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THE INTERDISCIPLINARY JOURNAL OF PROBLEM-BASED LEARNING

BOOK REVIEW

Learning, Problem Solving, and Mindtools: Essays in Honor of David H. Jonassen

Donna Russell (Capella University)

Spector, J. M., Lockee, B. Smaldino, S. & Herring, M. (Eds.). (2013). *Learning, problem solving, and Mindtools: Essays in honor of David H. Jonassen*. New York: Routledge. 302pp. ISBN 978-0-415-52435-3.

This book is a series of essays on problem-based learning structured around the correlating issues of mental schemas, instructional actualities, and technology-based learning tools. The book is inspired by the research and writings of David H. Jonassen, who died last year. Dr. Jonassen's enormous and pivotal influence on the dialog about and the implementation of problem-based learning is difficult to understand in its totality. However, this book of essays, dedicated to developing that type of holistic understanding of his work, is an excellent way to do exactly that. The chapter's authors are all experts in their fields and provide the reader with a comprehensive case for the why, what, and how of the learning potential of technology-based problem-based learning.

Dr. Jonassen has had a dramatic influence on my conceptual knowledge of learning and problem-based instructional processes. His research and writing about problem-based learning and technology-based learning environments was inspirational to me as a classroom teacher and later as an educational researcher. I had the opportunity to meet and talk with him while he was at the University of Missouri at Columbia. He continues to inspire me to work towards developing new understandings of how technology-based problem-based learning environments can be implemented in varied educational settings.

This book, *Learning, Problem Solving, and Mindtools: Essays in Honor of David H. Jonassen*, is a great resource for continuing his work. It was edited by Michael Spector, Barbara Lockee, Sharon Smaldino, and Mary Herring and includes 17 chapters organized around the topics of learning with technology, design and implementation of problem-based learning environments, and research methodologies for understanding problem-based learning. The first chapter, written by the editors, is an introduction to Mindtools and problem solving, and addresses the issues of complexity in problem solving, technology as a pedagogical tool, critical thinking, and Mindtools (Jonassen, 2000). Dr. Jonassen wrote the final

chapter. Titled "The First Principles of Learning," he fluidly moves the reader through the core distinctions between the learning principles, underlying problem-based learning environments, and traditional learning environments, including discussions of how learning occurs and what types of activities build the development of advanced cognitive processes such as modeling, analogizing, arguing, and reasoning casually to problem solve.

Throughout the book, essays are structured around core themes defining the multi-dimensional contexts for Mindtools including 1) the development of mental models through Mindtools, 2) the affordances of technologies to represent visual understanding as an aspect of innovation in education, 3) the process of developing critical thinking and problem-solving through meditational tools, and 4) the integration of Mindtools into teaching and learning.

In the chapters focused on the development of mental models through Mindtools the essays explain the multi-dimensional contexts for Mindtools. In Chapter 2, Seel, Ifenthaler, and Pirnay-Dummer discuss the psychological aspects of the development of useful mental models including an interesting review of the mental models relevant to invention, such as a beam search as a method to sort through potential solutions. In Chapter 3, Wilson reviews the learning, complexity and problem solving from an instructional design perspective. He thoroughly reviews aspects that impact the design of problem-based learning environments and their influence on learning such as coherence to cognitive theory in the design of unit. In Chapter 4, Reeves reviews these issues from the perspective of developing problem-based learning in healthcare.

In the chapters focused on developing the second theme, the affordances of technologies to support the development of advanced learning processes, the authors are able to define a thorough representation of the many aspects of technology that can support the development of simulations as problem-

based learning environments including a discussion of the need for large scale design and development of simulations. In Chapter 5, Warren and Wakefield discuss how educational simulations, games, and virtual worlds can support and increase the potentiality of the development of critical thinking through the integration of complex ill-structured problems in the virtual learning environment. In Chapter 6, Kirschner and Wopereis develop the process of using Web 2.0 as a collaborative online learning environment to increase the community of practice among teachers. In Chapter 7, Laffey, Schmidt, and Galyen discuss 3D virtual learning environments as a forum to increase motivation and engagement through meaningful activities that encourage problem solving structured around a new Theory of Transformational Play. In Chapter 8, Wijekumar and Meyer review and redefine the principles of media affordances in Jonassen's book *The Technology of Text: Principles for Structuring, Designing, and Displaying Text* (1982) by relating a web-based intelligence tutoring system (ITSS) to its use as a Mindtool to develop reading comprehension abilities.

In the third theme, the essays are focused on the theme of the development of critical thinking and problem solving. In Chapter 9, Tan assesses the impact of Jonassen's research on two types of related research, the design experiment and the theory-based approach to understand instructional design. Hannafin, in Chapter 10, defines the separation and the connections between theory and design in responding to the learner's needs to augment the design of self-regulated learning environments such as problem-based learning units. In Chapter 11, Hung develops the concepts of structures for learning in problem solving environments including concept mapping, influence drawings and systems modeling. In Chapter 12, Lee and Murcia discuss how students undergo conceptual change formatively and summatively as ongoing aspects of learning resulting from problem-based learning. In Chapter 13, Land, Smith, and Zimmerman review how mobile technologies enhance the development of advanced cognitive processes in learners through aspects of augmented reality. In Chapter 14, Belland writes on the need for the development of argumentation to solve complex ill-structured problems supporting the development of advanced cognitive processes required by knowledge workers.

In the final theme, the integration of Mindtools into teaching and learning, there are two chapters that discuss the actualization of problem-based learning environments using evaluative research and assessments. In Chapter 15, Tristen identifies a series of taxonomies that includes four main types of knowledge, declarative, procedural, attitudinal, and meta-cognitive with a thorough compendium of all related concepts of learning. In Chapter 16, Marra describes the implementation of Mindtools, such as Voicethread, to develop interactions in an online learning environment to augment learning and offset isolation in online learning environments.

In summary, this book of essays is a diverse and productive review of the main conceptual constructs underlying Jonassen's work. The insight and practical tools that are blended throughout the book are a perfect reflection on Dr. Jonassen's work to enhance the learning experiences of students through the meaningful integration of technology into complex learning environments. For me, the core understanding of Jonassen's work as well as this book, is that Jonassen and these educators respect both the learners' and the instructors' ability to respond to these ideas and develop the knowledge workers of the future who have the ability to use information to solve problems at all levels of difficulty, to collaborate, and to communicate these new ideas. This hopefulness and potentiality for both teachers and learners is a critical theme in these days of educational reform based on punitive and dismissive ideas of teachers and learners. His theme of productive, respectful engagement in a dialog among all stakeholders in education is carried on throughout this book and, in my opinion, bodes well for the future of education.

References

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Donna Russell holds a PhD in educational psychology with a focus on cognition and technology and a master's degree in Curriculum and Instruction. She is a faculty member at Capella University's Harold Abel School of Social and Behavioral Sciences in the School of Psychology's educational psychology department, where she teaches courses in developmental, organizational, and social psychology, as well as mentors doctoral students.

Dr. Russell is an academic technology liaison at the Sinclair School of Nursing. In this role she works through Educational Technology at Missouri (ET@MO) to design, develop, implement, and research immersive virtual learning environments at the School of Nursing.

She has published six refereed journal articles; four chapters in books, including research on her problem-based online course for graduate education students in the book *Creativity and Problem-Based Learning*; and three books. She served as the author of *Inquiry into Mediated Action: Understanding Collaborative Online Professional Development*, editor of *Cases of Collaborative Virtual Learning Environments: Processes and Interactions*, and lead editor of *Web-Based Engineering Education: Critical Design and Effective Tools* with co-editor Dr. Haghi of Guilan University in Iran.