Making the implicit explicit: Theories informing simulation-based education
October 18
Introduction: Debra Nestel
Theory #1: Gabriel Reedy
Theory #2: Peter Dieckmann

November 10
Theory #3: Nancy McNaughton
Theory #4: Walter Eppich
Theory #5: Ryan Brydges
Simulation education and...

Cognitive Load Theory
Installation Theory

November 10

Critical Theory
Cultural-Historical Activity Theory
Normative Theory
WORLD VIEWS
WORLD VIEWS

Positivism & post-positivism

Interpretivism
WORLD VIEWS

Positivism & post-positivism

Interpretivism

Critical theory
Theories can be seen as frameworks of ideas... are complex and contestable
Theories are nets cast to catch what we call ‘the world’; to rationalize, to explain and to master it. We endeavor to make the mesh ever finer and finer.

Theories to illuminate

Theories to magnify

Theories as lenses

Theories as liquids

Not fixed in time, constantly changing, not fixed in space...
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Cognitive Load Theory
and Simulation Education

Gabriel Reedy PhD
King’s College London
Simulation and Interactive Learning Centre at
Guy’s and St Thomas’ NHS Foundation Trust
Information Processing Model

• How many items are you faced with?
• How are the items related to each other and to what you already know?
• What rules (schemata) in your long-term memory can help you process them?
Intrinsic Load

• How difficult is the task for the learner?
  – Contextual to task, situation, learner
  – What is the learner’s previous experience with this or similar tasks
  – Cannot be lowered, as such – but it can be mitigated and must be considered
Extraneous Load

- Not inherent or necessary to complete a task
- Based on the design of the task or experience
- Adds to intrinsic load
- Can potentially overload working memory
Germane Load

Sometimes the task is richly difficult, but working through it can help the learner progress— it is *germane* to the learning.

Part of intrinsic load

Helps to create schemata in working memory to help learner be successful in the long term with other tasks

Be judicious and thoughtful
Using Cognitive Load in Simulation

• **Goal-free learning allows for more specific and appropriate learning opportunities**
  – Learner-defined goals
  – Safe to make mistakes

• **Setting up the simulation tasks appropriately can make for a more effective learning environment**
  – Set learners up for success – lower the extraneous cognitive load by reminding participants of protocols and previous knowledge
  – Use confederates judiciously to lower the extraneous cognitive load

• **Start with simple tasks and move towards more complex ones**
  – Develop learners over time, lower intrinsic load by preparing learners

• **Develop higher fidelity as learners progress**
  – Too much detail can overwhelm novice learners and is unnecessary
Installation Theory
by Saadi Lahlou, LSE

Peter Dieckmann
PhD, Dipl-Psych
Why do people do, what they do?
Person(ality)       Situation
Person(ality)  Situation
Person(ality)  Situation
Person(ality)

Jung
Adler
Kelly

Situation

Lave & Wenger
Goffman
Lewin
Kurt Lewin

(1890 – 1947)

The whole as starting point
Dynamic of situations
Psychological aspects
B = f(P, E)
Life Space
Affordances describe the value of elements for a person in the life space.
Life Space

Not all is achievable (easily)
Borders have different strengths
Material Aspects

Social and Organisational Aspects
Installation

Material Layer

Embodied Competence

Societal and organisational control

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Installation

Material Layer

Embodied Competence

Societal and organisational control

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Installation  Compensations

ML

EC

SC

Declining Eyesight

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Installation to Compensations

- ML
- EC
- SC

Declining Eyesight

Increase Light

Extend Arm

Reluctance to buy glasses

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**Installation**

- ML
- EC
- SC

**Compensations**

- Restart Computer
- Ask your colleague
- Find workaround
- Inform programmer

Software Bugs
Installation

- ML
- EC
- SC

Compensations

- Hide Folders
- "Violations"
- Block implementation
- Feedback to designers
- Complain to colleagues

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Work as imagined / Work as done.

(Erik Hollnagel)
Formula for Impact

Adapted from Resuscitation 59 (2003) 11-43

Science  \times  Educational Efficiency  \times  Local Organization = Safety Quality of care

Human Factors
Ergonomics
Process science
...
Standardized Teaching

Variable Learning

Variable Teaching

"Standardized" Learning
Thank you

Peter Dieckmann

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Thank you

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AMEE Simulation Committee
Further reading (DN)

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