

## Development of Educational Software

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## Today

- Definition of educational software and its life cycle.
- Types of educational software.
- Development processes.

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## ROLES IN TEACHING & LEARNING

- Learning method
- Teacher
- Student
- Educational software
- Other media
- Subject material
- Choices, preferences, evaluation, interaction
- Figure 1.2 in Thesis 1995.

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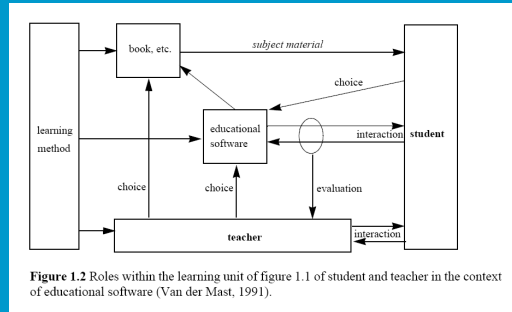


Figure 1.2 Roles within the learning unit of figure 1.1 of student and teacher in the context of educational software (Van der Mast, 1991).

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## ESSENTIAL COMPONENTS OF E.S.

- Structured subject matter
- Student model
- Pedagogic model
- User interface
- Figure 1.3

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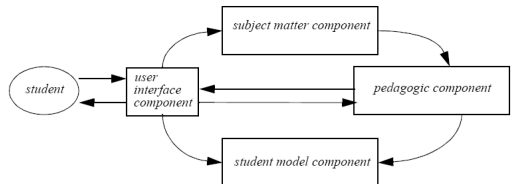


Figure 1.3 Essential components of software forming a part of the educational system operated by the student. When the component for subject matter is missing we have full CMI.

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## LIFE CYCLE OF E.S.

- Learning & experience
- Observation
- Records
- Analysis
- Patterns
- Design
- Specs
- Implementation



Figure 1.5

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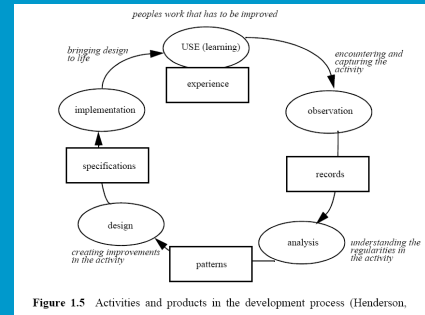


Figure 1.5 Activities and products in the development process (Henderson).

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## WAYS OF developing e.s....

- Way of thinking
- Way of working
- Way of modelling
- Way of controlling
- Support tools

Figure 2.1

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## Main functions within ed.softw.

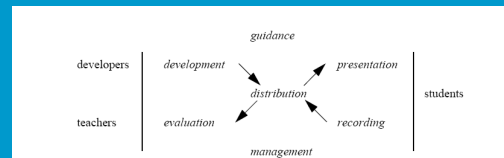


Figure 1.4 The main functions of educational software, cf. Van der Mast (1983).

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## Levels of interaction in application

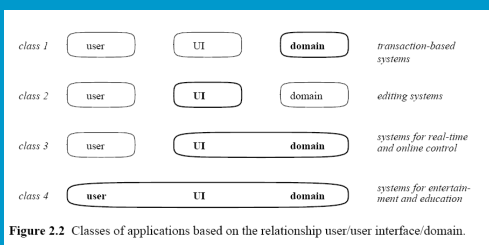


Figure 2.2 Classes of applications based on the relationship user/user interface/domain.

⌚ Class 5 user – UI – domain virtual reality exposure

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## Types of educational software

- Computer assisted learning / based training
- Computer managed instruction
- Drill and practice
- Tutorial
- Simulation
- Modelling
- Blended learning
- Serious gaming
- \* organizational context
- \* educational plan
- \* media selection
- \* content
- \* Web lecture
- \* WIKI

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## Development of educational software and e-Learning

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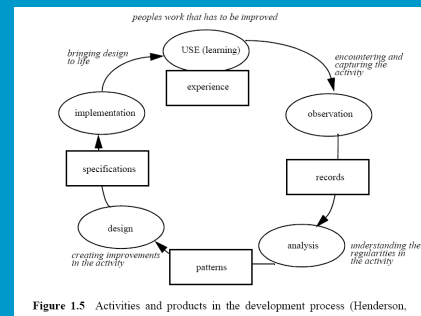


Figure 1.5 Activities and products in the development process (Henderson).

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## Observations (1)

- An important aspect for classification of the quality of courseware is the degree of economic professionalism of the organizational environment where courseware is used. There are considerable differences between using courseware in a commercial organization where the potential students are involved in the production process of the company, and in a school setting where achieving "good" quality teaching and learning is the general aim.

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## Observations (2)

- Businesses once they commit to the use of courseware will demand that a product is tailor-made for their circumstances. Thus courseware used in a business setting is normally a product of "demand" whilst in the formal education setting the software used, if used, is often a product of "supply", that is a piece of software exists and is then taken up by the institute for its use.

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## Observations (3)

- Within the formal education system the individual freedom of the institute and of the teacher to approach the training of any subject in a manner they deem expedient means that the existence of good courseware does not necessary guarantee use. In the formal education system you have first to convince the middle user, the teachers and trainers, that there is value to found in using courseware and it can be difficult to obtain commitment for its use by the institute or by the individual teacher. In the formal education setting products tend to be made for a more general audience, there are a greater number of variables, i.e. level of the institute and ability of user/student, etc.

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## Observations (4)

Developing courseware demands close collaboration by rather traditionally different disciplines.

- Subject matter experts, educational specialists and senior teachers perceive it as difficult to collaborate in a team to make a satisfactory specification of the educational problem and a consistent conception of the proposed solution. Some of the reasons for these difficulties may be an inability to recognize and acknowledge mutual responsibilities and skills and a lack of accurate communication.
- Another observation is that to achieve a good design, a great amount of prototyping, reviewing, user participation and formative evaluation is necessary. Intense feeling and imagination is demanded from the designers with regard to the design. As a consequence of the "qualitative" characteristic of courseware the phase of conceptual and functional design takes a very long time compared to software, for conventional, more deterministic domains.

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## Observations (5)

3. Within the development team rather different disciplines are needed; for example marketing analysts, project managers, user (organization), subject matter experts, educational technologists, system engineers, programmers, writers and editors, publishers, graphic designers, publishers. Communication among the different disciplines can prove to be difficult as people have to learn to do this. The leading role of the project manager of such a team is difficult. He/she needs the characteristics of a director or producer of artistic projects such as a strong image of the product aimed at and the power to convince the team of their ideas. She should be able to be responsible personally for the quality of all aspects of the design contributed by the different disciplines.
4. The development of educational and instructional materials for all traditional and technological media is generally not based on economics but on idealism and the ambition of teachers, trainers and educational specialists. Only the production and distribution of the materials is planned commercially by publishers for the open market. Tailor-made instruction and courseware is mostly, as yet, not commercially successful for the user and provider. Measurement of success is difficult.

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## Observations (6)

From these observations of some factors causing failure and poor success in multi-disciplinary professional courseware projects the hypothesis is derived that the development process should be considered as part of the complete life cycle of courseware, i.e. the trajectory from the first identification of an educational problem upto the distribution and implementation of a product. Considering the life cycle of only the modelling or the realization (authoring) process on an isolated way is insufficient.

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## Intermezzo

Recent experience with e-learning in India Jan-Feb 2010.

Kalyani 100 km north of Calcutta, West Bengal.

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## My experiences in Calcutta, Feb 2010 [PUM-program funded by Dutch government]

- JIS College of Engineering
- HBO-MBO
- 1000 students
- 7 programs



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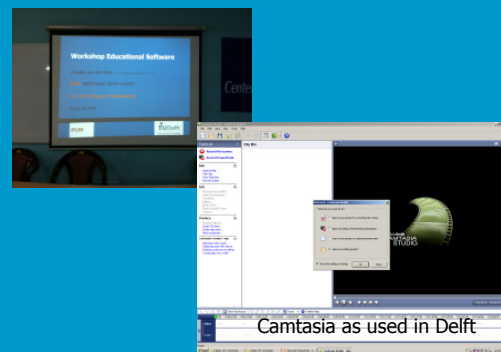
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## My experiences in Calcutta, Feb 2010 [PUM-program funded by Dutch government]

- Problem: change skills and attitude of students to cope with practical problem solving
- Solution: teach the teacher – start workshop and program to design and implement small web lectures and home assignments by a small team of the most ambitious teachers
- **Why: designing ES requires and triggers change of mind about how YOUR subject material should be taught to YOUR students**

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An integrated framework for

- eLearning
- Skill Management
- Training Administration
- Knowledge Management

LearnITy collects comprehensive business intelligence across all knowledge processes, providing a unified, realistic view of learning effectiveness

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LearnITy Usage Scenarios

- Sales Training
- Employee Induction Programs
- Customer Service Training
- New Software Application Rollout Programs

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## End of Intermezzo

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## Activities reported during development

- problem analysis** (market analysis if commercial product is aimed)
  - feasibility study
  - educational
  - organizational
  - technical
  - economical
  - global project planning
  - problem definition
  - product definition
  - target group definition
- educational design**
  - context analysis
  - subject matter analysis
  - didactic strategy design
  - media selection
- software design: functional design**
  - design of other materials**
  - realization**
    - technical design and construction
    - integration of media
  - evaluation**
    - formative evaluation
    - field test
    - acceptance procedure
  - production**: final product
  - distribution** (marketing if commercial product is aimed)
  - deployment**: in organization or school
  - maintenance and use**

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graph TD
    A[feasibility study] --> B[start up]
    B --> C[functional design]
    C --> D[global technical design]
    D --> E[detailed technical design]
    E --> F[programming]
    F --> G[acceptance procedure]
    G --> H[distribution and usage]
    C --> I[revision and evaluation]
    D --> I
    E --> I
    F --> I
    G --> I
    I --> A
    I --> H
  
```

**Figure 2.3** Overview of the phases for educational software development used in the Handbook for the Development of Educational Software (HOEP).

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## WAYS OF developing e.s....

- Way of thinking
- Way of working
- Way of modelling
- Way of controlling
- Support tools

Figure 2.1 in thesis

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## Chapter 4

- Way of thinking: why, what, how; roles in team; director
- Way of modelling: context, subj matter, engagement
- Way of working: project management
- Way of controlling: quality assurance methods
- Way of supporting: tools and communication between disciplines (film industry)

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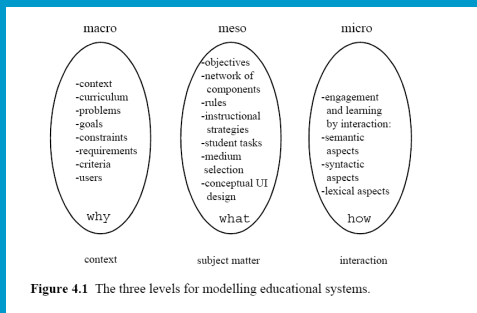
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## THREE LEVEL MODEL (fig 4.1)

- |   |  |  |
|---|--|--|
| <p><b>macro</b></p> <ul style="list-style-type: none"> <li>• Context</li> <li>• Curriculum</li> <li>• Problems</li> <li>• Goals</li> <li>• Constraints</li> <li>• Requirements</li> <li>• Criteria</li> <li>• Users</li> <li>• Costs</li> </ul> <p><b>why</b></p> | <p><b>meso</b></p> <ul style="list-style-type: none"> <li>• Objectives</li> <li>• Network of components</li> <li>• Rules</li> <li>• Instructional strategies</li> <li>• Student tasks</li> <li>• Media selection</li> <li>• Conceptual UI design</li> </ul> <p><b>what</b></p> | <p><b>micro</b></p> <ul style="list-style-type: none"> <li>• Engagement and learning by doing / interacting</li> <li>• Semantic aspects</li> <li>• Syntactic aspects</li> <li>• Lexical aspects of layout</li> </ul> <p><b>how</b></p> |
|---|--|--|

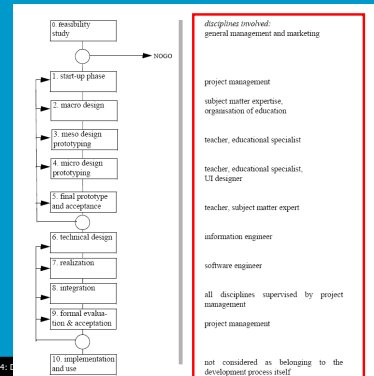
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## Conclusions for teams

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## Summary

- Life cycle
- Observations
- Activities during development
- Ways of ...
- Three level model
- Development process with roles and responsibilities

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## Next week

- One student will present the summary of todays lecture