



Universiteit
Leiden

The Netherlands

Variables and variable naming in introductory programming education

Werf, V. van der

Citation

Werf, V. van der. (2025, September 2). *Variables and variable naming in introductory programming education*. Retrieved from <https://hdl.handle.net/1887/4259393>

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/1887/4259393>

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

Variables and Variable Naming in Introductory Programming Education

Proefschrift

ter verkrijging van
de graad van doctor aan de Universiteit Leiden,
op gezag van rector magnificus prof.dr.ir. H. Bijl,
volgens besluit van het college voor promoties
te verdedigen op dinsdag 2 september 2025
klokke 13.00 uur

door

Vivian van der Werf

geboren te Tilburg
in 1992

Promotores:

Prof.dr. M.M. Specht (Leiden University; Delft University of Technology; University of Hagen)
Prof.dr.ir. F.F.J. Hermans (Vrije Universiteit Amsterdam)

Co-promotor:

Dr.ir. E. Aivaloglou (Delft University of Technology)

Promotiecommissie:

Prof.dr. M.M. Bonsangue

Prof.dr. S. Verberne

Dr. M.J. van Duijn

Prof.dr. E. Barendsen (Radboud University Nijmegen; Open University of the Netherlands)

Prof.dr. T. Kohn (Karlsruhe Institute of Technology for Computer Science Education)

Copyright © 2024 VIVIAN VAN DER WERF

All rights reserved. No part of this publication may be reproduced, stored in an automated system, or published, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the rights holder.

ISBN : 978-94-6496-445-5

Cover : Wendy Bour-van Telgen

Printer : Gildeprint

The research in this thesis was performed at the Leiden Institute of Advanced Computer Science (LIACS, Leiden University) and the Leiden-Delft-Erasmus Centre for Education and Learning (LDE-CEL, Delft University of Technology).

CONTENTS

Contents	iii
1 Introduction	3
1.1 Research objectives	5
1.2 Research design and sneak preview	6
1.3 Chapter outline	8
1.4 Origin of chapters	10
2 Understanding Students' Code Explanations	13
Abstract	14
2.1 Introduction	15
2.2 Background and related work	16
2.3 Methods	19
2.4 Results	24
2.5 Discussion	32
2.6 Conclusions	36
3 Teachers' Beliefs, Practices, and Observations regarding Variable Naming	37
Abstract	38
3.1 Introduction	39
3.2 Related work	39
3.3 Methodology	42
3.4 Results	45
3.5 Discussion	55
3.6 Conclusion	57
Interview protocol	58
4 Observations from Programming MOOCs	61
Abstract	62
4.1 Introduction	63
4.2 Related work	63
4.3 Methods	64
4.4 Results	65
4.5 Discussion	72
4.6 Conclusion	73
5 Observations from Programming Textbooks	75
Abstract	76
5.1 Introduction	77
5.2 Related work	77
5.3 Methods	79
5.4 Results	81
5.5 Discussion	85
5.6 Concluding remarks	87

6	Designing a Set of Interactive Educational Activities Focused on Naming	89
	Abstract	90
6.1	Introduction	91
6.2	Background	91
6.3	Activities - design & expectations	92
6.4	Workshop - design, setting & data	95
6.5	Workshop - experiences & results	96
6.6	Practical implications	101
6.7	Concluding remarks	102
7	Discussion and Conclusions	105
7.1	Recap of research aim and questions	105
7.2	Key findings in context	105
7.3	Concluding summary	115
	Bibliography	119
	Afterword and acknowledgments	133
	Summary	135
	Samenvatting	137
	Curriculum Vitae	139
	List of publications	141