

# **Learning Environments and Usability: Appropriateness and Complementarity of Evaluation Methods**

**Angelique Dimitracopoulou**

**Learning Technology and Educational Engineering  
Laboratory, University of the Aegean**



# What about?

↪ **Main Concepts and questions:**

↪ **Learning environments**

↪ **Usability of Learning Environments**

↪ **Evaluation methods and their appropriateness**

↪ **Are they exclusive or they complement each other?**

↪ **Implicit Criteria of Evaluation methods' selection**



# Technology-based learning environments

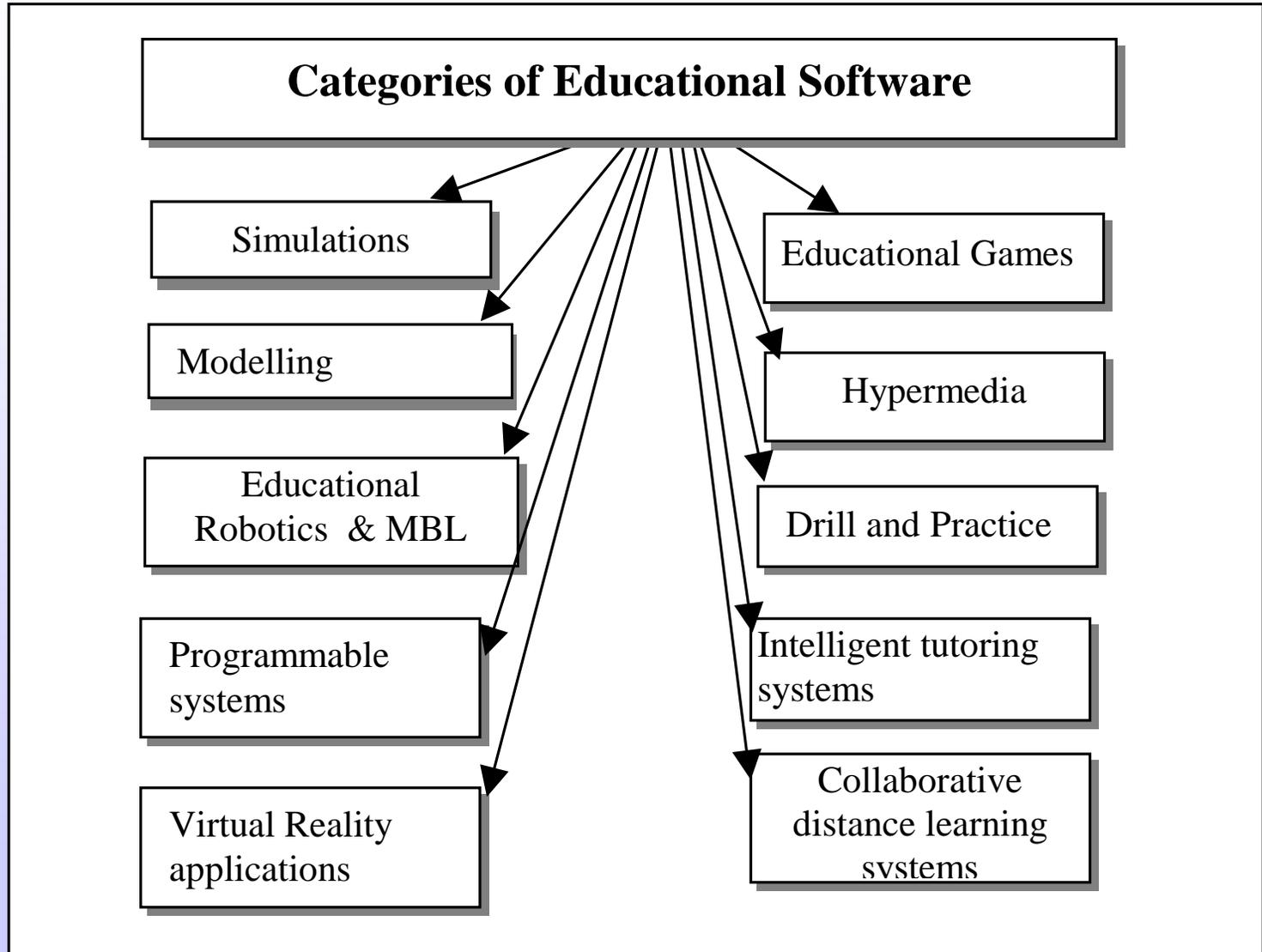
⇒ Their main purpose is **users learning**

⇒ Not just provide tools facilitating task execution,

⇒ **allow learning during activity & support learning process**



# Technology-based learning environments





# Usability of learning environments /task related aspects

- ↳ **Is the Usability of educational software related only to the efficiency and effectiveness of the task execution ?**
  
  - ◆ **Paradoxes: A seamless fluency of use, is not conducing to meaning making & deep learning but merely to restrain it.**
    - ⇒ **Ex. 1. Drill and practice (that give the correct answer)**
    - Ex.2. A modelling system, (that provides the correct model)**
      - it manage to solve the task in an efficient manner
      - but prohibits efficiency in learning.
- .... The prime objective is make the learner think*



## *Cognitive psychology*

### ↳ **Learning environments should:**

#### ✓ **Support thinking and reflection**

⇒ **Not provide immediate & direct informative feedback**

#### ✓ **Support expression of learners by pre-existing knowledge structures, supporting also their evolution during activity**

⇒ **A need of multiple expression modes or adaptable interfaces**

#### ✓ **Support metacognition**

⇒ **New components, : structured notebooks, analysis & visualisations of “history of interaction, ...**



# Usability of learning environments

## ↳ Usability of educational software

↳ It is not related to the efficiency and effectiveness of the task execution, but to the effectiveness and efficiency of learning that should occur during activity,

↳ It is merely related to the extend which the software supports expression, thinking, reflection and metacognitive mental activity in an efficient and effective manner.



## ↳ Aspects related to the 'Users'

Teachers are "users" too

Usable systems provide tools, analysing & visualising structured information on interactions, e.g. Exploratory or Collaborative distance learning systems

## ↳ Aspects related to the 'Context of use'

In a school context, there is not a single user, but a group of users

⇒ Recognize two simultaneous users

⇒ Offer more than on one external devices (e.g. mouses)



# Usability Evaluation methods

## ↳ Evaluation by designers

Formative evaluation methods with the purpose to improve design

- ◆ Clinical Evaluation in the laboratory
- ◆ Evaluation in the field of use
- ◆ Long Term Evaluation in the field of use

## ↳ Evaluation by external experts, policy makers and teachers

Global summative evaluation approaches aiming to validate

- ◆ Guidelines Checklists
- ◆ Heuristics,



## ↪ **Clinical Evaluation in the laboratory**

**Observations of users in various settings:**

**A single student, Group of students, with the presence or not of a passive or active teacher-researcher**

**Data:** - protocols of observation (from observator)

- video tapes of dialogues and/or gestures
- screen captures (of interaction in screen)
- log-files
- written protocols (of students)

**Variations:** - different users profiles

- different versions of interface



## ↳ **Evaluation in the field of use** (in real school context)

**Data:** - protocols of observation (from observator)

- video tapes of dialogues and/or gestures (of groups of users)
- Sound data (multiple sources)
- screen captures (of interaction in screen)
- log-files
- written protocols (of students)

**Difficulties:** it is needed to focus in some of the participants

**Post session:** panel, group, or individual interviews



## ↳ Long Term Evaluation in the field of use

- Student as an extensive user of the software, in current school conditions or

- Participatory designs (successive versions of the software) & Research action

Ethnographic approach (data related to a wide context, multiple interactions and factors).

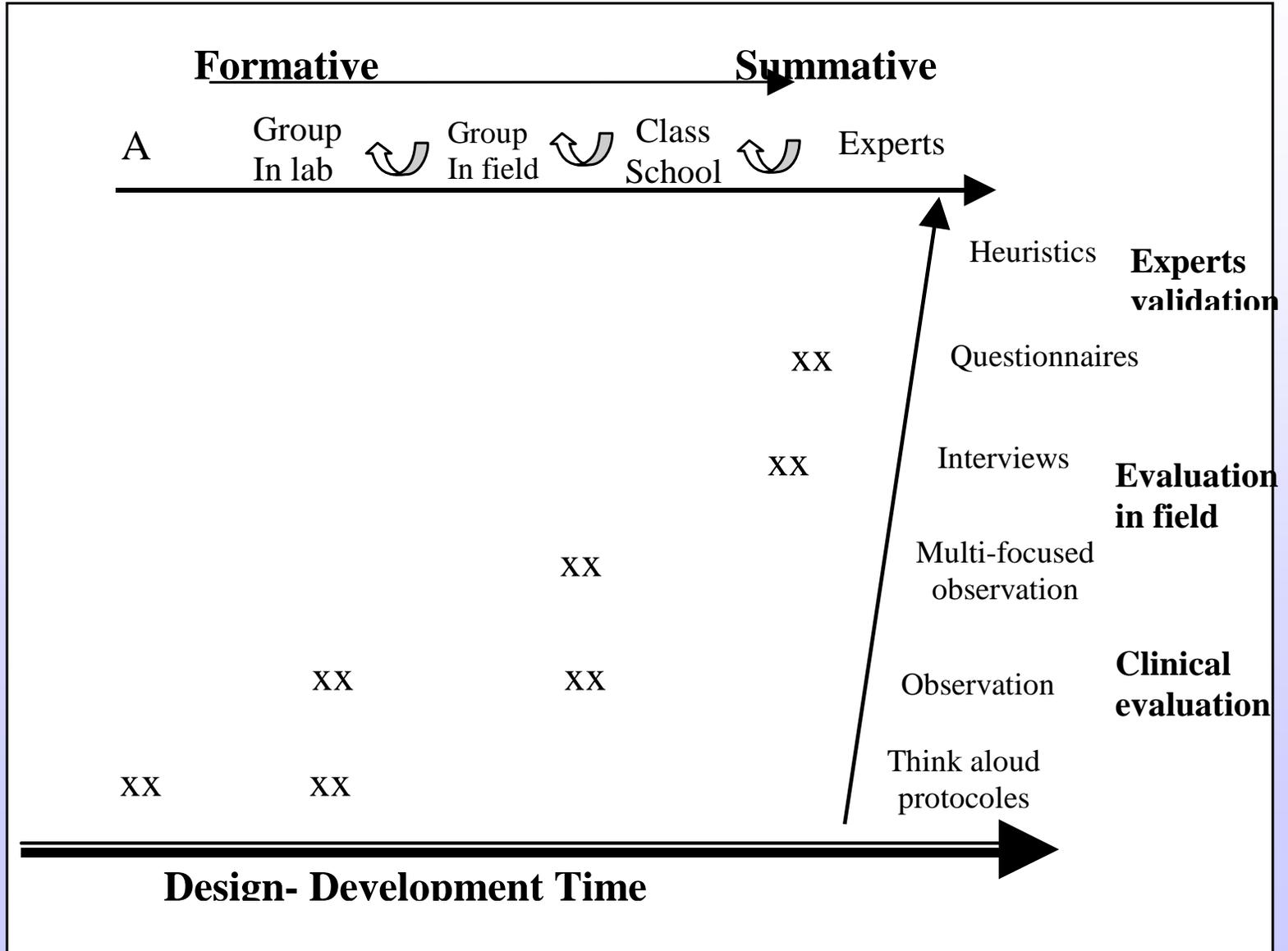


# Usability Evaluation methods / External Evaluation

- ↪ **Validation** - summative evaluations from experts committees
  - ◆ Guidelines Checklists
  - ◆ Heuristics,
  - ◆ Questionnaires



# Usability Evaluation methods / a global view





- ↪ **Designers usually apply one method**
  
- ↪ **Designers and researchers preferences depend on:**
  - ◆ **category of educational software**
  - ◆ **underlying theoretical design framework**
  - ◆ **academic background of researchers**
  - ◆ **financial and time constraints**



# Summarizing: Usability & Evaluation methods

## ↪ **Evaluation methods of educational software usability**

*Designing & evaluating acc. the wide definition of Ed. Soft usability*

- ◆ **Prefer methods that allows us to *learn* (how to design better systems and how users interact in powerful and significant ways)**
- ◆ **Apply multiple and successive evaluations (informal and formal that are crucial in early stages**
- ◆ **Take advantage from the wonderful diversity of evaluation methods in order to develop full products**