Foreword

The case studies in this volume offer a rich opportunity for educators across a broad spectrum of educational endeavors, including public schools, medical education, and museum and public exhibitions—and at various age levels and content areas—to develop or enhance their perspectives on the use of 3D technology. A word about perspective is in order here. Visually, in the world of art, there have been two seminal innovations related to perspective. The 15th century architects Leon Battista Alberti (1404-1472) and Filippo Brunelleschi (1377-1446) developed perspective as a technique to represent a three-dimensional object on a two-dimensional medium. Their invention, perspective drawing, requires viewing an object from a single anchoring point and then representing a visual geometry of its length, width, and depth. This formulation of perspective held until the 19th century when the artists developing the Cubist movement—Cezanne and Picasso—complained about the limiting factors of conventional perspective taking. They sought to represent a new way of seeing that extended beyond the rigid boundaries and singular viewpoint of Renaissance perspective drawing. Thus, a typical Cubist painting depicts real objects but not from a fixed viewpoint. Instead, the artist’s rendering provides the viewer with many parts of the subject at one time, viewed from different angles. It is energizing to consider that new 3D technologies offer visual representations and the construction of new worlds that incorporate both the inventions of the 15th century Renaissance artists and the 19th century Cubists. In this casebook you will find insightful information that metaphorically enables developing perspective from a single vantage point of a subject area or grade level or may wish to develop an understanding of new ways of seeing, mixing perspectives from multiple positions afforded by new tools and resources.

Advantageous Anchored Perspectives

The reader may anchor her perspective as an educator teaching at a grade level or on a subject of expertise and explore cases such as “Using Second Life to Teach Collaboration Skills to Preservice and Inservice Special Educators” that report on
the use of the Second Life online virtual world, currently in use at West Virginia University, for simulation activities and role playing exercises in teacher education programs in special education, or “3D Science and Social Studies in Grades 5-6: Virtualization Expanding Instruction,” where the authors note that both the literature review and the classroom research show that students retained content knowledge and possibly improved overall achievement.

One may also locate a vantage point to bring a focus on student outcomes into sharper view. The authors of “Using 3D Virtual Reality Technology in Cyber Ethics Education: How Can We Really Evaluate and Change Students’ Attitudes?” explore the need for a new instructional method that teaches students to use three types of knowledge in their analyses of moral judgment problems: knowledge of ethical codes, Information and Communication Technology (ICT), and rational judgment. The case results reported in “Student Learning Experience through CoSpace Educational Robotics: 3D Simulation Educational Robotics Tool” suggest that CoSpace, a platform for designing and creating robotics simulations, promotes learning of collaborative skills and may provide an authentic context for flow states, a term in the educational psychology literature defining highly productive states of concentration.

Findings from a mixed method study in “Earth System Science in Three Dimensions: Perspectives of Students and Teachers on NASA’s Project 3D-VIEW” indicate that using 3D technologies within a context of standards and research-based curriculum design can improve student engagement as well as performance on standardized tests.

In “Learning to Construct 3D Models in a High School Computer Visualization Class: Enacting a Productive Social Learning Environment,” the authors present a detailed analysis of pedagogical approaches, the learning environment, and students’ performance outcomes. Using the lens of activity theory and design thinking, they conclude that the social learning environment of this particular classroom was a powerful mediator of students’ learning, resulting in high quality modeling products. The combination of didactic, guided practice and exploratory modes of inquiry, self-selected work groupings, and peer designations of expertise that supported multiple problem solving approaches were key factors. The systematic literature elaborated in “Do 3D Pedagogical Agents Help Students Learn Science? A Systematic Review” revealed that 3D pedagogical agents provided more benefits than other instructional approaches in the learning of science.

Educators engaged in clinical and field-based contexts will find informative direction in “Developing 3D Case Studies for Authentic Learning Experiences” that describes the authors’ effort to develop and pilot prototypes of 3D case studies in Second Life for authentic interdisciplinary learning experiences in the health and allied health professions. Results from their quasi-experimental pilot study suggest 3D case studies appear to be an exciting, promising, affordable pedagogy to engage
students in analyzing a real life situation. Librarians at Texas Tech report on their pilot implementation of 3D stereoscopic technologies in “Stereoscopic 3D: Going Beyond Texas Tech University Libraries’ 3D Animation Lab.” The research reported in “Analyzing the Effects of a 3D Online Virtual Museum in Visitors’ Discourse, Attitudes, Preferences, and Knowledge Acquisition” examined the effectiveness of an online three-dimensional learning environment and its effects in visitors’ discourse, attitudes, preferences, and knowledge acquisition during and after a real museum visit. Participants who used the virtual museum previous to the museum visit showed an increase in discourse, enjoyment, and knowledge about the exhibition and the use of a three-dimensional previsualization can enhance and influence the learning experience.

New Ways of Seeing

Finally, one may wish to understand how the new 3D technology tools and resources afford new ways of seeing and specifically and robustly enable, quite literally, views and perspectives not possible, and certainly not accessible, to educators in personal and mobile technologies less than a decade ago. For example, the world’s first stereoscopic 3D document camera prototype, the 3D Ladibug, is quite unique in its ability to facilitate an interactive and constructivist implementation of stereoscopic content in the elementary classroom. In “Taking Elementary Document Camera Use to the Next Dimension: Support Material,” through a blend of anaglyphic and full-color stereoscopic 3D images, the authors’ report students were able to translate this technology into applications with print media, video editing, and live-action presentations, and create working models and products that demonstrated a deeper understanding of concepts. Confirmation that 3D technologies are diffusing throughout education can be found in 3D Technology in P12 Education: Cameras, Editing, and Apps,” and “3D Video Production in Education and in 3D Virtual Worlds as Creative Pedagogy for Art Education: Art Café@Second Life.” The author in this last case calls for a demystification of their potential application in art education and move forward with new eyes on our educational project. Thus, she makes recommendations for future research that examines the 3D VW as a new learning/teaching environment, new art form/medium, new exhibition/creation ground, and emerging curricular topic for inquiry.

We are due. As we draw on the perspective making of the Renaissance inventors and the perspective breaking of the Cubists, artifacts of an analog age, we now enter digital space of 3D potential. New visions of educational invention are in sight—immersive, interactive, manipulatable, multiple perspectives (linear, tubular, angle up, angle down, extrude, fabricate). Imagine! Many new views for many new pedagogies, sites for learning, and a new century of next generation learner, all with
3D technology. This book will provide an anchor to develop perspective and enrich new ways of seeing how to apply and integrate 3D technologies in educational pursuits across a wide range and depth of field.

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