According to the Doctorate Regulations of the University of Amsterdam, a person who wants to be admitted to candidacy for a doctorate must meet the following requirement: “As proof of his ability to pursue independent academic scholarship, he has written a degree thesis or completed an experimental project of equivalent standard.” I am of opinion that academic scholarship in the context of applied research and development in mathematics and science education is displayed by publications in scientific journals, conference proceedings, and teacher magazines. For this reason, I compiled a monograph from such papers. In these papers I presented outcomes of my applied research and development work aimed at improving the contribution of ICT to inquiry-oriented mathematics and science education at secondary school level. I also hope and expect that secondary school teachers in exact sciences find the doctoral thesis in this way readable and interesting. My independency shows up in the following ways: I paid much attention to the mathematical tools in the integrated computer learning environment and I explored applications in various fields, such as physics, biomechanics, and chemistry. I could nourish to my heart’s content my wide interests in mathematics and natural sciences.

Taking longer than usual to finish one’s thesis has disadvantages. But one advantage is to have a chance of collaborating with many interesting people. As a matter of fact, my thesis work would not have been possible without the contribution and support of so many people in so many ways.

I had a headstart in my thesis work through all the preceding accomplishments of the Physics Education Department headed by Ton Ellermeijer, which had resulted in the development and release of the computer learning environment Coach 4 and Coach Junior. This software and hardware environment, distributed by the Center for Microcomputer Applications (CMA), had already become one of the most popular environments in Dutch secondary physics education. It formed an excellent starting point for my research and development work. As director of AMSTEL, Ton offered me ample opportunity to do this in the last decade. It was not always easy to supervise my work, in particular when my work load slowed down the progress and when I drifted far away in pursuit of successful realizations of ideas. Ton, I very much appreciate that you gave me much freedom in my thesis work, continuously supported me, and shared your knowledge, experience and insight in ICT applications in science education. I have good memories of the international projects and workshops in science education in which we engaged.
Acknowledgments

My work would not have been possible without the unique AMSTEL setting in which researchers, software and hardware developers, technicians, in-service teacher trainers, secondary school teachers, and master students jointly engaged in curriculum innovation, research and development in mathematics, science, and technology education at all levels, ranging from primary school to university. It is a pity that this setting does not exist anymore, but I hope and expect that Ton and my former colleagues Martin Beugel, Vincent Dorenbos, Eva Kędzierska, and Ron Vonk continue the good work of enriching and improving science education with innovative products via the CMA Foundation. I will always feel connected with them.

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as Sheila Tobias once named us in recognition of our contributions to start AMSTEL and make it successful. Our longstanding companionship in professional life was sadly broken when we took different routes after the discontinuation of AMSTEL. I am very, very grateful for the many years that we collaborated in perfect harmony.

Former colleagues of AMSTEL who do not find their names listed above should not feel offended: Each and every colleague has made me feel at home at this institute and has somehow contributed to my thesis work. I thank all of you for the pleasant atmosphere of work.

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André Heck
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