A Pattern for Innovations in Mathematics Education with ICT via Teacher Education

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1. Innovations in complex systems

1.1 Innovations
1. Innovations in complex systems

1.2 Complex systems

can potentially be in so many states that nobody can cognitively grasp all possible states of the system and all possible transitions between the states
1.3 Steering complex systems

- on the meta-level
  - analytic-directive
  - incremental-evolutionary

- on the object level
1.4 Innovations in complex systems

- on the meta-level
  - analytic-directive
  - incremental-evolutionary
- on the object level
2. Learning

2.1 Aspects of Learning

- constructive
- individual
- active
- self-organized
- situative
- social
2.2 Concept of Learning Environments
3. Innovations in the educational system

3.1 A Summary
Innovations in complex systems

on the meta-level

analytic-directive

incremental-evolutionary

on the object level
Aspects of Learning

• constructive
• individual
• active
• self-organized
• situative
• social
Concept of Learning Environments

Teacher ➔ Design ➔ Learning Environment ➔ Offer ➔ Learner

Feedback ➔ Design ➔ Learning Environment ➔ Work ➔ Learner

Learning Environment

Tasks ➔ Media

Method ➔ Partners
3.2 Pattern for innovation projects

• aiming at teachers
• networks of schools
• main areas of innovation
• meta-level of beliefs
• development of learning environments
• Universities as innovation centres
• (inter-)national teacher education