Virtual learning environments as supportive element in schools

Hauptseminar “E-Learning” – Sommersemester 2008

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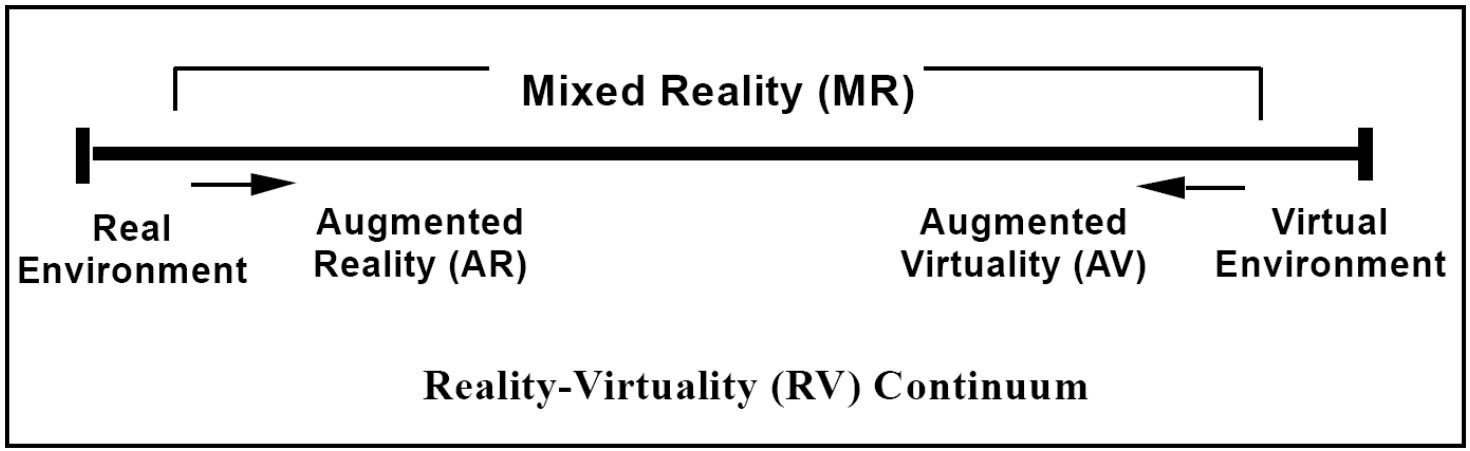
Agenda

- Theoretical background
  - Concepts of virtuality
  - Virtual learning environment
  - Constructive learning
- Case studies
  - ArtDeCom
  - Global Change World
  - Construct3D
  - Teatrix and NIMIS
- Conclusion

Concepts of virtuality

- Classification of systems by the relationship of reality and virtuality



- Virtual Reality: interactive 3D computer-generated environments provide the effect of immersion
- Mixed Reality:
  - Augmented Reality: virtual objects composited with the real world
  - Augmented Virtuality: virtual environment enriched by real world objects

Milgram, P., Takemura, H., Utsumi, A., Kishino, F., 1994. Augmented Reality: A class of displays on the reality-virtuality continuum.

Virtual learning environments VLE

- Software systems to support e-learning:

  tools for communication, content sharing, collaboration, administration...

- Designed information space: structure of information depends on functional requrirements of the environment
- Social space: interaction with other users as central concept
- Students as actors: active consumption of information as well as contribution of own content
- Heterogeneous technologies: integration of different technologies into a single application

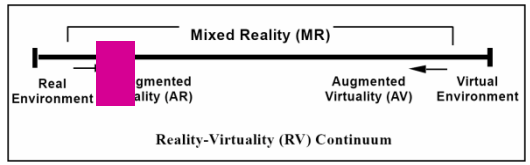
Dillenbourg, P., Schneider, D., Synteta, P., 2002. Virtual Learning Environments.

Constructive learning

- Constructionism
  - Knowledge arises from direct interaction with objects of the real world
  - Experiences in VLEs comparable to real world experiences
- Exploratory learning
  - Autonomous assimilation of knowledge more effective than perceiving pre-build points of view
  - VLEs advantage of locating students in context-related situation
- Collaboration
  - Important element next to learning outcome
  - VLEs provide common environment without local restrictions

Mantovani, F., 2001. VR Learning: Potential and Challenges for the Use of 3D Environments in Education and Training.

ArtDeCom



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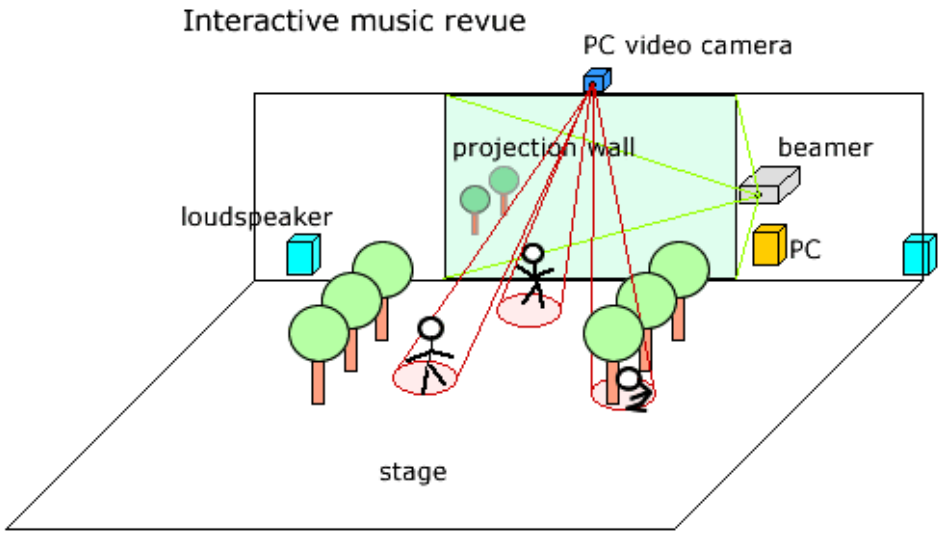
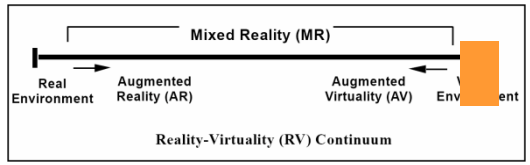
- Interactive music revue for pupils at elementary school
- Theory and practice of integrating education and training in Arts and Computer Science



Kritzenberger, H., Winkler, T., Herczeg, M., 2002. Collaborative and Constructive Learning of Elementary School Children in Experiental Learning Spaces along the Virtuality Continuum.

Global Change World



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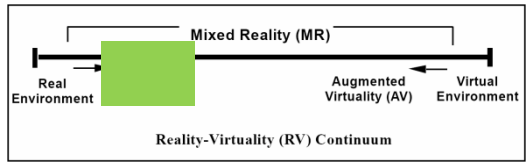
- Simulation of climate changes in a virtual model of Seattle over longer periods of time
  - Pairs of students try to solve several tasks concerning climate change
  - Three adjustable variables influence climate
  - Jumping to different points in time reveals changes

Jackson, R. L., Fagan, E., 2000. Collaboration and learning within immersive virtual reality.

Construct3D



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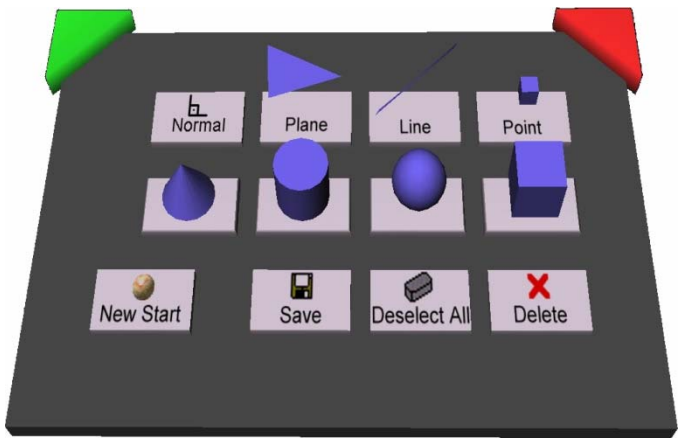
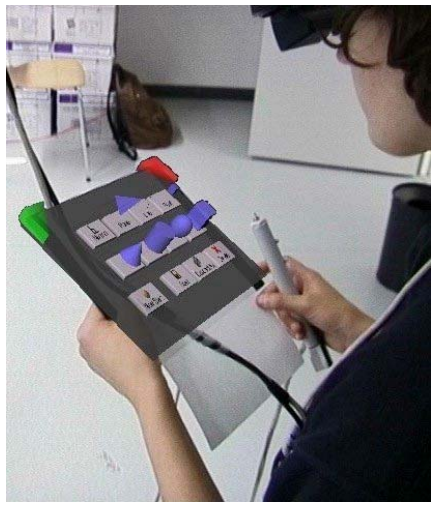
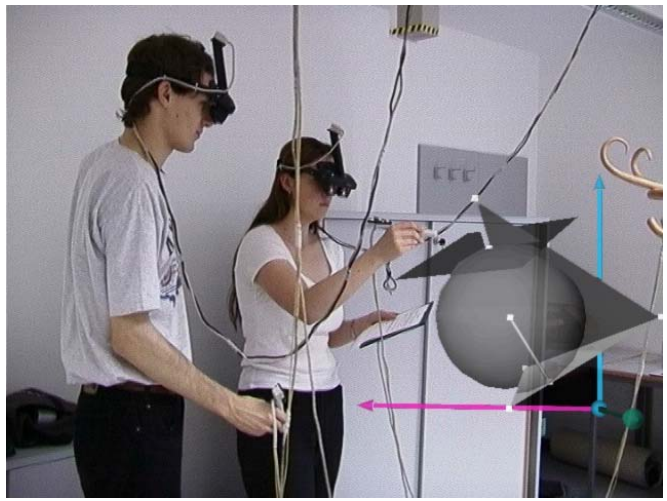
- Three dimensional geometric construction application for multiple users
  - Various hardware setups for teacher-student interaction
  - Several modes for learning, with different degrees of guidance

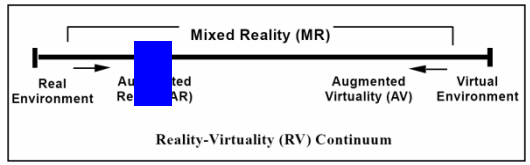






Hannes Kaufmann, Dieter Schmalstieg, M. W., 2000. Construct3D: A Virtual Reality Application for Mathematics and Geometry Education.

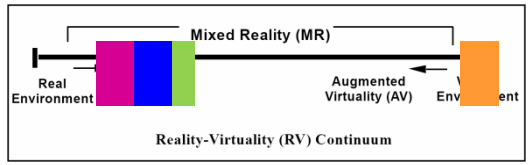
Teatrix and NIMIS



- Playful approach for collaborative story creation in elementary school
  - Characters and role-models support narrative process
  - Characters controlled by pupils or computer interact depending on their mood and intention

Prada, R., Machado, I., Paiva, A., 2000. TEATRIX: Virtual Environment for Story Creation.

Conclusion



- Wide range of application of VLE
  - Covering almost the whole Reality-Virtuality Continuum
  - Showing different pedagogic approaches
  - Covering all age-group levels of students
  - Covering various subjects
- Challenges to be solved
  - Proof of positive influence on learning
  - Adaptable learning material
  - Universal applicability