## Contents

### Section I  Foundations
J. Michael Spector and M. David Merrill

1 Bridging Learning Theories and Technology-Enhanced Environments: A Critical Appraisal of Its History .................................................. 3  
Joost Lowyck

2 Research Paradigms and Perspectives on Learning ............................................. 21  
Jeroen J.G. van Merriënboer and Anique B.H. de Bruin

3 Research-Based Instructional Perspectives ........................................................... 31  
Gary R. Morrison and Steven M. Ross

4 Cousins but Not Twins: Instructional Design and Human Performance Technology in the Workplace .......................................................... 39  
Wellesley R. Foshay, Steven W. Villachica, and Donald A. Stepich

5 Implications of Neuroimaging for Educational Research .................................... 51  
Pavlo D. Antonenko, Tamara van Gog, and Fred Paas

6 Emotions and Motivation in Learning and Performance ..................................... 65  
ChanMin Kim and Reinhard Pekrun

7 Instructional Design Models ................................................................................... 77  
Robert Maribe Branch and Theodore J. Kopcha

8 The Impact of Technology and Theory on Instructional Design Since 2000 ............................................................................ 89  
Scott Joseph Warren, Jennifer Lee, and Anjum Najmi

9 The Technological Pedagogical Content Knowledge Framework .......................... 101  
Matthew J. Koehler, Punya Mishra, Kristen Kereluik, Tae Seob Shin, and Charles R. Graham

10 Ethics of Educational Technology ........................................................................ 113  
Stephanie L. Moore and James B. Ellsworth

### Section II  Methods
Jan Elen and M.J. Bishop

11 Educational Design Research ............................................................................... 131  
Susan McKenney and Thomas C. Reeves

12 Design and Development Research .................................................................... 141  
Rita C. Richey and James D. Klein

13 Practices and Potential of Activity Theory for Educational Technology Research ........................................................................ 151  
Turkan Karakus
14 Action Research for Educational Communications and Technology .................. 161
Meghan McGlinn Manfra and Daniel Kelvin Bullock

15 Trends and Issues in Qualitative Research Methods ................................. 173
Marcia A. Mardis, Ellen S. Hoffman, and Peter J. Rich

16 Program and Project Evaluation .................................................................. 195
J. Michael Spector

17 Tools for Analyzing Quantitative Data ........................................................... 203
Gerald A. Knezek and Rhonda Christensen

18 Tools for Analyzing Qualitative Data: The History and Relevance of Qualitative Data Analysis Software ................................................................. 221
Linda S. Gilbert, Kristi Jackson, and Silvana di Gregorio

Section III Assessment and Evaluation
J. Michael Spector and M. David Merrill

19 Assessing the Costs and Benefits of Educational Technology .................... 239
Thomas F. Luschei

20 Planning a Program Evaluation: Matching Methodology to Program Status ................................................................. 249
Jennifer Hamilton and Jill Feldman

21 Perspectives on Assessment of Educational Technologies for Informal Learning ........................................................................... 257
Wilhelmina C. Savenye

22 Assessing Problem Solving ........................................................................... 269
David H. Jonassen

23 Model-Based Tools for Knowledge Assessment .............................................. 289
Dirk Ifenthaler and Pablo Pirnay-Dummer

24 Performance Assessment: Something Old, Something New ....................... 303
Dee H. Andrews and Wallace H. Wulfeck II

25 Formative and Stealth Assessment ................................................................ 311
Valerie J. Shute and Yoon Jeon Kim

26 Evaluation of ICT Competencies ................................................................ 323
Agustin Tristán-López and Miguel Angel Ylizaliturri-Salcedo

27 Data-Driven Decision Making in the K-12 Classroom .................................. 337
Trent E. Kaufman, Charles R. Graham, Anthony G. Picciano, J. Aaron Popham, and David Wiley

Section IV General Instructional Strategies
Jan Elen and M.J. Bishop

28 The Presence of Culture in Learning .............................................................. 349
Patricia A. Young

29 Learning Ability Development in Flexible Learning Environments .............. 363
Saskia Brand-Gruwel, Liesbeth Kester, Wendy Kicken, and Paul A. Kirschner

30 Instructional Message Design: Past, Present, and Future Relevance ............. 373
M.J. Bishop
31 Multimedia Instruction ................................................................. 385
Richard E. Mayer

32 Authentic Learning Environments ............................................. 401
Jan Herrington, Thomas C. Reeves, and Ron Oliver

33 Feedback Models for Learning, Teaching and Performance .......... 413
Elizabeth K. Molloy and David Boud

34 Advanced Technologies for Personalized Learning, Instruction,
and Performance .............................................................................. 425
Mieke Vandewaetere and Geraldine Clarebout

35 Computer-Supported Collaborative Learning: Instructional Approaches,
Group Processes and Educational Designs ........................................ 439
Peter Goodyear, Chris Jones, and Kate Thompson

36 Inquiry Learning ............................................................................. 453
Ard W. Lazonder

37 Model-Based Learning and Performance ...................................... 465
Norbert M. Seel

38 Game-Based Learning ..................................................................... 485
Sigmund Tobias, J. Dexter Fletcher, and Alexander P. Wind

39 Scaffolding: Definition, Current Debates, and Future Directions ...... 505
Brian R. Belland

40 Support Device Usage .................................................................... 519
Geraldine Clarebout, Jan Elen, Lai Jiang, Griet Lust,
and Norma A. Juarez Collazo

Section V  Domain-Specific Strategies and Models
M. David Merrill and Jan Elen

41 Technology-Enhanced, Modeling-Based Instruction (TMBI)
in Science Education ........................................................................ 529
Ji Shen, Jing Lei, Hsin-Yi Chang, and Bahadir Namdar

42 Cognitive Task Analysis for Expert-Based Instruction in Healthcare .. 541
Richard Clark

43 Mathematics Education ................................................................. 553
Lieven Verschaffel and Brian Greer

44 Innovation and Research on Engineering Education .................... 565
Erik de Graaff and Anette Kolmos

45 Educational Technology in Social Studies Education .................. 573
Timothy Green, Jennifer Ponder, and Loretta Donovan

46 Visual Arts Education ...................................................................... 583
Barbara B. Lockee and Feihong Wang

47 Technologies That Support Students’ Literacy Development .......... 591
Carol McDonald Connor, Susan R. Goldman, and Barry Fishman
Section VI  Design, Planning, and Implementation
J. Michael Spector and M. David Merrill

48 Instructional Design Models ................................................................. 607
Andrew S. Gibbons, Elizabeth Boling, and Kennon M. Smith

49 Change Agency in Learning, Instruction, and Performance ................. 617
Michael Ramon Savoy and Alison A. Carr-Chellman

50 Policies Governing Educational Technology Practice and Research .......... 627
Phillip Harris and Donovan R. Walling

51 Student-Centered, Open Learning Environments: Research, Theory, and Practice .............................................................. 641
Michael J. Hannafin, Janette R. Hill, Susan M. Land, and Eunbae Lee

52 Preparing Instructional Designers: Traditional and Emerging Perspectives .. 653
Monica W. Tracey and Elizabeth Boling

53 Technology-Based Instructional Design: Evolution and Major Trends ........ 661
Gilbert Paquette

Section VII  Emerging Technologies
M.J. Bishop and Jan Elen

54 Advancing Children’s Engineering Through Desktop Manufacturing ........ 675
Glen Bull, Jennifer Chiu, Robert Berry, Hod Lipson, and Charles Xie

55 Supporting Learning with Interactive Surfaces and Spaces .................. 689
Michael A. Evans and Jochen Rick

56 Smart Toy Based Learning ................................................................. 703
Kursat Cagiltay, Nuri Kara, and Cansu Cigdem Aydin

57 e-Books for Educational Uses .......................................................... 713
Ann-Louise Davidson and Saul Carliner

58 Situated Learning in Virtual Worlds and Immersive Simulations .............. 723
Lisa Dawley and Chris Dede

59 Augmented Reality Teaching and Learning ....................................... 735
Matt Dunleavy and Chris Dede

Yu-Chang Hsu, Yu-Hui Ching, and Barbara L. Grabowski

61 Pedagogical Agents ............................................................................. 759
George Veletsianos and Gregory S. Russell

62 Adaptive Technologies ........................................................................ 771
Sabine Graf and Kinshuk

63 Open Educational Resources: A Review of the Literature ..................... 781
David Wiley, T.J. Bliss, and Mary McEwen

64 Enhancing Learning with Visualization Techniques ............................. 791
Joris Klerkx, Katrien Verbert, and Erik Duval

65 Emerging Representation Technologies for Problem Solving ................. 809
Ton de Jong
Section VIII Technology Integration
M.J. Bishop and J. Michael Spector

66 Generational Differences and the Integration of Technology in Learning, Instruction, and Performance ........................................... 819
   Eunjung Oh and Thomas C. Reeves

67 Measuring Technology Readiness and Skills .................................. 829
   Rhonda Christensen and Gerald A. Knezek

68 Technology Integration in Schools .................................................. 841
   Randall S. Davies and Richard E. West

69 Synthesis of Recent Literature on Educational Technologies in Medical Curricula ......................................................... 855
   Tiffany A. Koszalka, John W. Epling, and Jennifer Lynn Reece-Barnes

70 Technology Integration in Multicultural Settings ................................ 867
   Konrad Morgan

Section IX A Look Forward
M. David Merrill and Jan Elen

71 The Philosophy of Science and Educational Technology Research ........ 875
   Sebnem Cilesiz and J. Michael Spector

72 ICT in Developing Countries: Policies, Implementation, and Impact ........ 885
   Robert B. Kozma and Wayan Surya Vota

73 Prospects for Instructional Design and Teacher Education .................. 895
   Ellen S. Hoffman

74 Fostering Relevant Research on Educational Communications and Technology .......................................................................... 909
   Martin Oliver

Epilogue ........................................................................................................... 919

About the Authors .......................................................................................... 925

Glossary ............................................................................................................ 953

Index ............................................................................................................... 965
Handbook of Research on Educational Communications and Technology
Spector, J.M.; Merrill, M.D.; Elen, J.; Bishop, M.J. (Eds.)
2014, XXXV, 1005 p. 146 illus., 57 illus. in color., Hardcover
ISBN: 978-1-4614-3184-8