TABLE OF CONTENTS

Foreword
Preface
 Acknowledgment

Section 1
Cognition and Visual Literacy

This section discusses essential notions pertaining to cognitive and visual thinking. As cognitive mental activities support us in acquiring knowledge with the use of our senses, thoughts, and exposure to nature, authors of this section’s chapters inquire into the sensory and cognitive functions that seem to be necessary in understanding and learning processes.

Chapter 1
Teaching and Learning Science as a Visual Experience
Anna Ursyn, Computer Graphics, University of Northern Colorado, USA

Chapter 2
Exploring Perception, Cognition, and Neural Pathways of Stereo Vision and the Split Brain Human Computer Interface
Greg P. Garvey, Quinnipiac University, USA

Chapter 3
Better Visualization Through Better Vision
Michael Eisenberg, Department of Computer Science and Institute of Cognitive Science, University of Colorado, Boulder, USA

Chapter 4
Visual Approach to the 4th Dimension in Mathematics, Computing and Art
Jean Constant, Hermay.org, Switzerland & Santa Fe, NM, USA

Section 2
Visual Communication and Knowledge Visualization

This section describes instances of knowledge visualization in selected areas: biology, mathematics, digital media, and music. Authors present their conceptions of visualization with the use of implements used in their domains.

Chapter 5
Visualization in Biology: an Aquatic Case Study
Maura C. Flannery, St. John’s University, NY, USA

Chapter 6
Visualisation and Communication in Mathematics
Hervé Lehning, AC-HL, France

Chapter 7
Understanding Collage Strategy as a Learning Method and Its Use in Digital Media

Dennis Summers, Strategic Technologies for Art, Globe and Environment, USA

Chapter 8

How We Hear and Experience Music. USA

Robert C. Ehle, School of Music, University of Northern Colorado, USA

Section 3

Computing and Programming

This section delves into selected methods aimed at assisting the learners in acquiring computing and programming skills with the use of video tutorials and metaphorical visualization.

Chapter 9

Using Video Tutorials to Learn Maya 3D for Creative Outcomes: a Case Study in Increasing Student Satisfaction by Reducing Cognitive Load

Theodor Wyeld, Flinders University, Australia

Chapter 10

Metaphors for Dance and Programming: Rules, Restrictions, and Conditions for Learning and Visual Outcomes

Anna Ursyn, Computer Graphics, University of Northern Colorado, USA
Mohammad Majid al-Rifaie, Computer Science, Goldsmiths, University of London, UK
Md Fahimul Islam, Queens College CUNY, NY, USA

Section 4

Educational Applications and Cognitive Learning

The authors of this section provide theoretical and practical materials supporting teaching and learning science.

Chapter 11

Optimizing Students’ Information Processing in Science Learning: a Knowledge Visualization Approach

Robert Zheng, University of Utah, USA
Yiqing Wang, Shanghai Normal University, P.R. China

Chapter 12

Integrative Visual Projects for Cognitive Learning

Anna Ursyn, Computer Graphics, University of Northern Colorado, USA

Chapter 13

The Difference between Evaluating and Understanding Students’ Visual Representations of Scientists & Engineers

Donna Farland-Smith, The Ohio State University, USA
Kevin D. Finson, Bradley University, USA