

Learning Environments and Usability: Appropriateness and Complementarity of Evaluation Methods

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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

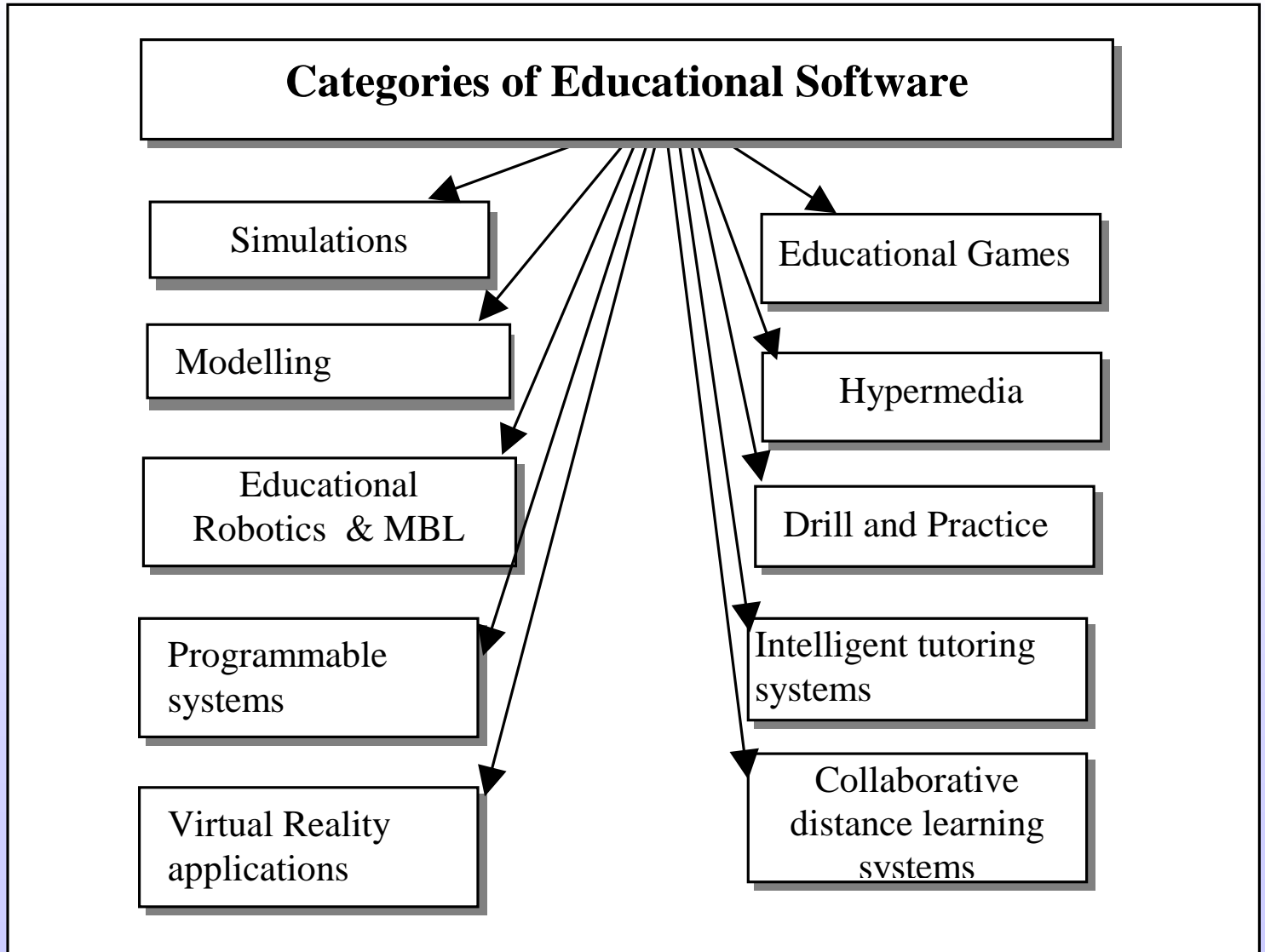
⇒ Their main purpose is **users learning**

⇒ 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 extent 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).

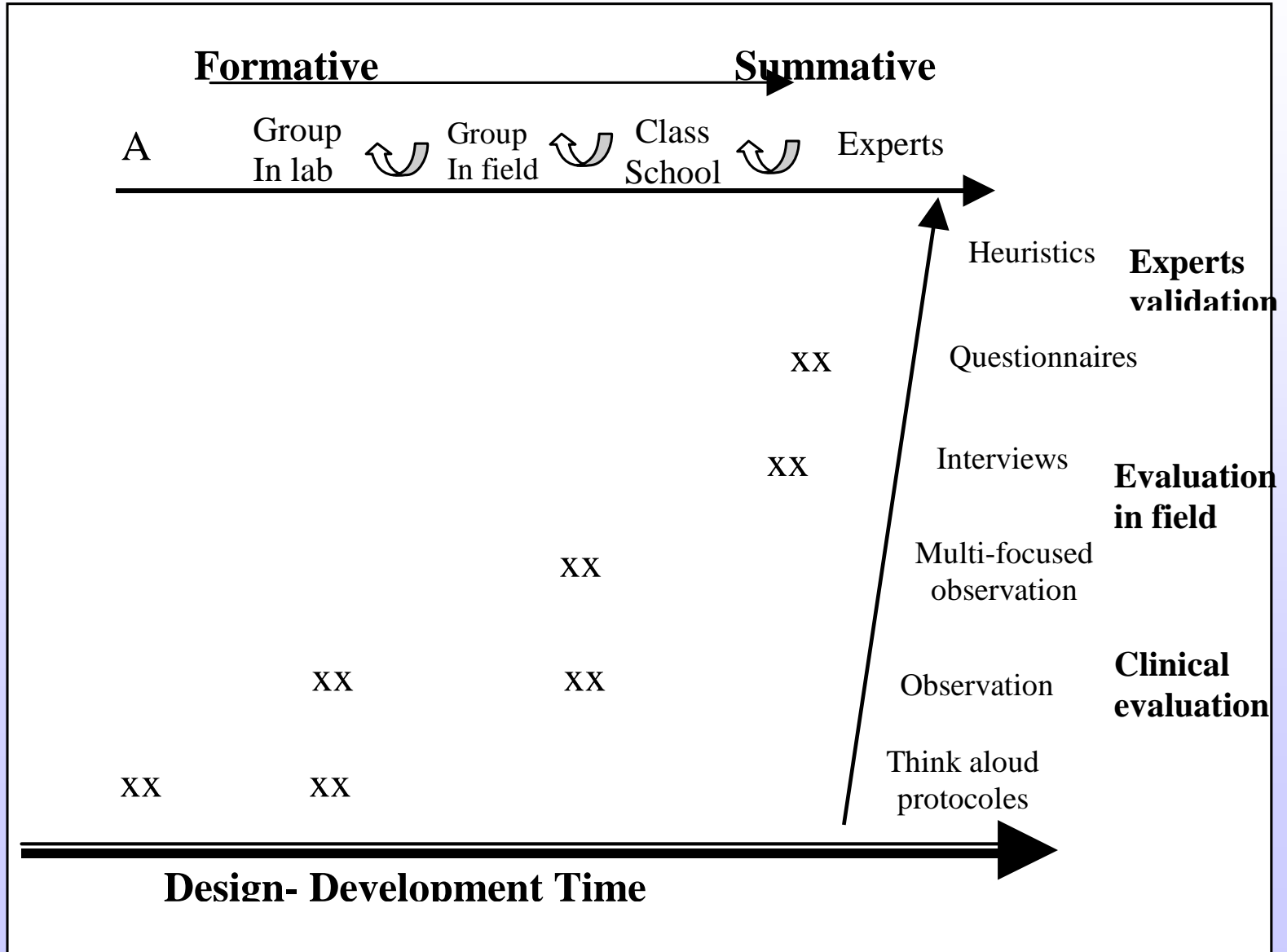


Usability Evaluation methods / External Evaluation

- ↪ **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**