A pedagogical model for simulation-based education in healthcare

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BACKGROUND

- Simulations and virtual realities are currently a point of focus in healthcare education around the world

- Although simulation-based education has been noted to be effective in many ways, it is not currently well known *when* and *how* simulation-based education should be applied

- We need appropriate *theories, models and methods* to help educators to plan, implement and evaluate teaching and learning

- The aim of this study is to give examples of *how simulation-based education can be applied in pedagogically appropriate* ways by developing a pedagogical model

PEDAGOGICAL MODEL

- Pedagogical model can be viewed as "a plan or pattern that can be used to shape curriculums (long-term courses of studies), to design instructional materials, and to guide instruction in the classroom and other settings"

- Pedagogical models are especially valuable for educators who use educational technology in their teaching

(Alinier, 2011; Joyce and Weil, 1980, p. 1; Keskitalo, 2011; Randolph, Kangas, Ruokamo & Hyvönen, 2013)

SIMULATIONS

- Simulation means to do something in the ”as if”, to resemble reality (not perfectly, because then it would be reality again). E.g. To train or learn something without risks or costs of doing things in reality
    - Simulation mechanism
    - Simulation scenario

- Simulators are devices or tools used to resemble parts of reality. E.g. Patient simulator

- However, there are also numerous other concepts used to refer different types of simulations

(Rall & Dieckmann, 2005)

SPECIFIC GOALS

- In particular, this study aims to:

  - 1) find out *on what facilitators base their teaching* and what educational tools, pedagogical models and methods they use in their teaching in SBLEs (Sub-study I),
  - 2) explore *students' expectations* of simulation-based learning (Sub-study II),
  - 3) increase our knowledge of *conceptions of teaching and learning* in SBLEs (Sub-study III), and
  - 4) *design a pedagogical model* that supports students' meaningful learning and assists facilitators in their teaching practices (Sub-study IV)

THE MAIN RESEARCH QUESTION

What kind of *pedagogical model* supports *facilitation* and *students' meaningful learning* in *SBLEs*?

THEORETICAL BACKGROUND

- Study is based on:

  - the socioconstructivist and socio-cultural theory of learning (esim. Lave & Wenger, 1991; Palincsar, 1998; Vygotsky, 1978),

  - meaningful learning (Ausubel, 1968; Ausubel et al., 1978; Jonassen, 1995), and

  - previous studies undertaking in this field (e.g. Dieckmann, 2009; Joyce et al., 2002; Hakkarainen, 2007; Tissari et al., 2005)

SOCIO-CULTURAL THEORY OF LEARNING

- Learning is *tool-dependent*
- Learning is influenced by *social, cultural and historical* factors
- Knowledge is the result of a *shared and contextually-bound process* than solely an individual experience

(Lave & Wenger, 1991; Palincsar, 1998; Säljö, 2004; 2010; Vygotsky, 1978)

MEANINGFUL LEARNING

- Meaningful learning is a process whereby new information is assimilated to what the learner already knows
- In addition, the learning materials and task must be meaningful, and the learners must engage themselves in the meaningful learning process
- Later Jonassen (1995) developed Ausubel's ideas in a more social constructivist direction
- In this study, we have developed those characteristics in a more *practice-oriented direction*

(Ausubel et al., 1978; Jonassen, 1995)

THE INITIAL PEDAGOGICAL MODEL

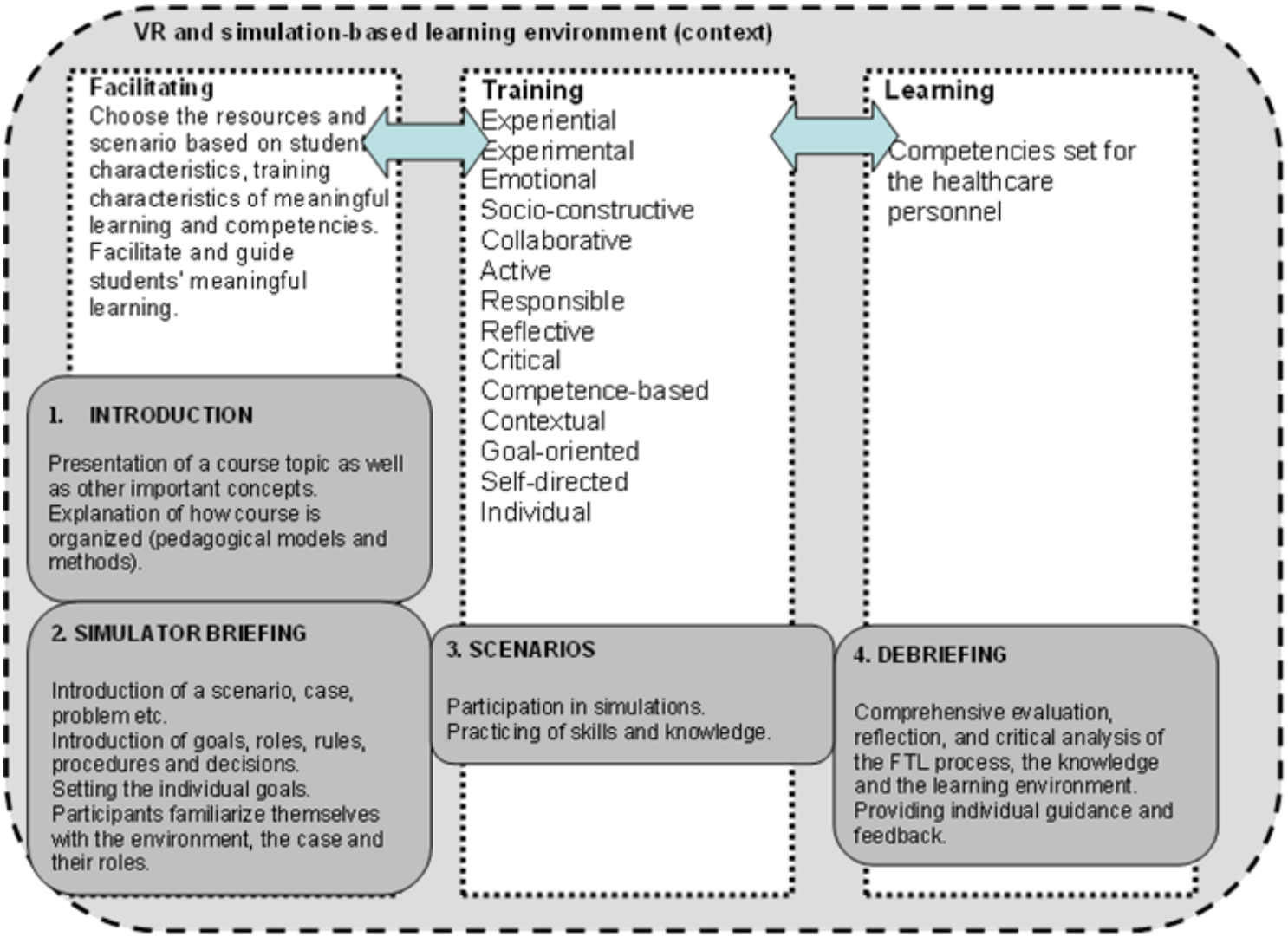


Figure 1. Facilitating, Training and Learning (FTL) model for VR and simulation-based learning (Keskitalo et al., 2010).

RESEARCH METHODS

- Study was conducted using applied *design-based research* and *case study* approaches
- Altogether study involved *21 facilitators* and *136 students*
- Study utilized various data collection and analysis methods

RESEARCH METHODS

- **1. Sub-study:** *Exploring Facilitators' Conceptions and Their Approaches to Teaching and Learning in SBLEs*
  - Thematic interviews with 8 healthcare facilitators
  - Transcriptions were analyzed using qualitative content analysis method
  - New insights of healthcare facilitators' conceptions of teaching and learning as well as their development needs

- **2. Sub-study:** *Studying Students' Expectations of the Learning Process in SBLEs*
  - Questionnaires (students, $n = 97$)
  - Statistical analysis (factor analysis, Cronbach's alpha, Kolmogorov Smirnov test)
  - Produced understanding of students' expectations about learning in SBLEs

RESEARCH METHODS

- **3. Sub-study:** *Investigating facilitators' and students' conceptions of teaching and learning*
  - Data was collected during the two case studies (Arcada 2009 and Stanford 2010)
  - Data was collected from six different courses (facilitators, $n = 13$; students, $n = 30$):
    - Individual interviews (facilitators, $n = 5$; students, $n = 14$)
    - Group interviews (facilitators, $n = 8$; students, $n = 16$)
    - Learning diaries (students, $n = 14$)
    - Open answers of the questionnaires (students' pre-questionnaire, $n = 10$; students' post-questionnaire, $n = 13$)
  - Data was analyzed using qualitative content analysis method
  - Deeper understanding of facilitators' and students' views about teaching and learning in general and in SBLEs

RESEARCH METHODS

- **4. Sub-study:** *Towards Meaningful Simulation-based Learning*
  - Utilized design-based research approach and case study approach
  - Second case study at Stanford in 2010
  - Data was collected from five different courses (facilitators, $n = 9$; students, $n = 25$)
    - Individual interviews (facilitator, $n = 1$)
    - Group interviews (facilitators, $n = 8$)
    - Video recordings (facilitators, $n = 6$; students, $n = 16$)
    - Field notes (facilitators, $n = 9$; students, $n = 25$)
  - Qualitative data was analyzed using qualitative content analysis methods
  - Defining and understanding the meaningful learning in SBLEs and designing the pedagogical model

MAIN RESULTS: THE REDESIGNED PEDAGOGICAL MODEL

- What is *special about* the pedagogical model presented here:
  - (1) the socio-cultural context surrounds the pedagogical model in order to remind us of the complexity of learning and the development of expertise;
  - (2) the main phases of simulation-based learning – *Introduction, Simulator and Scenario briefing, Scenarios* and *Debriefing* (Joyce et al., 2002; Dieckmann, 2009b) – are embedded in it,
  - (3) in addition to pre- and postactivities of the facilitator and students,
  - (4) these phases are completed with fourteen characteristics of meaningful learning, and
  - (5) the previous research results of the present study (Sub-studies I–IV)

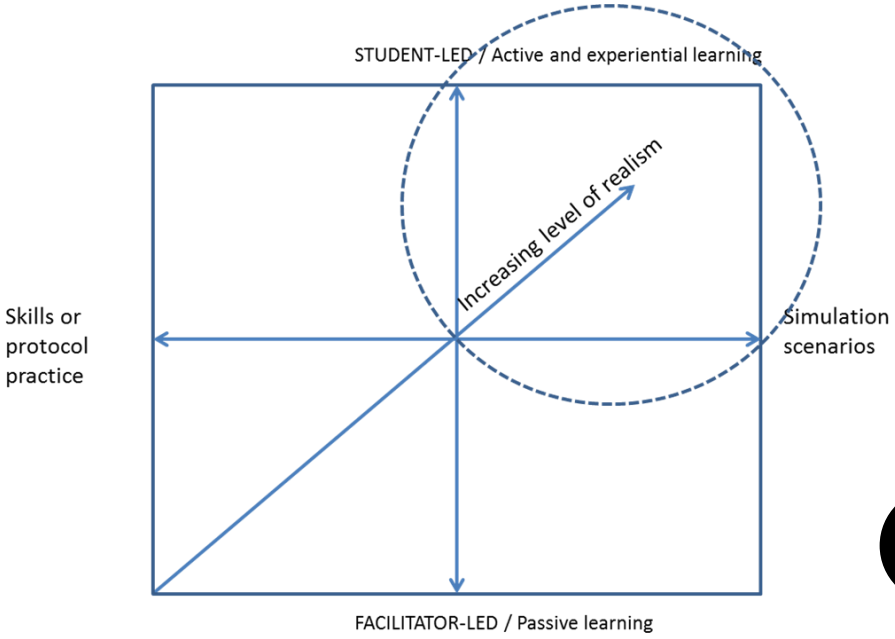
Figure 2. The pedagogical model (Keskitalo, 2015).

CONCLUSION

- SBLEs are demanding environments to teach and learn
- In SBLEs training is experienced quite meaningful
- However, *goal-oriented*, *self-directed and individual* characteristics of meaningful learning need more attention and support

CONCLUSION

- There are also different types of simulations that need pedagogical grounding:



FUTURE RESEARCH

- The pedagogical model need to be *tested and redesigned*
- We need to *compare* and *test different types of models*
- What kind of pedagogical models and methods bring about best learning results
- We need to combine multiple data collection and analysis method

PUBLICATIONS

- **Keskitalo, T. (2015).** *Designing a pedagogical model simulation-based healthcare education. Acta Universitatis Lapponiensis 299.* Rovaniemi, Lapland University Press.
- **Keskitalo, T. (2011).** Teachers' conceptions and their approaches to teaching in virtual reality and simulation-based learning environment. *Teachers and Teaching: Theory and Practice, 17*(1), 131–147.
- **Keskitalo, T. (2012).** Students' Expectations of the Learning Process in Virtual Reality and Simulation-based Learning Environments. *Australasian Journal of Educational Technology, 28*(5), 841–856.
- **Keskitalo, T., Ruokamo, H., Väisänen, O., & Gaba, D. (2013).** Healthcare Facilitators' and Students' Conceptions of Teaching and Learning – An international Case Study. *International Journal of Educational Research, 62,* 175–186.
- **Keskitalo, T., Ruokamo, H., & Gaba, D. (2014).** Towards Meaningful Simulation-based Learning with Medical Students and Junior Physicians. *Medical Teacher, 36*(3), 230–239.

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