Perspectives on an integrated computer learning environment

Heck, A.J.P.

Citation for published version (APA):

General rights
It is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), other than for strictly personal, individual use, unless the work is under an open content license (like Creative Commons).

Disclaimer/Complaints regulations
If you believe that digital publication of certain material infringes any of your rights or (privacy) interests, please let the Library know, stating your reasons. In case of a legitimate complaint, the Library will make the material inaccessible and/or remove it from the website. Please Ask the Library: https://uba.uva.nl/en/contact, or a letter to: Library of the University of Amsterdam, Secretariat, Singel 425, 1012 WP Amsterdam, The Netherlands. You will be contacted as soon as possible.
# Contents

1 Introduction
   1.1 Educational Context ........................................ 2
   1.2 R&D at AMSTEL ............................................. 13
   1.3 Multiformity of ICT Tools .................................. 15
   1.4 Aims and Set-Up of the Study .............................. 18
   1.5 Structure of the Thesis .................................... 24

2 Classroom Studies ............................................ 25
   2.1 Introduction ................................................. 26
   2.2 Student Work with Real Data about Human Growth ........ 30
   2.3 Computer-Based Investigations of Mathematical Shapes of Real Objects
       2.3.1 Image Analysis of Bridges and Hanging Chains .......... 37
       2.3.2 Modeling Shapes of Bridges and Hanging Chains ........ 41
   2.4 Video Analysis of Human Locomotion ........................ 44
       2.4.1 Gait Analysis in the Classroom ......................... 45
       2.4.2 Gait Analysis in a Masterclass .......................... 51
   2.5 Video-Based Practical Work at Pre-Vocational Secondary School Level 56
   2.6 Spreadsheet-Based Data Handling ........................... 62
       2.6.1 Survival Analysis of Censored Clinical Data by Students 62
       2.6.2 Handling Weather Data .................................. 67
   2.7 Computer-Based Modeling in Quantitative Pharmacology ...... 74
   2.8 Video Analysis and Modeling of Bouncing Balls ............ 83

3 Computer Tools for Cross-Disciplinary Work with Real Data ............... 99
   3.1 Overview of Activity Types ................................ 100
       3.1.1 Data Logging ........................................... 102
       3.1.2 Control ............................................... 103
       3.1.3 Digital Image and Video Analysis ....................... 104
       3.1.4 Modeling and Simulation ................................ 108
       3.1.5 Animation ............................................. 111
   3.2 Digital Image and Video Analysis ........................... 114
       3.2.1 Image Analysis of a Hanging Slinky .................... 115
       3.2.2 Perspective Correction Applied in Crime Scene Photography 118
       3.2.3 Using High Speed Video to Study Moving Coins .......... 122
   3.3 Modeling ..................................................... 127
       3.3.1 Modeling Chemical Kinetics Graphically ................ 127