### "Learning" is not a general thing:

- Learning Types: Attitudes, Factual Information, Concepts, Reasoning, Procedure Learning, Problem solving, Learning Strategies,...
- Degrees: beginners vs. advanced, easy vs. difficult, personal preferences
- All major learning paradigms have a point and a sound theoretical foundation
  (Constructivism, Instructionalism, Socio-culturalism etc.)

### Educational paradigms

- all insist on some form of guidance or scaffolding
- require some form of structuring



### Common features:

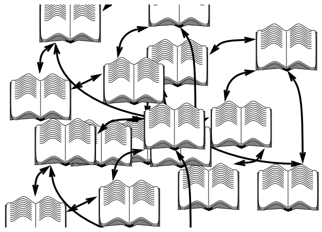
- Reading is NOT learning
  => On must "do" to learn
- ... and Internet is NOT interactive (per se)
  => What counts is activity
  (triggered by the system and/or by the task)
- Most people need guidance to achieve instructional goals
  => External conditioning (teaching, monitoring)

### Virtual Campus software:

☞ must be flexible to accommodate
various learning and teaching paradigms

## 1.4 On misconceptions

### Hypertext ??



- There is no empirical evidence that Hypertext (HTML) really helps learning
- Note: a good book is also a Hypertext

### Is individual learning pace important ??

- People who do different things can't talk to each other
- cost is very high and benefits are minor

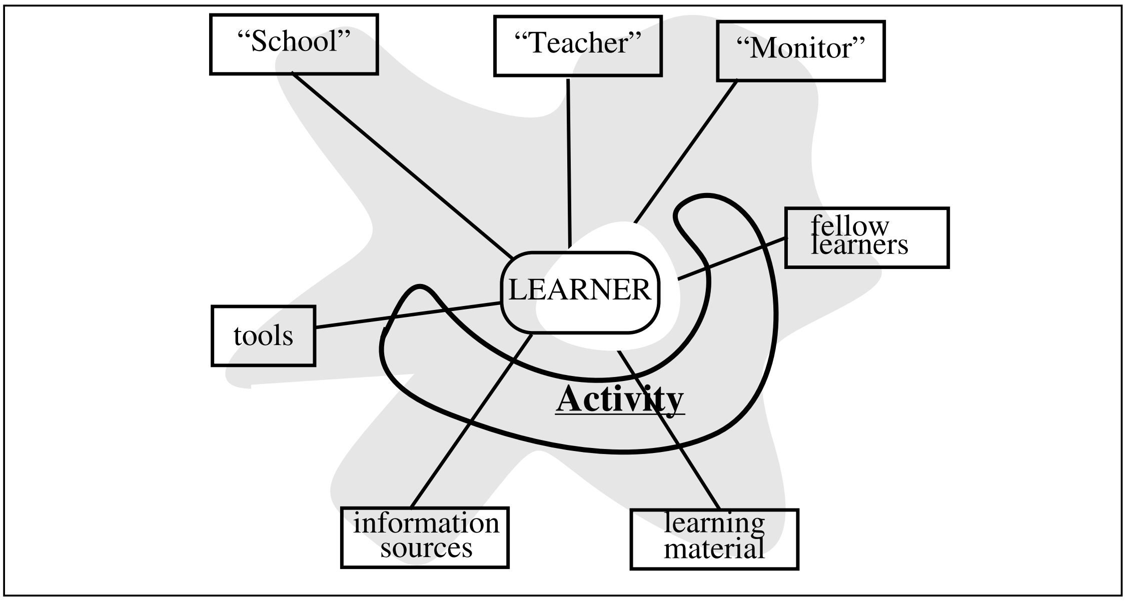
### NO: design must start with the learner activity !

- There can be hypertext and accommodations for learning style or pace
- You can give flexible assignments (good for motivation)



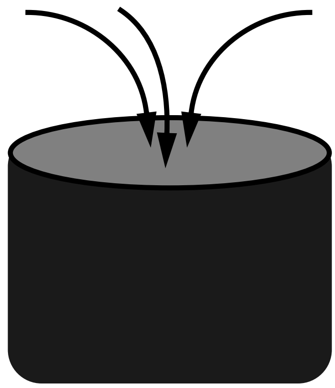
## 2. Software for the Virtual Campus (quickly, sorry)

- We only get "some of it"
- There isn't any globally satisfactory virtual campus software



## 2.1 Standard Internet Tools

1. WWW (hypertext), e.g. for:
   - planning, curricula, agendas, assignments
   - texts, manuals, resources and pointers
   - assignments (student productions)
   - collaboration within group projects
2. Email, e.g. for:
   - agenda planning (teacher)
   - search for information (student)
   - information about updates (student, teacher)
   - short comments (teacher)
3. Discussion Forums, e.g. for:
   - debates (about articles or themes)
   - technical Q/A
   - student-student help (!)
4. The MOO (advanced chat)
   - urgent things
   - co-presence (common virtual space, radio channels)
   - virtual meetings



**The standard soup**



## Problems with the "basic four"

- "*Please send Email*" does not work very well
  - Typically, students hesitate to ask questions (or too late)
  - Teachers are overloaded: overlook details, do not prompt
- "*Use the forums*"
  - Need constant coaching/animation else they die
  - Students think their problem is private
  - Slowness of WWW-based tools, features missing within standard News
- "*Be on the MOO*", chat, etc.
  - Connection costs
  - difficulty to find a date for large group meetings
  - Not sexy enough
  - No teacher animation (lack of time)
- Web pages
  - updating
  - structuring and navigation, meta-information, etc.

## 2.2 Mainstream virtual campus software

- See: http://www.ctt.bc.ca/landonline/
  (best feature comparison)

**Some market leaders:**

- WebCT: http://www.webct.com/
- Topclass: http://www.wbtsystems.com/
- Lotus Learning Space: http://www.lotus.com/
- Cose: http://www.staffs.ac.uk/COSE/ (new product)
- others on available .....



**Main features:**

- Asynchronous Communication: email, forums
- Synchronous Communication: chat, whiteboard, teleconferencing, group browsing, application sharing,...
- Student tools: home page, self tests, bookmarks, progress tracking, ....
- Student Mgmt Tools: progress tracking, on-line grading, ....
- Lessons tools: authoring (structured HTML text), testing (e.g. JavaScript generators)

## Main differences:

- Authoring (ability to import, hand coding, HTML forms-based editing tools)
- Student Management (at course- and general level)
- Application sharing and co-editing
- TeleConferencing
- Flexibility and possibility to adapt the software

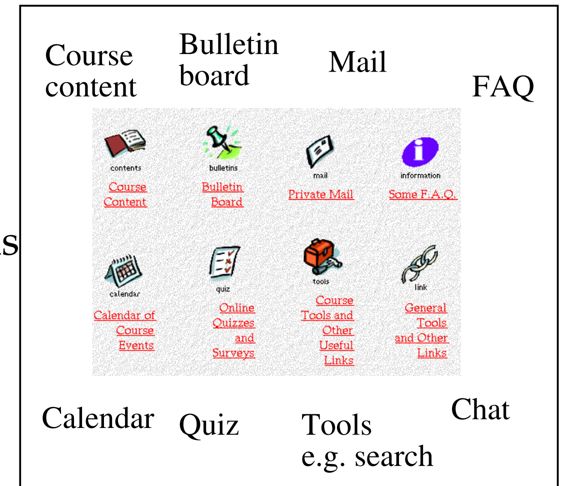
## Missing features:

- Virtual Space
- Interactive applications (besides HTML forms)
- Interactive shared applications
- “openness” (most are quite locked)



## Our evaluation of WebCT and TopClass

- lack of flexibility (closedness)
- Incorporated tools don’t do much more than separate tools
- Student management is ok (no task management tools)




*A WebCT Menu*

## Major benefits:

- integrated tools (forums, index, quiz engine)
- automatic coherent look & structured text
- student management above task level

**..... nice & flexible instructionalism, but not spectacular**

## 2.3 Virtual Environments

- featuring: spacial organization, avatars (identities), building spaces, forums, sophisticated chat and more
- Varieties: MUDs, VRML-based, custom 2D, custom 3D

### Why multi-user environments ?

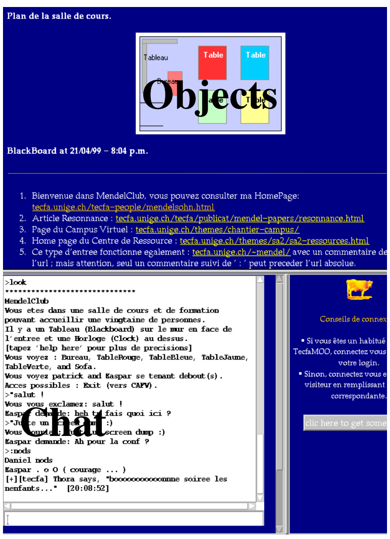
- People collaborate better with a feeling of co-presence (same space = same context)
- People working in pairs can infer what the other is doing from his location
- 3D space metaphors might make hyperspace navigation easier
- Community building ("feeling there")



### 2/3D Environments

### ... under development

### ... potential is not clear yet (besides community)




## 2.4 Summary for all tools

### Support for:

☞ Traditionalist teaching

- Mostly reading and answering questions

☞ Resource and project-based learning

- Students do things outside the environment
- communication & collaboration

### Common problem: students need a lot of attention

- They have a tendency to get lost in text space
(they rather read than produce in any environment)
- We don't always cope with student management

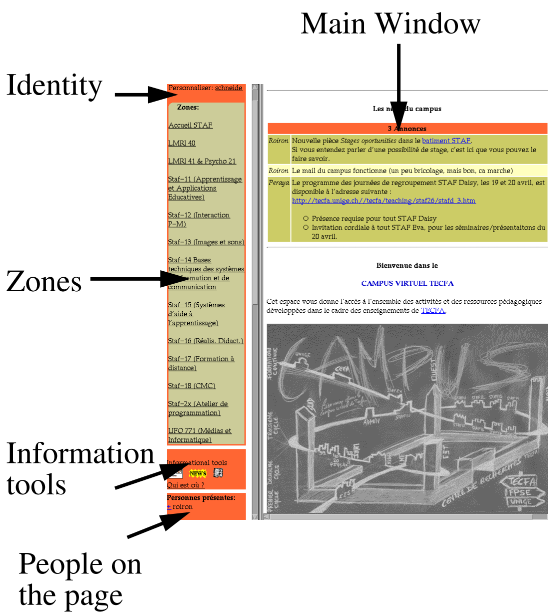
💡 Build more structured activity into the virtual campus



# 3. TECFA's Campus project: structure and collaboration

### Overall Design

- Spacial metaphor
  - Zones = courses
  - buildings = main activities
  - rooms = sub activities
- Featuring a growing amount of structured learning/teaching activities

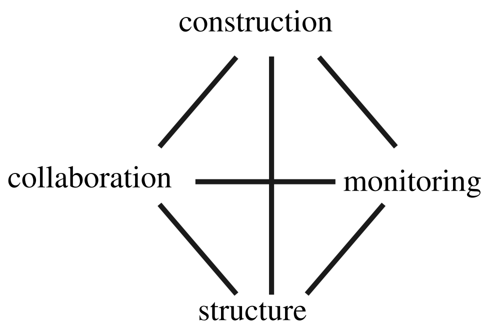


# 3.1 Our growing activity collection

## Features (each has some)

- Sharing
- Project monitoring
- Construction
- Discussion & argument
- Information classification
- Navigation tool construction

**The principle:**





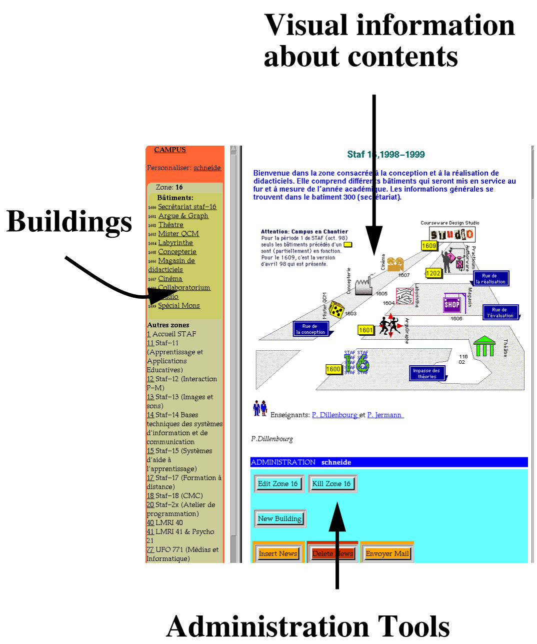

# 3.2 Zone Example: Educational software course

## Main buildings (activities):

- Argue & Graph
- Mister QCM
- Design Studio
- Concept Factory

- A building for each activity (teaching/learning)

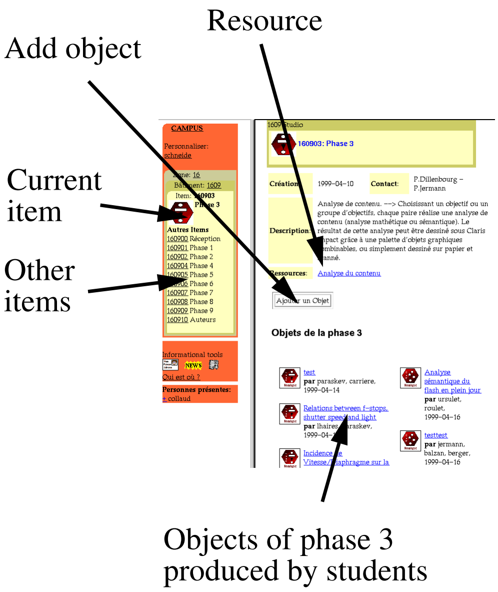
- Each building:
  - sets up various tasks with special tools
  - contains the necessary information
  - features collaboration



## 3.3 Activity examples

## A. The Courseware Studio

- Goal: Learn to design edu software



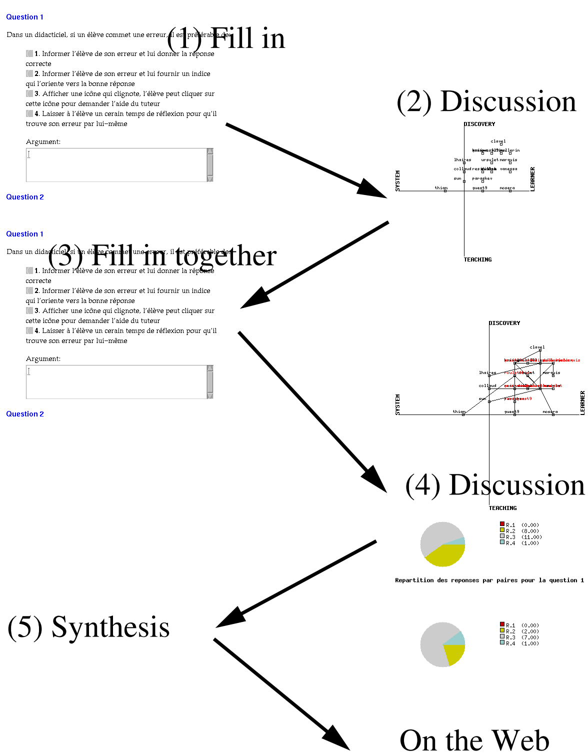

### Phases (learner activities):

1. Topic specification
2. Objectives specification
3. Content analysis
   (analyse the objectives)
4. Operational pedagogical objectives spec
   (of other pairs)
5. Architecture and scenario spec
6. Learning activities spec
   (of 3 learning activities)
7. Preparation of Materials
8. Development of a module (with Authorware)
9. Assembly of all the modules



## B. Argue & Graph

- Goal: Support classroom discussion
  about pedagogical style

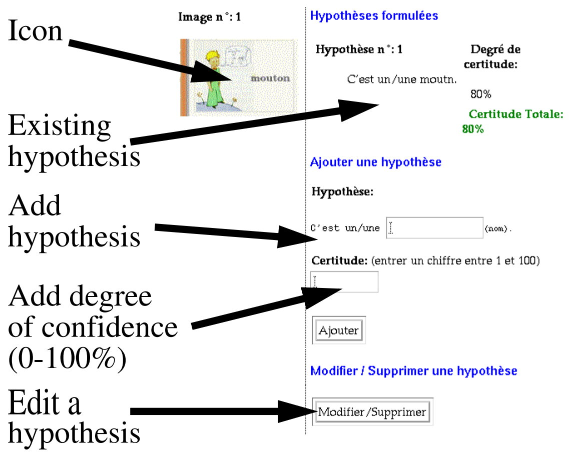



### Scenario:

1. Students fill in a questionnaire about design choices
   - Campus produces summary information (incl. graphs)
2. Collaborative fill in
   - Teacher selects opposite pairs
   - Pairs fill in questionnaire
   - Campus produces summary + details
3. Classroom discussion
4. Synthesis (HomeWork)
   - Each student writes a text

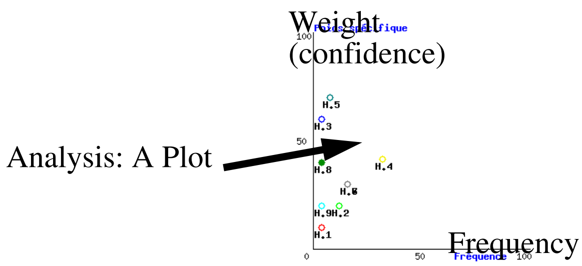
# C. The Iconometer

- Goals:
  - Test icons used in web pages
  - Learn about "monosémie"




## Scenario

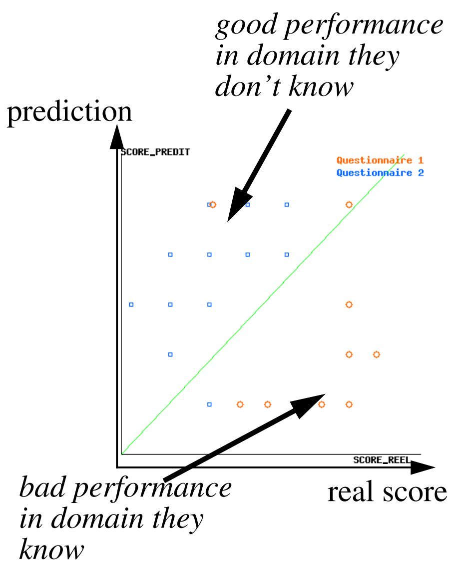
1. Look at an icon
2. Formulate hypothesis
   - one or several
   - each with a confidence factor
   - total must not exceed 100%
3. Look at results
   - Look at each hypothesis
   - Look at summary information
4. Discuss ....






# D. Mister QCM

- Goal: Students have to experience QCM design effects
- Scenario:
  - Students fill in 2 badly designed MCQs They also indicate their level of competence.
  - Students look at results (question by question and overall plot)
  - They are very angry at the results (bad performance on what they know and good one on what they don't know)
  - Now they are motivated to understand QCM design and participate in classroom discussion




- The tool has design notes on each question (including "don'ts")

## 3.4 Information Space

### Motivation:

- Better support for less structured scenarios ...
- Resource-based teaching implies support with documentation

### Details:

- An RDF-type of database (http://tecfa.unige.ch/guides/rdf/pointers.html)
- Various interfaces (queries, graphical networks, etc.)

**..... No details (sorry)**



## 3.5 XML Grammars for project support

- Grammars are central to understanding and doing

**XML = grammar + content**

- XML will add structure to web contents (and more ...) (http://tecfa.unige.ch/guides/xml/pointers.html)

### Simple use of XML

- Write a grammar (schema, DTD)
- Students use it to write something
- Give feedback, organize discussions for different phases
- Server-side programs can extract and combine information

### Tools for simple XML authoring (1999)

- exist, but are either expensive or not totally usable

## Example: Project Management

1.Students do a feasibility study

2.Feed back:
Teacher fills in slots with comments

3.Students write the specification
Teacher adds comments

4......

5......

6........

```
<?xml version="1.0" encoding="ISO-8859-
1"?>

<!DOCTYPE project SYSTEM "http://
tecfa2.unige.ch/staf/staf-e/staf18/
project.dtd">
<project>
  <title></title>
  <group>
    <person>
    </person>
  </group>
  <specifications>
    <specification>
      <main-goal>
          <title></title>
          <content></content>
      </main-goal>
      <objectives>
          <goal>
            <title></title>
            <content></content>
          </goal>
          <goal> ...</goal>
      </objectives>
    </specification>
  </specifications>
  <resources>
    <resource>
```

- Technical note for display: best current solution is XSLT (translate to HTML)



## <u>Summary</u>:

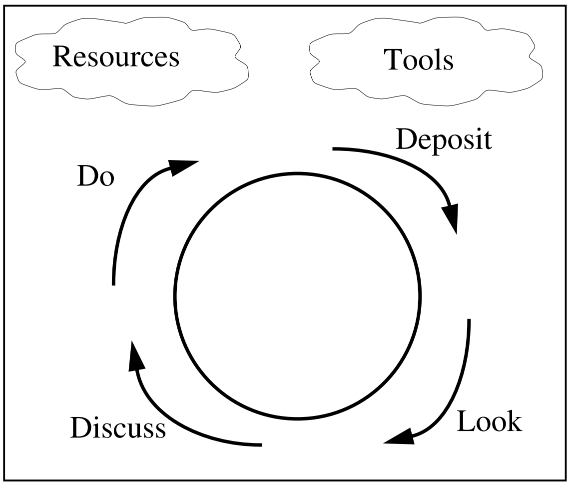
## A lot of structured activities:

1.Students do something
- using tools and resources

2.Results are collected

3.Debriefing, synthesis, feedback

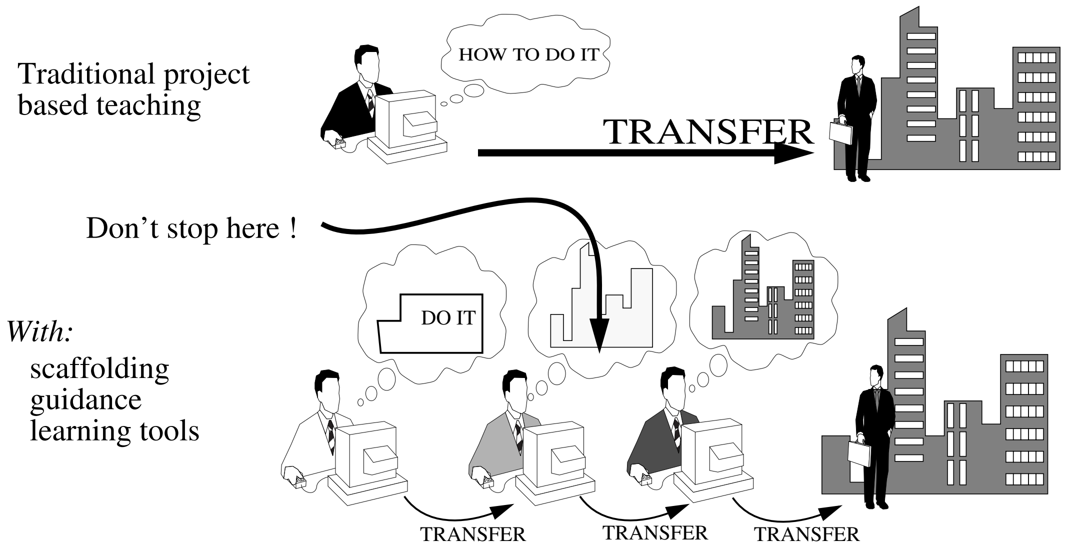
**mostly work flow tools**




- Tasks are often pseudo tasks,
- phases are sometimes repetitive,
- most are collaborative or “collective”,
- collaboration is structured,
- teacher can monitor, add, help, edit ...

## A word of caution

- Some student projects/exercises will remain “open”
  - We have to avoid the “video game effect”
  - We must plan the mastering of the content, not of the tool






## We have more ...

- some ideas are spreading (medical school, social sciences)

## It’s research for us !

- We do data collection on some tools
- A lot of people should mine data !!
- Campus systems: only Virtual-U allows data-mining
  http://virtual-u.cs.sfu.ca/vuweb/VUenglish/

- Note:
  - We never will build any authoring environment
  - You can steal ideas from us:
    http://tecfa.unige.ch/campus/tecfarama/campustour.php

# 4. Outlook on technology

## 4.1 Integrated campus software

- ok for traditional, resource or project-based teaching
- not much support for learner activities (tasks)
- limits on "on-line" creativity
- student management tools above task level are ok
- progress in the next few years, but not a lot I believe (unless we get easily to understand open source)

**.... of course, you can combine (and a lot of people do)**

Pick a campus tool that allows adding your own tools



## 4.2 The open environment

- Standard communication tools (possibly better integrated)
- SQL server and maybe an object store
- Some Java applets and servlets
- Custom plugins (e.g. Authorware)
- LDAP (for central authentication and person look up)
- XML and less HTML (at Tecfa: near future)
- Server-side html-embedded scripting languages (Php, Asp, ColdFusion, Java-HTML)
- Advanced Groupware (like CVW, Workplace)
- Multi-user environment servers (DeepMatrix, Moo, etc.)

**...... but you have to do it yourself :(**

**...... pay a programming course to one of your people**

## How much does our development cost ?

### Technology is mostly free

- Simple HTML, soon: XML
- MySQL (a free relational SQL database)
- PHP
  - server-side html-embedded scripting language
  - supports SQL, XML, graphics, LDAP, etc.
- A bit: Javascript, Java (applets), Authorware and plug-in, Python, Perl, VRML, Java Web Server (servlets), MOO

### Resources:

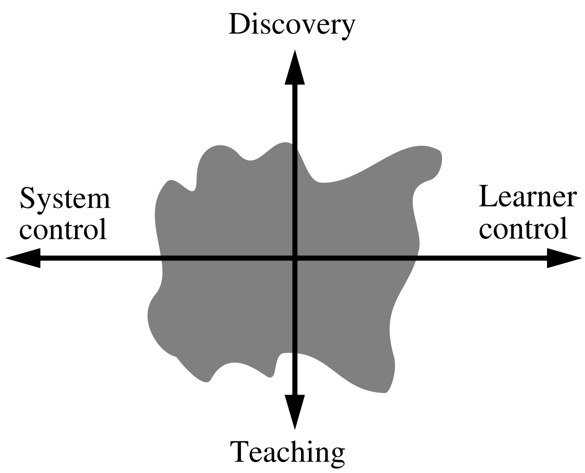
- Teaching assistants (know basic programming)
- Cost for one activity: 2 weeks - 1 month
- Little for a real production team, a lot for a teaching team!



## 5. Conclusion

### The old CBL debate:

- is still important
- there are (fine) CBL applications on the Web
- E.g.
  - simulations
  - tutoring systems
  - instructionalist text
  - ........




- Various good and proven solutions exist

**The new Web debate**

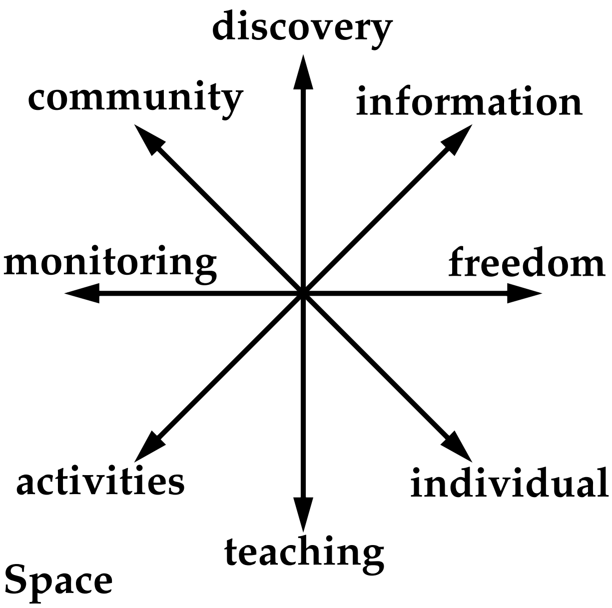
**E.g. open learning**

adds:

- big information space
- collaboration

needs:

- some monitoring
- some scaffolding
- some structure




- Main stream virtual campus software is not flexible enough .... but what can we use instead ?



# I am a bit pessimistic

## ... we all can/will do better
## ... but it will cost !

## Accept some instructionalism
## but don't kill Piaget and Vygotsky

## Try to give learners better support
## ... You can ! (even with simple tools)