

Contents

Editors' Foreword	v
Contents	vii
List of Contributors	xix
Section 1: The Enabling Technologies	1
Section 1.1: Enabling Technologies	3
1 A Typology of Learning Object Repositories	5
<i>R. McGreal</i>	
1.1 Background	5
1.1.1 Reuse and Repurposing	6
1.1.2 Federated Searches and Harvesting	7
1.1.3 Learning Object Criticisms	7
1.2 Types of LORs	8
1.3 LOR Features	21
1.4 Discussion	22
1.5 Conclusion	25
1.5.1 What Types of LORs Are Available on the Internet?	25
1.5.2 What Are the Principal Features of These LORs?	25
1.5.3 What Features Are More or less Universal and Which Are Specific to Certain Types?	25

1.5.4	With the Vast Amounts of Information Available on the Internet, Is There a Need for LORs?	26
References	26
2	Adaptive Hypermedia	29
	<i>P. De Bra</i>	
2.1	Introduction	29
2.2	Adaptation Methods in Educational Hypermedia	31
2.3	Overlay User Models	34
2.3.1	Registering Changes in Learners' Knowledge	35
2.3.2	Deducing Knowledge About Higher Level Concepts	36
2.3.3	Which User Model State to Use in Adaptation?	39
2.4	Adaptation to Other Aspects Besides Knowledge	40
2.4.1	Adaptation to Learning Styles	41
2.4.2	Adaptation to the Browsing Environment	42
2.5	Summary/Conclusions	43
References	44
3	Ontologies and Semantic Web for E-Learning	47
	<i>D. Dicheva</i>	
3.1	Introduction	47
3.2	Overview of WBES	48
3.2.1	WBES at a Glance	48
3.2.2	Semantic WBES	50
3.3	Ontologies in Education	54
3.3.1	The O4E Ontology	55
3.3.2	The Ontologies for Education Portal	58
3.3.3	The OMNIBUS Project: An Ontology of Learning, Instruction and Instructional Design	58
3.4	Topic Maps for E-Learning (TM4L)	59
3.4.1	TM4L Editor	60
3.4.2	TM4L Viewer	61
Acknowledgements	61
References	62
4	Design and Case Studies on Mobile and Wireless Technologies in Education	67
	<i>H. Ogata, G. Li Hui</i>	
4.1	Introduction	67
4.2	Mobile Technologies	68

4.2.1	Mobile Devices	68
4.2.2	Wireless Networks	69
4.2.3	Issues and Limitations.....	71
4.3	Case Studies and Examples.....	73
4.3.1	Learning Theories for Mobile Learning.....	73
4.3.2	Mobile Learning Applications	73
4.3.3	Mobile Language Learning Applications.....	74
4.4	Conclusion and Further Research	76
	References	76
5	Ambient Intelligence and Ubiquitous Computing	79
	<i>M. Bick, T.-F. Kummer</i>	
5.1	Introduction and Definitions	79
5.2	Technology	82
5.2.1	Technology Trends	83
5.2.2	Sensors	83
5.3	Architectures.....	84
5.4	Standards.....	86
5.5	Application Areas	88
5.5.1	Logistics	88
5.5.2	Healthcare	89
5.5.3	University Education.....	90
5.6	Ambient Learning	90
5.6.1	Definitions.....	91
5.6.2	Characteristics	92
5.6.3	Learning Concepts	93
5.6.4	Recent Developments	94
5.7	Conclusion and Further Research	95
	References	96
6	Designing Contextualized Learning.....	101
	<i>M. Specht</i>	
6.1	Introduction.....	101
6.2	Contextualized Learning.....	102
6.3	Designing Contextualized Learning Support for Field Trips: RAFT Project	103
6.3.1	Prototyping and Scenario Based Analysis	104
6.3.2	Functional Analysis and Role Model Design.....	105
6.3.3	Information Architecture and Use Case Analysis	107
6.4	Conclusions.....	109
	References	110

7	Virtual and Augmented Reality.....	113
	<i>D. Fabri, C. Falsetti, A. Iezzi, S. Ramazzotti, S. Rita Viola, T. Leo</i>	
7.1	Introduction.....	113
7.2	Virtual Reality and Augmented Reality Versus Pedagogical Models.....	114
7.3	Review of the Main Enabling Technologies.....	119
7.3.1	Virtual Engine.....	120
7.3.2	Input/Output Devices	123
7.3.3	Interaction and Reactive Feedback Devices	124
7.4	Some Relevant Applications to E-Learning	124
7.5	Perspectives	128
	References	129
	Section 1.2: Enabling Interoperability and Re-Use	133
8	Learning Design: Concepts.....	135
	<i>R. Koper, S. Bennett</i>	
8.1	Introduction.....	135
8.2	High Quality Learning Designs	136
8.3	Applying the Learning Designs in Online Courses	138
8.4	The IMS Learning Design Specification	140
8.4.1	Introduction.....	140
8.4.2	The Requirements	140
8.4.3	The Conceptual Model.....	141
8.4.4	The Information Model and XML Binding	145
8.5	Interpreting IMS LD	147
8.6	Conclusion	148
	Acknowledgement.....	150
	References	150
9	Competence Models in Technology-Enhanced Competence-Based Learning	155
	<i>D. Sampson, D. Fytros</i>	
9.1	Introduction.....	155
9.2	The Concept of Competence.....	158
9.2.1	Historical Origins.....	158
9.2.2	Competence Definition: A Literature Review	160
9.2.3	Competence Development	162
9.2.4	Towards a Unified Definition of Competence.....	163
9.2.5	Competence Models.....	166

9.3	Competence Specifications and Discussion.....	169
9.4	Conclusions.....	173
	Acknowledgements.....	174
	References	174
10	Learner Modelling Through Analyzing Cognitive Skills and Learning Styles.....	179
	<i>S. Graf, Kinshuk</i>	
10.1	Introduction	179
10.2	Identifying Individual Differences	181
10.2.1	Identifying Cognitive Traits	182
10.2.2	Identifying Learning Styles	184
10.2.3	Relationship Between Cognitive Traits and Learning Styles.....	186
10.3	Providing Adaptivity	188
10.3.1	Adaptivity Based on Cognitive Traits	188
10.3.2	Adaptivity Based on Learning Styles	190
10.4	Conclusion.....	191
	References	192
11	Turning Potentials into Reality: Achieving Sustainable Quality in E-Learning Through Quality Competence	195
	<i>U.-D. Ehlers</i>	
11.1	Introduction	195
11.2	E-Learning Quality: A Field of Great Diversity.....	197
11.3	Methodology and Instruments to Develop Quality for E-Learning	199
11.3.1	Quality Management Approaches	200
11.3.2	Quality Assessment on the Basis of Criteria Lists and Checklists.....	200
11.3.3	Evaluation Approaches for E-Learning.....	201
11.3.4	Standards for Quality and E-Learning.....	201
11.3.5	Further Quality Approaches for E-Learning	202
11.4	Quality Literacy: Competencies for Sustainable Quality Development	203
11.4.1	The Four Dimensions of Quality Literacy	205
11.5	Quality Development in Education and E-Learning: A Negotiation Process	208
11.6	Summary and Conclusion	212
	References	213

12 Integration of Learning and Working: Convergent Processes and Systems.....	217
<i>J.M. Pawlowski, M. Bick</i>	
12.1 Introduction	217
12.2 Integration	219
12.2.1 Process Integration	220
12.2.2 Process Integration Using Reference Models and Standards	220
12.3 Systems Integration Based on Learning Technology Standards.....	225
12.4 A Step-by-Step Guide Towards Process and Systems Integration Based on Standards.....	227
12.4.1 Application Scenario	228
12.4.2 Awareness Building and Context Setting.....	229
12.4.3 Process Analysis and Redesign	230
12.4.4 Designing Shared Services and Systems.....	231
12.4.5 Integrating Data and Information	232
12.5 Conclusion.....	233
References	234
 Section 2: The E-Pedagogy.....	237
 13 Bridging the Gap Between Face-to-Face and Cyber Interaction in Holistic Blended Learning Environments.....	239
<i>N.-S. Chen, C.-W. Wei, Kinshuk, Y.-R. Chen, Y.-C. Wang</i>	
13.1 Introduction	240
13.2 Literature Review	242
13.2.1 Blended Learning	242
13.2.2 Classroom Climate	243
13.2.3 Learning Effectiveness	244
13.2.4 Classroom Climate and Learning Effectiveness	244
13.3 Research Methodology.....	245
13.4 Result and Discussion	248
13.4.1 Classroom Climate	249
13.4.2 Learning Satisfaction.....	250
13.4.3 Test Scores	251

13.4.4	The Correlation Between Classroom Climate and Learning Effectiveness	252
13.5	Conclusion.....	252
	Acknowledgement.....	253
	Appendix	253
	References	257
14	Complex Domain Learning	261
	<i>J.M. Spector</i>	
14.1	Introduction	261
14.2	Complex Domains.....	263
14.3	E-Learning.....	267
14.4	E-Learning in Complex Domains.....	268
14.5	Assessment and Evaluation.....	270
14.6	Future Developments	271
	References	272
15	Communities of Practice.....	277
	<i>P. Reimann</i>	
15.1	Introduction	277
15.2	Learning as Participation.....	278
	15.2.1 Types of CoPs	279
	15.2.2 Online Communities, Virtual Communities.....	280
15.3	CoP as a Metaphor for Online Design.....	283
	15.3.1 Guideposts for Design.....	284
	15.3.2 Frameworks for Design.....	285
15.4	Current Research	288
	15.4.1 Limitations of CoPs.....	288
	15.4.2 Limits to the Instructional Use of CoPs	289
	References	290
16	Business Models for the Sustainable Implementation of E-Learning at Universities	295
	<i>D. Euler, S. Seufert, F. Zellweger Moser</i>	
16.1	Point of Departure and Presentation of Problem.....	295
16.2	Business Models at Universities.....	297
16.3	Business Models from a University Perspective.....	300
	16.3.1 Product/Market Combinations: Which Products and Services Are Offered in Which Markets?.....	300

16.3.2	Value Generation Chain: Which Tasks and Processes Need to Be Accomplished for Product/Service Provision Purposes?	304
16.3.3	Funding and Income Models: How Can Economic Viability Be Assured?	308
16.4	Formation and Application of Frame of Reference.....	310
16.5	Thinking in Business Models: The Beginning of the End?.....	312
	References	313
17	The Role of Competence Assessment in the Different Stages of Competence Development	317
	<i>J. Schoonenboom, C. Tattersall, Y. Miao, K. Stefanov, A. Aleksieva-Petrova</i>	
17.1	Introduction	317
17.2	What Are Competence Development and Competence Assessment?	319
17.2.1	Competence Development	319
17.2.2	Competence Assessment	320
17.3	Processes in Competence Development and Competence Assessment.....	322
17.3.1	Perspectives on Processes in Competence Development	323
17.3.2	Perspectives on Processes in Competence Assessment	325
17.4	Integrating Competence Assessment and Competence Development	327
17.4.1	The Cycle of Competence Development.....	327
17.4.2	Assessment Forms Within the Cycle of Competence Development	330
17.5	Assessment in the Four Stages of Competence Development	332
17.5.1	Stage 1: Orientation.....	332
17.5.2	Stage 2: Evidence Collection by the Learner	333
17.5.3	Stage 3: Assessment by Others	334
17.5.4	Stage 4: Performing Competence Development Activities	337
17.6	Conclusions	339
	Acknowledgements	339
	References	339

Section 3: The Organisational Perspective.....	343
18 The Future of E-Learning in Schools	345
<i>G. Bull, T. Hammond</i>	
18.1 Twentieth Century Learning	346
18.2 Educational Technology and Instructional Practice in E-Learning.....	346
18.3 Web 2.0 and the Possibilities for E-Learning 2.0.....	348
18.4 The Future of E-Learning in K-12 Education: E-Learning 2.0.....	349
18.4.1 Teachers as well as Students Must Be Fluent with the Medium	350
18.4.2 Pedagogy Must Be Adapted to the New Environment, While Satisfying Existing Curricular Goals	351
18.4.3 Student- and Teacher-Generated Content Will Become Significant Beyond the Classroom	354
18.4.4 Teachers Will Have the Tools to Exercise Greater Control Over Their Instructional Design.....	357
18.4.5 Teachers Will Be Able to Engage in an Accelerated Level of Peer-to-Peer Collaboration	358
18.5 Conclusion.....	359
References	360
19 An Executable Model for Virtual Campus Environments	363
<i>G. Paquette, F. Magnan</i>	
19.1 Introduction	363
19.2 Revisiting Virtual Campus Models	365
19.2.1 A First Virtual Campus Model.....	365
19.2.2 The Explor@ Implementation of the Virtual Campus Model	369
19.2.3 Values and Limits of the Explor@ Implementation of the Virtual Campus Model.....	370
19.3 Vision and Orientation for a New Virtual Campus Model	372
19.3.1 Major Innovations and Trends	372
19.3.2 Orientation Principles.....	375
19.3.3 System's Levels and Main Actors.....	377

19.4	A Virtual Campus Framework and an Ontology for TELOS	379
19.4.1	Main Operations and Actors in the Virtual Campus Model	379
19.4.2	A Service-Oriented Framework for the Virtual Campus Model	382
19.4.3	The Virtual Campus Model as an Ontology	384
19.5	The TELOS Software Architecture	385
19.5.1	TELOS Aggregates and Scenarios	387
19.5.2	Technological Backend	390
19.5.3	Semantic Referential Services	391
19.6	Cases	393
19.6.1	Aggregating Components Services	393
19.6.2	Building an E-Learning Platform	396
19.6.3	Designing an E-Learning Environment	398
19.7	Conclusion: Expected Benefits for E-Learning Environments	400
	References	401
20	Corporate Universities	405
	<i>V. Zimmermann</i>	
20.1	Business Drives Learning in Corporate Universities	405
20.2	Business View: The Role and Tasks of a Corporate University Today	407
20.3	The User's View: How People Want to Learn	409
20.4	The Future Path of Corporate Universities	414
20.5	Conclusion	420
	References	420
21	Lessons from Africa	423
	<i>J. Cronje</i>	
21.1	Introduction	423
21.2	Why ICT for Education in Africa?	424
21.2.1	The Problems	424
21.2.2	The Opportunities	425
21.3	The Literature	426
21.3.1	Outsourcing	426
21.3.2	Offshoring	426
21.3.3	Open-Sourcing	427
21.3.4	Insourcing	427

21.3.5	Supply Chaining.....	428
21.3.6	Informing.....	428
21.4	Lessons Learnt the Hard Way	429
21.5	Ten Case Studies	431
21.5.1	Learners Learn by Doing.....	431
21.5.2	Learners Produce Learning Materials	431
21.5.3	Schools Develop Their Own Software and Websites	432
21.5.4	Research Done by Learners.....	432
21.5.5	Focus on Learning, Not on Technology	432
21.5.6	Computers Across the Curriculum: Integrated and Thematic	432
21.5.7	Educator Training.....	433
21.5.8	Community Involvement, Outreach and Sharing.....	433
21.5.9	Focus on Girls	433
21.5.10	International Links	433
21.5.11	Future Plans	434
21.6	Contextualizing Computers for Developing Countries	434
21.6.1	Import	435
21.6.2	Transfer	436
21.6.3	Apply	436
21.6.4	Contextualize.....	436
21.7	Conclusions	436
	References	437
22	The African Virtual University	439
	<i>P. Bateman</i>	
22.1	Introduction	439
22.2	A Short History	440
22.3	Adapting to a Changing Educational Environment.....	441
22.4	The AVU In-Country Strategy	446
22.5	The AVU Capacity Enhancement Program	447
22.6	The AVU Learning Architecture.....	449
22.7	The Dual Challenges of Connectivity and Bandwidth	451
22.8	The AVU Open Educational Resources (OER) Strategy	453
22.9	Conclusion.....	456
	References	459
	Index.....	463