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Development and implementation of VR-simulated experiences to train communication skills

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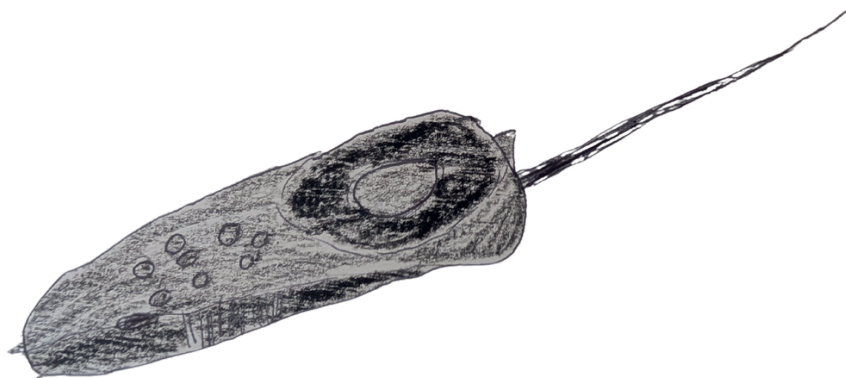
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Section VII



Portfolio

VI

Portfolio

OVERVIEW OF THE PHD TRAJECTORY

This PhD trajectory originated from a practical question arising from clinical practice: how therapeutic communication skills could be trained in a way that would be meaningful and acceptable within everyday healthcare settings. Rather than positioning communication training as a matter of opinion, the research focused on developing experiential approaches that could make the relevance of communication tangible and open to discussion.

The first project within this trajectory was the development of a patient-embodied virtual reality (VR) experience. During the same period, coinciding with the COVID-19 pandemic, limitations of traditional in-person simulation became apparent. This context led to the development and evaluation of VR-based simulation training for communication in high-stress situations (Section II).

Subsequent work addressed therapeutic communication and patient experience (Section III), including phenomenological and mixed-methods studies and the development of a therapeutic communication training programme in nursing education. In parallel, research was conducted on non-pharmacological interventions for preoperative anxiety.

The final phase of the PhD focused on communication as a relational and cultural phenomenon within the operating room (Section IV), including observational research on non-verbal rapport and the development of a VR experience exposing elements of the hidden curriculum for medical interns.

DISSEMINATION OF RESEARCH OUTPUT

Scientific articles

Year	Title	Journal / Conference	Type	Status
2025	From theory to practice: simulation in anaesthesiology through active learning experiences	IHCI	Conference paper	Published
2023	Therapeutic communication: a nursing educational program, study protocol	JMIR	Journal article	Published
2025	Beyond manikins: virtual simulation training in a post-COVID era	Medical Education	Journal article	Published
2025	Development of a real-time adaptable VR scenario training for anaesthesiology education	CSEDU	Conference paper	Published
2025	Evaluation of a VR simulation program: a mixed-method study	PEC Innovation	Journal article	Published
2024	Development of a patient-embodied experience, how and why?	CSEDU	Conference paper	Published
2024	A VR experience exposing the hidden curriculum of the operating room	IHCI	Conference paper	Published
2023	Response to comments on patient-embodied VR	Patient Education and Counseling	Letter / Response	Published
2023	Patient-embodied virtual reality as a learning tool for therapeutic communication skills among anaesthesiologists	Patient Education and Counseling	Journal article	Published
	A good intention does not suffice			Submitted
	Effects of a bundle of non-pharmacological interventions on preoperative anxiety			Submitted
	Non-verbal elements of rapport			Submitted

Scientific presentations

Year	Title	Conference	Type
2026	Immersive virtual reality for anaesthesia simulation training: a pilot study on presence, embodiment and user acceptance	EuroAnesthesia Rotterdam	Poster presentation
2026	Therapeutic communication, a nursing educational program, implementation and analysis on Kirkpatrick level 1 and 2	EuroAnesthesia Rotterdam	Poster presentation
2026	Effects of a bundle of non-pharmacological interventions on preoperative anxiety: a mixed methods study	EuroAnesthesia Rotterdam	Poster presentation
2026	Data, AI en VR, kennis voor nu en de volgende stap	NVA PhD dag, Utrecht	Presenter
2025	Preoperative anxiety, so what?	NVA Wetenschapsdag Utrecht	Keynote speaker
2024	Nonverbal elements for rapport in the endoscopy department, a video ethnographic study	ICCH, Zaragoza	Pitch presentation (with Pitch award)

Year	Title	Conference	Type
2024	VR simulatie: hoe en waarom simulatie werkt	NVA dagen 2024, Maastricht	Presenter
2024	VR development for the OR, a UCD design	ESIC 2024, Milaan	Poster presentation
2023	VR, development of a patient-embodied experience	IAMSE 2023, Cancun	Poster presentation
2022	Comfort study, a PAR design	NVA Wetenschapsdag	Presentation
2022	VR, the development of a patient-embodied experience	NVA Wetenschapsdag	Presentation
2022	How VR can encompass empathy in the OR	ICCH, Glasgow	Artistic presentation

Courses and Training Activities

Year	Course	Institution	Hours / ECTS
2020	Responsible Research	Leiden University	42h
2020	Basic Methods and Reasoning in Biostatistics	Leiden University	42h
2020	Leiden Onboarding Programme	Leiden University	10h

Grants and Funding

Year	Grant	Funder	Role	Amount (€)
2022	VR equipment	ZonMw	Applicant	5000
2023	Virtual Reality Trainer voor Anesthesisten	TFF	Applicant	200.000
2025	Virtual Reality Trainer voor Anesthesisten 2.0	TFF	Applicant	200.000
2025	Gereedmking operatiekamer	DUTCH Stichting	Co-applicant	500.000

Teaching and Supervision

During the PhD trajectory, I supervised Dutch medical students during *wetenschapsstages*, as well as bachelor and master students in social sciences (psychology, anthropology) and XR/VR development. Supervision activities included collaboration with the Saxion Extended Reality Lab, supporting student projects related to VR prototyping and user-centered design.

I also taught and facilitated simulation sessions and therapeutic communication training for healthcare professionals, reaching over 200 participants. In addition, themed weeks in the operating room focusing on comfort care were organised, contributing to interdisciplinary learning and practice development.

Chapter overview and authorship credits

Below is a listwise overview of all chapters included in the dissertation *Development and implementation of VR-simulated experience to train communication skills*, including verified DOI numbers where available, followed by a consolidated CRediT contribution table.

SECTION II – COMMUNICATION IN HIGH-STRESS SITUATIONS

Chapter 1

From theory to practice: simulation in anaesthesiology through active learning experiences

Type: Conference paper *Intelligent Human-Computer Interaction* 2024

Authors: Krista Hoek, Monique van Velzen, Elise Sarton

Status: Published

DOI: **10.1007/978-3-031-88705-5_3**

Chapter 2A

Beyond manikins: virtual simulation training in a post-COVID era

Type: article *Medical Education* 2025

Authors: Krista Hoek, Monique van Velzen, Elise Sarton

Status: Published

DOI: **10.1111/medu.15685**

Chapter 2B

Development of a real-time adaptable virtual reality scenario training for anaesthesiology education: a user-centered design

Type: conference paper *International Conference on Computer Supported Education* 2024

Authors: Krista Hoek, Christina Jaschinski, Elise Sarton

Status: Published

DOI: **10.5220/0012755600003693**

Chapter 2C

Evaluation of a VR simulation program: a mixed method study

Type: article *Patient Education and Counseling Innovation*

Authors: Krista Hoek, Monique van Velzen, Elise Sarton, Christina Jaschinski

Status: Published

DOI: 10.1016/j.pecinn.2025.100441

SECTION III – COMMUNICATION FOR PATIENT COMFORT AND ANXIETY REDUCTION

Chapter 3

A good intention does not suffice

Author: Krista Hoek

Status: Submitted

DOI: Not available (submitted)

Chapter 4A

Patient-embodied virtual reality as a learning tool for therapeutic communication skills among anaesthesiologists: a phenomenological study

Type: article in *Patient Education and Counseling* (2023)

Authors: Krista Hoek, Monique van Velzen, Elise Sarton

Status: Published

DOI: 10.1016/j.pec.2023.107789

Chapter 4B

Response to correspondence on patient-embodied virtual reality as a learning tool for therapeutic communication skills among anaesthesiologists

Type: response in *Patient Education and Counseling* (2023)

Authors: Krista Hoek, Monique van Velzen, Elise Sarton

Status: Published

DOI: **10.1016/j.pec.2023.107980**

Chapter 4C

Development of a patient-embodied experience: how and why?

Type: conference paper *Serious Games for Education 2024*

Authors: Krista Hoek, Monique van Velzen, Elise Sarton

Status: Published

DOI: **10.5220/0012755800003693**

Chapter 5A

Therapeutic communication: a nursing educational program – study protocol of a mixed method design

Type: study protocol in *Journal of Medical Internet Research* (2025)

Authors: Krista Hoek, Louise Suur, Monique van Velzen, Elise Sarton

Status: Published

DOI: **10.2196/65795**

Chapter 5B

Therapeutic communication: a nursing educational program – implementation and analysis

Authors: Krista Hoek, Louise Suur, Monique van Velzen, Elise Sarton

Status: Submitted

DOI: *Not available (submitted)*

Chapter 6

Effects of a bundle of non-pharmacological interventions on preoperative anxiety: a mixed methods study

Authors: Krista Hoek, Rutger van der Schrier, Monique van Velzen, Elise Sarton

Status: Submitted

DOI: *Not available (submitted)*

SECTION IV – COMMUNICATION AND TEAM CULTURE IN THE OPERATING ROOM

Chapter 7

Non-verbal elements of rapport during endoscopic procedures

Authors: Krista Hoek, Monique van Velzen, Hannah van Zweeden, Jurjen Boonstra, Elise Sarton

Status preprint, submitted

DOI: **10.21203/rs.3.rs-4562058/v1**

Chapter 8

A VR experience exposing the hidden curriculum of the operating room: a case study

Type: conference paper International Conference on Computer Supported Education 2024

Authors: Krista Hoek, Christina Jaschinski, Monique van Velzen, Elise Sarton

Status: published

DOI: **10.1007/978-3-031-88705-5_1**

CRediT contribution table

Chapter	Conceptualization	Methodology	Software	Investigation	Data Curation	Formal Analysis	Writing – Original Draft	Writing – Review & Editing	Visualization	Project Administration	Funding Acquisition
Ch 1	✓	✓	✓	✓	-	-	✓	✓	✓	✓	✓
Ch 2A	✓	✓	✓	✓	-	-	✓	✓	✓	✓	✓
Ch 2B	✓	✓	✓	✓	-	-	✓	✓	✓	✓	✓
Ch 2C	✓	✓	-	✓	✓	✓	✓	✓	✓	✓	✓
Ch 3	✓	✓	-	-	-	-	✓	✓	-	✓	-
Ch 4A	✓	✓	-	✓	✓	✓	✓	✓	-	✓	-
Ch 4B	✓	-	-	-	-	-	✓	✓	-	✓	-
Ch 4C	✓	✓	✓	✓	-	-	✓	✓	✓	✓	-
Ch 5A	✓	✓	-	-	-	-	✓	✓	-	✓	-
Ch 5B	✓	✓	-	✓	✓	✓	✓	✓	-	✓	-
Ch 6	✓	✓	-	✓	✓	✓	✓	✓	-	✓	-
Ch 7	✓	✓	-	✓	✓	✓	✓	✓	-	✓	✓
Ch 8	✓	✓	✓	✓	-	-	✓	✓	✓	✓	-

Legend: ✓ = substantial contribution