

Index

- Action 3, 8, 11, 14, 22-28, 41-47, 49, 64, 65-78, 80, 97, 126-138, 152, 195, 205-216, 223, 229, 232-238, 246, 255, 256
 - action networks 78
 - action regulation 205-215
 - action theory 205
- Bayesian approach 181
- Categories 3, 8, 10-17, 23, 27, 31-40, 56, 57, 74, 81, 96, 98, 107-115, 142, 155, 170-175, 191, 194-203, 206-214, 223, 227, 237-241, 257, 258
 - Category-based analysis (CBAV) 8, 28, 31-38, 96-102, 191, 205, 222-230
- Classification 9-16, 41, 69, 72, 108-113, 155, 184, 244, 255, 257
 - of labwork tasks 9-11
- Cognitive 3, 13-15, 23, 28, 32, 34, 50, 51-64, 65-78, 82-89, 91-103, 134, 136, 182, 193-204, 205-217, 225, 229, 233, 236
 - Cognitive state 206, 243-253
 - Mental representation 192, 243-254
- Complexity 4, 28, 40, 49, 50, 93-103, 134, 206-210, 257
- Computer 5, 8, 18, 34, 36, 44, 123, 125, 171, 191, 192, 193-204, 205-217, 219-229, 231-242, 254, 259
 - Computer model building (MBS) 36, 38, 191, 208-216, 219-230, 237
 - Computer simulation 243, 244
 - Computer-based laboratory (MBL) 32, 36, 191, 208-216, 219-230
- Concept map 24, 28, 90, 191, 205-217, 221
- Content analysis 32, 39, 79, 163, 165-169
- Doing and learning 65, 67
- Doing and thinking 65
- Effectiveness of Labwork 6, 7, 9-19, 21-30, 33, 38, 50, 219
- Epistemology 48, 126, 131, 151-161, 162, 257, 258
 - Epistemological understanding 4, 24, 27, 41, 48, 178
 - Image of science 105-115, 126
 - Metaknowledge 128, 135
 - Nature of theory 8, 42-46, 163, 181
- Error 29, 48, 73, 75, 87-90, 123-138, 163, 168-178, 179-190, 212, 216, 258
 - Instrument readings 179, 183, 184
 - Metrological approach 190
- Experiment 4, 28, 32-39, 45, 49, 51-63, 65-77, 79-89, 92-96, 105-116, 121-138, 144, 145, 163, 173, 182-185, 191, 192, 194-204, 205-216, 219-229, 231-242, 243, 255-258
 - Experimental activities 21, 63, 83, 105-118, 194, 203, 241
 - Experimental process 121-131, 258
- Explanation 13-16, 27, 28, 41-47, 63, 67-75, 84, 101, 109-116, 124, 142, 189, 198, 199, 236, 244-252
 - Causal explanation 243-253
 - Nature of explanation 8, 42, 46
 - Scientific explanation 16, 244
- Graphs 22, 24, 36, 43, 44, 108, 123, 138, 166-171, 183, 193-204, 212, 219-228, 239-241
 - Computer-based graphing 204
 - Graphing skills 193-204
- Intended learning outcomes 13, 17, 157
- Interactive 191, 192, 193-202, 219-224
 - Interactive simulation 243-253
- Interviews 24-28, 41, 42, 65-75, 83, 84, 92, 122, 140-147, 151-161, 165-173, 183, 192, 197-203, 246
- Investigation strategy 121, 124
- Knowledge
 - Conceptual knowledge 2, 4, 24, 66-75, 79, 88, 121, 131, 192, 210, 255-258
 - Epistemological knowledge 3, 24, 119, 121-135
 - Mathematical knowledge 36, 91, 217, 223
 - Metaknowledge *See* Epistemology
 - Physics knowledge 8, 33-38, 91, 92, 223, 226, 238, 239
 - Procedural knowledge 3, 21, 28, 65-75, 79-89, 162, 193, 258
 - Technical knowledge 33-36, 223
 - Verbalised knowledge 31-36, 223, 237-239
- Labguide 4, 32-38, 94-102, 207-216, 219-229
- Laboratory Dimensions Inventory (LDI) 11
- Laboratory Structure and Task Analysis Inventory (LAI) 10-19, 32

- Labwork
 aims, goals 41, 51, 56
 Context 28, 31-38, 94, 223, 225
 Role of 1, 51
 Traditional labwork 51-63, 92
- Levels
 of modelling 54-62
- Linking of theory and experiment 193, 201, 219-229
- Measurement
 Repeated 44, 182
 Single 163, 181-190
 Uncertainty 43, 144, 163, 172, 179-190
- Model
 Behaviour model 123-137
 Black box model 123, 132
 Materialised model 192, 232-241
 Mathematical model 16, 123
 Model of object 123-138
 Modelling 4, 5, 23, 36, 40, 50, 51-64, 80, 129, 162, 163, 179-184, 191, 192, 207-217, 219-229, 231-242, 244, 255-258
 Simulated model 22, 123
- Objects and events 28, 34, 54-63, 105-116, 192, 219, 231-241
- Open-ended
 Investigation 42, 120, 139-149
 Labwork 4, 45, 47, 119, 120, 124, 134, 144
- Process
 Experimental *See* Experiment
 Scientific 121-128
 Simulated 246
 Theoretical 123-131
- Profile of a labwork task 9-19
- Project 2-5, 7, 11, 19, 24, 27, 33, 42, 47, 51, 56, 84, 92, 96, 119, 121-137, 139-150, 167, 237, 258
- Mini-Projects 24, 120, 139-150, 220, 221
- Textbooks 4, 11-20, 39, 50, 76, 88, 105-118, 127, 131, 132, 165-167, 181
- Theories and models 54, 63, 192, 231-236, 241
- Theory and Experiment 130, 137, 182, 186, 219-229
- Transcript-based analysis 97, 102
- Tutor 28, 35-38, 65, 66, 92-101, 120, 151-161, 173, 207-215, 219-229, 259
- Verbalisation 28, 33-38, 96-102, 212, 223-226, 237-242
- Video data of labwork 31, 209-211
- Categorie-based analysis (CBAV) *See* Categories

Teaching and Learning in the Science Laboratory

Psillos, D.; Niedderer, H. (Eds.)

2002, X, 270 p., Hardcover

ISBN: 978-1-4020-1018-7