Towards Meaningful Simulation Pedagogy

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Lessons Learned

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Introduction

- Simulation-based learning is more than fun (Rosen 2008); it is also effective (McGaghie, Issenberg, Petrusa, & Scalese 2010).

- In order to be effective, it has to be planned appropriately (McGaghie et al., 2010; Kneebone 2003), taking into account educational principles and the nature of the human being.

- This study contributes to the field by implementing both:
  - the characteristics of meaningful learning (Ausubel 1968; Hakkarainen 2007; Jonassen 1995; Löfström & Nevgi 2007; Ruokamo & Pohjolainen 2000) and
  - the concepts of the facilitating, training, and learning process (Kansanen et al. 2000; Uljens 1997)

  (Keskitalo, Ruokamo, & Gaba, submitted)

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Aims

- To facilitate meaningful simulation-based learning by developing a pedagogical model;

  - namely the *Facilitating*, *Training* and *Learning* (*FTL*) model (Keskitalo, Ruokamo, & Väisänen 2010).

- To evaluate, from facilitators' and students' perspectives, the meaningfulness of five different simulation-based courses, which were implemented in the spring of 2010.

Theoretical Background

- Research builds on the socio-constructivist and socio-cultural perspectives on learning (Lave & Wenger, 1991; Vygotsky, 1978):

  - Learning is:

  - related to all actions that take into account a person as a whole (body, mind and spirit) and the role of cultural tools and artefacts (technology and language)

  - seen as active, lifelong, life wide, and life deep (Banks et al., 2007) collaborative knowledge co-creation process

Pedagogical Model

- Can be used to shape curriculums or long term courses of studies, to design instructional materials, and to guide instruction in the classroom and other settings.

- Will help practitioners in the field of healthcare to plan, implement, and evaluate their teaching, instructional materials, and curricula designed for simulation-based learning.

  (Joyce & Weil, 1980, p. 1)

Pedagogical Model

- Is built on:

Facilitating → Training → Learning

- the facilitating-training-learning (FTL) processes (*cf. Teaching, studying and learning (TSL) process*, Kansanen et al., 2000; Uljens, 1997), and

- the characteristics of meaningful learning (Hakkarainen, 2007; Jonassen, 1995; Jonassen et al., 1999; Nevgi & Tirri 2003; Ruokamo & Pohjolainen 1999; Vahtivuori-Hänninen et al., 2004) and

- the *Learning through Simulation Model* (*Introduction, Simulator Briefing, Scenarios, Debriefing*) (Joyce et al., 2002; cf. Dieckmann, Gaba & Rall, 2007)

Facilitating

- Describes teacher's activity, it does not necessarily lead to learning, but that student activity is needed before learning can be attained.
- Is viewed as facilitators' intentional activities to plan, guide, and evaluate students' learning processes (Diekman, Gaba, & Rall 2007) as well as to reflect on the facilitation itself.
- The introduction and simulator briefing phases of the *Learning through Simulation Model* are considered as facilitator activities.
- Facilitators promote students' meaningful learning (e.g. Jonassen, 1995):
  - choose the resources and scenario based on students' characteristics, characteristics of meaningful learning and competencies
  - facilitate and guide students' meaningful learning process

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14 Characteristics of Meaningful Learning

Training

1. Experiential and 2. Experimental
- Using prior experiences as a starting point for learning (Kolb 1984); experimentation with new tools, devices, situations, roles etc. (Gaba 2004; Cleave-Hogg & Morgan, 2002).

3. Emotional
- The emotions are always intertwined with learning (Engeström 1982; Schuzt & DeCuir 2002); Taking into account emotions during the learning process.

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4. Socio-constructive and 5. Collaborative

- Students evaluate and accommodate new ideas on the basis of their previous knowledge; participating in the joint learning process (Jonassen 1995; Löfström & Nevgi 2007; Dieckmann, Gaba, & Rall 2007).

6. Active and 7. Responsible

- The student role is active and students are responsible for learning. The facilitator guides rather than lectures. (Jonassen 1995; 2002; Fanning & Gaba 2007; Issenberg et al. 2005.)

8. Reflective and 9. Critical

- Critical reflection of one's own learning, learning strategies, knowledge, skills, attitudes, and the learning environment (Hakkarainen 2007; Jonassen 1995; Issenberg et al. 2005).

10. Competence-based and 11. Contextual

- Training is based on the learning objectives; learning is contextual, thus learning objectives are simulated through real-life cases and examples (Hakkarainen 2007; Jonassen 1995; Löfström & Nevgi 2007; Ruokamo & Pohjolainen 2000).

12. Goal-oriented and 13. Self-directed

- Setting one's own learning goals and following up on those goals during the learning process (Jonassen 1995; Schuzt & DeCuir 2002; Brockett & Hiemstra 1991).

14. Individual

- Learning is individually different (De Corte 1995); Taking into account individual differences; providing individual guidance and feedback (McGaghie et al. 2010; Hakkarainen 2007; Ruokamo & Pohjolainen 2000).

Learning

- Is expected to take place in the debriefing phase because of student activities and reflection on those actions (cf. Dieckmann 2009).

- The students have reached the learning goals and the new learning goals have been set.

- At best, training has been meaningful for students.

Research Question

- *From facilitators' and students' perspectives, how does the facilitating and training in SBLE foster the meaningful learning of students?*
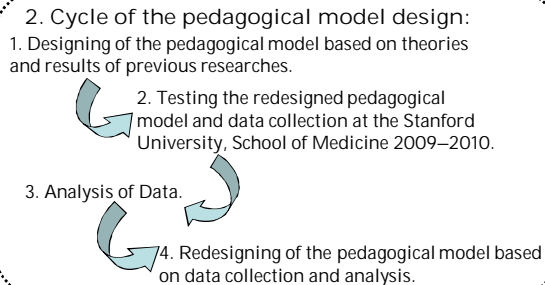
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Methods

- The research is a qualitative case study.

- Testing the pedagogical model is conducted applying design-based research method (DBR) (Brown, 1992; Design-based Research Collective, 2003).

- The purpose of DBR is to test and refine educational practice as well as theory by researching activities in authentic settings in collaboration with practitioners (Collins, Joseph, & Bielaczyc, 2004).

- During this study, researchers were following the courses designed by facilitators; therefore, the enactment phase of the pedagogical model is omitted.

Methods

2. Cycle of the pedagogical model design:
1. Designing of the pedagogical model based on theories and results of previous researches.

2. Testing the redesigned pedagogical model and data collection at the Stanford University, School of Medicine 2009–2010.

3. Analysis of Data.

4. Redesigning of the pedagogical model based on data collection and analysis.

- This research is the second cycle of DRB, although it is more an application of DBR.

- The DBR method is based on continuous cycles of design, enactment, analysis, and redesign (Brown 1992; Collins, Joseph, & Bielaczyc, 2004; DBRC 2003).

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Data Collection and Participants

- Was carried out in Stanford University's two different simulation centers between February and March 2010.

- From facilitators and students using group interviews (one individual interview), field notes, video recordings, and pre- and post-questionnaires.

- Facilitators' (N=9) specialties were anesthesia, surgery, and nursing.

- Students (N=25) were mainly second year anesthesia residents and third- and fourth-year medical students.

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Courses

- The students were studying anesthesia crisis resource management, emergency medicine, and anesthesia clerkship.

- Courses:
  - 2 x ACRM 2, 2 x Surg 313a, and 1 x Anes 306a
  - lasted 3 to 9 hours
  - structure followed the *Learning through Simulation model*

Data Analysis

Table 1. Data collection method, data source, and data analysis method

Interviews	Facilitators (N=9) , Students (N=16) 2 ACRM 2 2 Surg 313a 1 Anes 306a	Atlas.ti qualitative coding and analysis software, Qualitative content analysis
Video Recordings	Facilitators (N=6) , Students (N=16) 2 ACRM 2 1 Surg 313a	Qualitative content analysis
Field notes	Facilitators (N=9) , Students (N=25) 2 ACRM 2 2 Surg 313a 1 Anes 306a	Qualitative content analysis

Data Analysis

- The group interviews lasted approximately 30 minutes, they were primary source of information.

- Facilitators and students were asked questions related to:
  - concepts of teaching and learning,
  - the course structure, and
  - the characteristics of meaningful learning.

- Qualitative content analysis method (Brenner, Brown, & Canter 1985; Graneheim & Lundman 2004) and *Atlas.ti* software were used:
  1. coding produced 214 different codes.
  2. coding produced 32 categories.
  3. coding produced 14 categories.

Results

- Data analyses propose that learning in SBLE fosters the meaningful learning of students quite extensively.

- The training characteristics that were supported were: *experimental, experiential, emotional, socio-constructive, collaborative, active, responsible, reflective, critical, competence-based,* and *contextual.*

- *Goal-oriented, self-directed,* and *individual* characteristics were only fairly supported.

Results

Facilitators:

- Mentioned that formal articulation of the learning goals was rather weak.

- Only one of them said that in addition to the general learning goals, the students set their own goals.

- Others stated that they assumed that students set their own learning goals, but they did not query them if they had done so.

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Results

Students:

- Only a few students had set their own, individual learning goals; they were quite general in nature, such as: Don't kill the patient.

- The interest was mainly in attaining and evaluating the general learning goals in debriefings.

- Some of them mentioned that goals for the simulations were poorly articulated and that they did not know what to expect, and
  -> this prevented them from setting their own learning goals.

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Results

Facilitators:

- Gave individual feedback and guidance for students during the debriefing phase.

- Directed their questions mostly to the person who had been in the "hot seat", although they also mentioned that they made special efforts to draw out quiet participants and allowed individual questions to be answered.

- Mostly considered students' individuality before exercises, when taking into account their experience levels.

- Knew the general levels of the students, but not the students' individual experiences and knowledge base such as what kind of clinical experiences each student had.
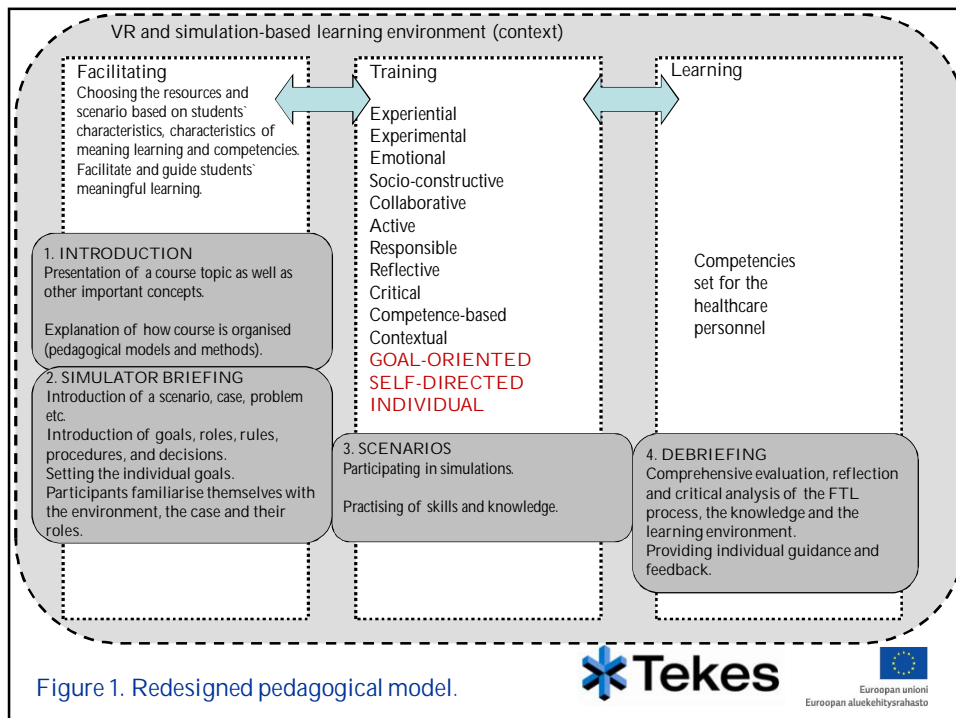
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VR and simulation-based learning environment (context)

Facilitating
Choosing the resources and scenario based on students` characteristics, characteristics of meaning learning and competencies. Facilitate and guide students` meaningful learning.

1. INTRODUCTION
Presentation of a course topic as well as other important concepts.

Explanation of how course is organised (pedagogical models and methods).

2. SIMULATOR BRIEFING
Introduction of a scenario, case, problem etc.
Introduction of goals, roles, rules, procedures, and decisions.
Setting the individual goals.
Participants familiarise themselves with the environment, the case and their roles.

Training

Experiential
Experimental
Emotional
Socio-constructive
Collaborative
Active
Responsible
Reflective
Critical
Competence-based
Contextual
GOAL-ORIENTED
SELF-DIRECTED
INDIVIDUAL

3. SCENARIOS
Participating in simulations.

Practising of skills and knowledge.

Learning

Competencies set for the healthcare personnel

4. DEBRIEFING
Comprehensive evaluation, reflection and critical analysis of the FTL process, the knowledge and the learning environment.
Providing individual guidance and feedback.

Figure 1. Redesigned pedagogical model.

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Future

- When redesigning the model and when running the courses, educators should address the goal-oriented, self-directed, and individual characteristics of meaningful learning.
- The goals direct our thoughts, behavior, and strategies (Schuzt & DeCuir 2002); therefore, they are also important determinants of learning and should be clearly stated (Biggs 1996).
- Setting the goals means both setting the individualized goals and the general learning objectives (Hakkarainen 2007; Jonassen 1995; Löfström & Nevgi 2007; Ruokamo & Pohjolainen 2000)
  → Curriculum is important!
- Defined outcomes are the one core feature of the use of high-fidelity medical simulation that will lead to effective learning (Issenberg et al., 2005).

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Future

- Facilitators should select their teaching methods based on the goals and desired levels of understanding.
- Besides setting the goals, they should be followed and evaluated (Biggs 1996).
- Self-directed learning may in the long run be more important to the development of expertise than formal education (Gibbons et al. 1980, 42).
- Facilitators help students to follow and evaluate their learning in debriefings, but individualized counseling sessions would be helpful.
- Learning is inherently individual (DeCorte 1995); some students would expect individualized guidance and feedback (Keskitalo, Ruokamo, & Väisänen 2010).

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Future

- Facilitators should adopt assessment methods that are in line with the educational principles and learning objectives.
- A multiple-choice test may not always be the best choice, when measuring the students' understanding (Biggs 1996).
- Measurement of learning before and after would be useful.
- The utilization of the DBR method has implications for theory (Barab & Squire 2004) and model development.
- Many characteristics are overlapping;
  - future research should concentrate on detecting the most important ones, and
  - study them in depth to provide even more clarified examples to help facilitators make their teaching decisions (Biggs 1996).

Reference

Keskitalo, T., Ruokamo, H., & Gaba, D. (Submitted). Towards Meaningful Simulation-based Learning. *Medical Teacher*.

Thank you!

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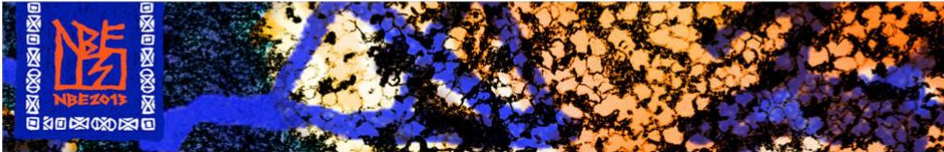
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