Virtual Reality, Learning and Experience

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Virtual Reality, Learning and Experience - seminar at Roskilde University, 21 August 2019

In this seminar, **we aim to focus on the domains of learning and experience,** as integral parts of almost any Virtual Reality-based activity. Participating in the seminar, you will gain insight into the latest knowledge about the use of Virtual Reality (VR) in different application areas. There will be an Open Session during the seminar where you will be able to have some fun with various hands-on demonstrations of VR and connect with people and their amazing creations! The highlight of the seminar is a panel discussion with seminar participants, experts, content providers, and researchers, who will address some of the many questions and ideas that our discussions give rise to.

Even though the VR hardware, simulations, and content applications become more and more accessible it seems that the users' VR experience varies considerably not least due to the varying quality of content and the scattered knowledge about relevant fields of application. If we are to use VR-based interventions in higher education and experiential learning, we need more nuanced knowledge about the following important questions:

- What does research-based knowledge tell us about the possibilities and challenges involved in using VR in learning practices?
- How can VR help improve the learning experience as well as its outcomes?
- How does the use of VR within areas such as art, communication, and design contribute to our understanding of human experience and experiential learning?
- Does the impact on learning and experience justify the necessary effort and economic investments, and if so how?

At Roskilde University, ongoing VR development projects and research aim to contribute to knowledge about students' learning experiences when VR laboratory simulations are integrated into university (undergraduate) natural sciences curricula. The seminar aims to build on these activities, deepening, increasing, and broadening our knowledge about the problems and possibilities of VR in learning. We bring together university researchers, students as well as professional providers of technology and content to discuss and evaluate existing knowledge, the nature of the new challenges, and the need for further research.

Roskilde University

Centre for Virtual Learning Technologies & Experience Lab - Roskilde University - Universitetsvej 1 - 4000 - Roskilde - +4546742747 - slars@ruc.dk

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This is the final seminar programme (updated 14 August 2019):

9.00-9.30	**Registration and coffee**
9.30-9.35	**Welcome** Hanne Leth Andersen (Rector, Roskilde University)
9.35-9.45	**Introduction to the seminar and the theme** Søren Larsen (Director, Centre for Virtual Learning Technologies, Roskilde University) Connie Svabo (Assoc. Prof., Experience Lab, Roskilde University)
9.45-10.30	**Virtual Reality Enhanced Learning? Challenges and Opportunities in Combining Lab and Classroom Research** Guido Makransky (Assoc. Prof., Virtual Learning Lab, University of Copenhagen)
10.30-10.45	**Coffee break**
10.45-11.30	**VR/AR, Learning, Representations & Embodiment: explorations at RUC** Prajakt Pande (Postdoc, Centre for Virtual Learning Technologies, Roskilde University)
11.30-12.00	**Simulations and visualizations in XR** Anders Pedersen (Lead Developer, Khora)
12.00-12.30	**Lunch**
12.30-13.30	**Open Space session** Hands-on demonstrations of VR and connect with people and their amazing creations: • Tidslommen / Museum Vestsjælland • Point-of-care Ultralyd / VitaSim, SDU, OUH • VR Training for Assembly and Engineering / AU • MeetInVR / Francois Schumer • VR Labs / Labster • Biology Education & Energy Taxes / TimestoryVR • Escape Room / RUC Student Project • VR Haptic Feedback / Guido Makransky • Eye-tracking & 3D Visualization / Tobii Pro • AR Baby / Tankespil • VR Archive for Performing Arts / VR Live Art Danmark • The Digital Reality project to streamline and improve production / DTU
13.30-14.15	**The Use of Virtual Reality Headsets in Higher Education** Lasse Jensen (PhD Fellow, University of Copenhagen and Deakin University)
14.15-14.30	**Coffee break**
14.30-15.15	**Unconstrained Walking through Virtual Worlds** Niels Christian Nilsson (Asst. Prof. Multisensory Experience Lab, Aalborg University)
15.15-15.45	**Panel discussion** Panel: Barbara Nino (Research Assistant, IT University of Copenhagen) Guido Makransky (Assoc. Prof., Virtual Learning Lab, University of Copenhagen) Lasse Jensen (PhD Fellow, University of Copenhagen and Deakin University) Remzi Ates Gursimsek (external lecturer, PhD, Roskilde University) Facilitator: Per Meyer Jepsen (Assoc. Prof., Department of Science and Environment, Roskilde University)
15.45-16.00	**Seminar closing** Live Art Closing Performance

Please forward all questions regarding the seminar to Søren Larsen at slars@ruc.dk.

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Registration and coffee

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Welcome
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Introduction to the seminar and the theme
Søren Larsen (Director, Centre for Virtual Learning Technologies, Roskilde University)
Connie Svabo (Assoc. Prof., Experience Lab, Roskilde University)

9.45-10.30
Virtual Reality Enhanced Learning? Challenges and Opportunities in Combining Lab and Classroom Research
Guido Makransky (Assoc. Prof., Virtual Learning Lab, University of Copenhagen)
Virtual Reality (VR) is expected to have widespread adoption within classrooms in the next two to three years*; but most studies investigating learning with immersive VR have reported mixed results when compared to low-immersion media. I will present the potential and challenges related to combining lab and classroom research in a rapidly developing research field with VR enhanced learning as an example. The presentation will cover novel approaches such as the use of psychophysiological measures and the use of interventions that incorporate forced feedback in lab settings, as well as some of the challenges and practical restraints associated with investigating the potential of using VR in classroom and lab settings. The presentation will be based on conclusions from approximately 20 experiments on the topic that we have run at the Virtual Learning Lab at the University of Copenhagen over the last four years as well as related research.
*Freeman, A., Adams Becker, S., Cummins, M., Davis, A., & Hall Giesinger, C. (2017). NMC/CoSN horizon report: 2017 k–12 edition. Austin, Texas. Retrieved from https://www.nmc.org/publication/nmccosn-horizon-report-2017-k-12-edition/.

10.45-11.30
VR/AR, Learning, Representations & Embodiment: explorations at RUC
Prajakt Pande (Postdoc, Centre for Virtual Learning Technologies, Roskilde University)
At the newly established Centre for Virtual Learning Technologies, we are currently involved in a two-fold research project on VR and learning: The first fold investigates how integrating some of the existing immersive VR simulations in the biology curricula at RUC, affects undergraduate students' learning outcomes. Whereas the second fold – a design-based research (DBR) study guided by the recent field theories of embodied and extended cognition – involves the design and testing of our own immersive, fully-manipulable and multi-representational VR/AR simulations.
In this talk, I cautiously present the research designs of, and some very preliminary findings from, two pilot experiments attempting to integrate four different immersive VR simulations developed by Labster, in RUC's undergraduate biology classrooms. I briefly discuss some of the challenges involved in such experiments, primarily in relation to technology-interfaces design. Then I slide into some of the theoretical work I did at RUC, that discusses major theoretical assumptions underlying educational technology interfaces about the process of (conceptual) learning through new media-based interactive external representations. In doing so, I plan to contrast the currently dominant information processing approach to learning, with the emerging field theory account, and argue how the latter provides more promising intervention design directions for future work in learning-teaching through new media-based multi-representational simulations. Situating in this new field theoretical background, I finally outline our DBR-fold of the project.

11.30-12.00
Simulations and visualizations in XR
Anders Pedersen (Lead Developer, Khora)
The immersive power that current VR & AR technologies provide, allows us to visualize environments and replicate scenarios in a way that is unrivalled by any other tech prior to it. From molecular dynamics simulation of Argon atoms to visualizing larger remodelations at the Copenhagen Lakes, Anders Bjørn Rørbæk Pedersen (former student at Roskilde University, MSc. Computer Science & Performance Design and current Lead Developer at Khora Virtual Reality), will talk about some of the cases that he has worked on at Khora.

12.30-12.30
Open Space Session
The Open Space session is an exhibition of VR demos that allow the participants to try out different VR learning experiences and to share ideas, concepts and knowledge on VR experiences for learning.
The VR demos are:
• Tidslommen / Museum Vestsjælland
• Point-of-care Ultralyd / VitaSim, SDU, OUH
• VR Training for Assembly and Engineering / AU
• MeetInVR / Francois Schumer
• VR Labs / Labster
• Biology Education & Energy Taxes / TimestoryVR
• Escape Room / RUC Student Project
• VR Haptic Feedback / Guido Makransky
• Eye-tracking & 3D Visualization / Tobii Pro
• AR Baby // Tankespil

• VR Archive for Performing Arts / VR Live Art Danmark
• The Digital Reality project to streamline and improve production / DTU

13.30-14.15

The Use of Virtual Reality Headsets in Higher Education

Lasse Jensen (PhD Fellow, University of Copenhagen and Deakin University)

Based on a review of relevant research and experiences from a classroom study, this presentation will discuss the few benefits and many challenges of using VR headsets in higher education.

In the light of substantial improvements to the quality and availability of virtual reality (VR) hardware since 2013, this project seeks to update our knowledge about the use of VR headsets in education. This proposed paper presentation is primarily based on a review published in November 2017*, but also includes insights from a pilot study at the Department of Public Health (UCPH) and a best-practice report about VR in Higher Ed**).

Wild claims about advantages and possibilities of VR in education have been pushed by the VR business, often backed with 'scientific proof' that this or that product increases learning. However, independent research tells another story of more limited benefits and unsolved issues. Does this mean we should stop investigating the use of VR in education? Or can the research help us focus on learning situations where VR is most likely to be useful for instructors and learners?

*Jensen, L., & Konradsen, F. (2017). A review of the use of virtual reality head-mounted displays in education and training. Education and Information Technologies. doi:10.1007/s10639-017-9676-0

**Jensen, L. (2017). Virtual Reality in Higher Education - Using Head-Mounted Displays in the Classroom. Retrieved from https://cobl.ku.dk/news/2017/virtual-fieldtrips/VR_Report.pdf

14.30-15.15

Unconstrained Walking through Virtual Worlds

Niels Christian Nilsson (Asst. Prof. Multisensory Experience Lab, Aalborg University)

The recent proliferation of consumer-grade virtual reality (VR) has made it easier than ever for users to immerse themselves in compelling virtual environments (VEs). However, enabling users to explore VEs on foot remain a major challenge. The challenge of providing users with natural walking experiences in VR can be divided into two separate, albeit related, challenges: (1) enabling unconstrained walking in virtual worlds that are larger than the tracked physical space and (2) providing users with appropriate multisensory stimuli in response to their interaction with the virtual environment. In this talk I will provide an overview of different approaches to addressing these challenges and discuss the challenges still facing the research community.

15.15-15.45

Panel discussion

Panel:
Barbara Nino (Research Assistant, IT University of Copenhagen)
Guido Makransky (Assoc. Prof., Virtual Learning Lab, University of Copenhagen)
Lasse Jensen (PhD Fellow, University of Copenhagen and Deakin University)
Remzi Ates Gursimsek (external lecturer, PhD, Roskilde University)

Facilitator: Per Meyer Jepsen (Assoc. Prof., Department of Science and Environment, Roskilde University)

15.45-16.00

Seminar closing

Live Art Denmark Closing Performance

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The seminar i organised by Experience Lab and The Centre for Virtual Learning Technologies at Roskilde University.

Experience Lab RUC is an interdisciplinary, experimental and design-based research center focusing on human experience in various interaction designs. Over the last decade, we have followed the development of Virtual Reality (VR) hardware devices and content applications to conduct experiments involving different forms of communication, design, and experience.

The Centre for Virtual Learning Technologies at RUC is implementing, developing and researching virtual learning technologies, primarily VR- and desktop-simulations at the Bachelor in Natural Sciences programme within a timeframe extending from 2018 to 2021.

Members of the organising committee:

Connie Svabo
Eduardo Abrantes
John Patrick Gallagher
Per Meyer Jepsen
Prajakt Pande
Remzi Ates Gürsimsek
Sisse Siggaard Jensen
Søren Larsen
Troels Andreasen

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