



Universiteit
Leiden
The Netherlands

At the heart of learning: navigating towards educational neuroscience in health professions education

Versteeg, M.

Citation

Versteeg, M. (2021, January 21). *At the heart of learning: navigating towards educational neuroscience in health professions education*. Retrieved from <https://hdl.handle.net/1887/3134566>

Version: Publisher's Version

License: [Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden](#)

Downloaded from: <https://hdl.handle.net/1887/3134566>

Note: To cite this publication please use the final published version (if applicable).

Cover Page



Universiteit Leiden



The handle <https://hdl.handle.net/1887/3134566> holds various files of this Leiden University dissertation.

Author: Versteeg, M.

Title: At the heart of learning: navigating towards educational neuroscience in health professions education

Issue Date: 2021-01-21

At The Heart Of Learning

Navigating towards educational neuroscience in health professions education

Marjolein Versteeg

Colophon

Cover design: Lars Rietkerk

Layout: Lars Rietkerk & Marjolein Versteeg

Printed by: Ridderprint

ISBN: 978-94-6416-234-9

This thesis was printed with financial support from Leiden University Medical Center and the Dutch Association for Medical Education (NVMO).

© Marjolein Versteeg, 2020

All rights reserved. No part of this thesis may be reproduced or transmitted in any form or by any means without permission of the copyright owner.

At The Heart Of Learning

Navigating towards educational neuroscience in health professions education

Proefschrift

Ter verkrijging van
de graad van Doctor aan de Universiteit Leiden,
op gezag van Rector Magnificus prof.mr. C.J.J.M. Stolker,
volgens besluit van het College voor Promoties
te verdedigen op donderdag 21 januari 2021
klokke 15.00 uur

door

Marjolein Versteeg
geboren te Hengelo
in 1994

Promotor

Prof. dr. P. Steendijk

Copromotor

Dr. A.J. de Beaufort

Promotiecommissie

Prof. dr. M.J. Schalij, Leiden University Medical Center

Prof. dr. F.W. Dekker, Leiden University Medical Center

Prof. dr. M. Wijnen-Meijer, Technical University of Munich

Prof. dr. A.B.H. de Bruin, Maastricht University

Table of contents

Chapter 1	General introduction	8
-----------	----------------------	---

PART 1: SPACED LEARNING

Chapter 2	Conceptualising spaced learning in health professions education: a scoping review <i>Published in Medical Education</i>	22
Chapter 3	Making a lecture stick: the effect of spaced instruction on knowledge retention in medical education <i>Published in Medical Science Educator</i>	40

PART 2: CONCEPT LEARNING

Chapter 4	The origins of medical students' misconceptions and misunderstandings in cardiovascular physiology <i>Submitted</i>	58
Chapter 5	An understanding of (mis)understanders: exploring the underlying mechanisms of concept learning using fMRI <i>Submitted</i>	72
Chapter 6	Peer instruction improves comprehension and transfer of physiological concepts: a randomized comparison with self-explanation <i>Published in Advances in Health Sciences Education</i>	90

PART 3: METACOGNITIVE LEARNING

Chapter 7	Putting post-decision wagering to the test: a measure of self-perceived knowledge in basic sciences? <i>Published in Perspectives on Medical Education</i>	110
Chapter 8	Informing the uninformed: a multitier approach to uncover students' misconceptions on cardiovascular physiology <i>Published in Advances in Physiology Education</i>	124
Chapter 9	Refuting misconceptions in medical physiology <i>Published in BMC Medical Education</i>	140

Chapter 10	What were you thinking? Medical students' metacognition and perceptions of self-regulated learning <i>Submitted</i>	156
Chapter 11	General discussion	172
Appendix	Nederlandse samenvatting	188
	Supplementary	194
	References	222
	List of scientific contributions	256
	Dankwoord	260
	Curriculum Vitae	264