The Role Of Knowledge Management In Creating Transformational Organizations And Transformational Leaders

Denise A. D. Bedford, Kent State University, USA

ABSTRACT:

W. Edward Deming's theories of management have informed our thinking and practices for four decades. In addition to informing business practices, his thinking provided a cornerstone in the foundation for the discipline known as knowledge management. We consider three questions: (1) how do Dr. Deming's theories align with the current representation of knowledge management? (2) how might today's knowledge management theory and practice help realize Dr. Deming's vision? (3) What form of education encourages systemic transformation? This paper begins with a topical map that represents the 21st century view of knowledge management, including its 10 competency areas. Dr. Deming's theory of management, fourteen points and five leverages are overlaid on the map. The paper suggests that we must move from business management to knowledge management in order to achieve Dr. Deming's vision. It also proposes that knowledge management education will be the primary driver. This paper proposes two education models: (1) a model for a Master's degree in Knowledge Management, and (2) a model for a Master's degree in Business Administration with a focus on knowledge management.

Keywords: *W. Edward Deming, Transformational leadership, KM education, Semantic Analysis methods*

Purpose Of The Research

W. Edward Deming's theories of management have informed our thinking and practice in business for six decades (Deming, 1982; Deming, 1986; Deming 1992; Deming, 2000). His theories form the foundation of continuous process improvement, total quality management and transformational leadership. In the broader context of the 21st century knowledge economy and knowledge society, Dr. Deming's work on the system of profound knowledge (Deming, 1992) has value that spans all economic sectors and all types of organizations. The value of his thinking goes beyond the business and manufacturing environments from which it originated. Deming's concept of profound knowledge contributed important constructs to the young discipline of knowledge management. The connections between Deming's theory and the practice of knowledge management have weakened over the past fifteen years due in large part to the technology and information focus adopted by the knowledge management discipline.

This thought piece offers two goals. The first is to demonstrate the connections between the two disciplines and revive the conversations. We believe that there is significant value in Deming's work to be leveraged by the knowledge management and knowledge sciences discipline. And, we believe that the knowledge management discipline is a productive avenue for the expansion and continuation of Dr. Deming's work. To address this goal, we consider:

- How Dr. Deming's ideas and work align with the theory and practice of knowledge management;
- How the field of knowledge management can provide greater exposure to and realization of Dr. Deming's ideas.

The second goal of this paper is to consider how to most effectively position learning and skills development for both the theory of Dr. Deming and of knowledge management. This paper makes the argument that in the 21st century Deming's work aligns closely with knowledge management and knowledge sciences. The paper proposes a model curriculum for a Master of Science degree in knowledge management which encompasses Dr. Deming's principles. It further describes a concentration in knowledge management which could be elected for a Master of Science in Business Administration might

Three Generations Of Knowledge Management

We begin our analysis of the relationship between Deming's theory of profound knowledge and knowledge management by describing the current state of knowledge management. While knowledge management is a term that has been in use for several decades, the concept first gained popular attention and was became a practice in the 1990s (Nonaka & Takeuchi, 1995; McElroy, 2003; Koenig, 2004; Snowden, 2002; Wiig, 1997). Since that time, the discipline has evolved and matured. By most accounts, knowledge management is in its third generation today. The first generation of knowledge management practice emerged simultaneously with the technology boom of the 1990s, and the growth of large information systems. As a result, knowledge management was more frequently associated with technology and information than with knowledge. From an economic perspective, the heavy emphasis on storage and capture of codified and explicit information resulted in a supply side perspective. The intent of first generation knowledge management was to find and capture information just in case it might be needed in the future. This generation gave rise to three basic facets of knowledge management – knowledge asset management, knowledge technologies, knowledge assessment and evaluation.

Second generation knowledge management shifted the focus to demand-side and from information to knowledge. Another development of second generation was anchoring knowledge management in the context of organizational operations and business value (McElroy, 2001). The demand for knowledge to solve business problems, to improve the way an organization worked, and to enable the organization to become more than the simple sum of its parts (Bollinger & Smith, 2001). Inherent to second generation knowledge management is a focus on the sources of knowledge – people, communities and organizations. This generation added several new facets to the landscape of knowledge management, including: organizational learning, organizational culture and communications, collaboration and communities, intellectual capital and knowledge-embedded business operations.

In 2012, the knowledge management discipline is in its third generation. Third generation knowledge management addresses the issues of a complex, trans-organizational context where knowledge flows in a semantic grid. Third generation builds upon both first and second generation, but focuses more directly and deeply on the semantics of knowledge and the design of knowledge architecture. Third generation knowledge management is also associated with change, agile organizations and complex adaptive systems. Facing a more complex context, knowledge management also takes the focus on economics to a community and household level – expanding the concepts of intellectual capital beyond an organization's accounting system to growth at the individual and household level. Third generation knowledge management adds two new facets – knowledge architecture, and knowledge leadership and strategy to lead the change.

The three generations have given rise to ten facets of knowledge management (Figure 1). Table 1 provides a description of each facet, its focus and scope.

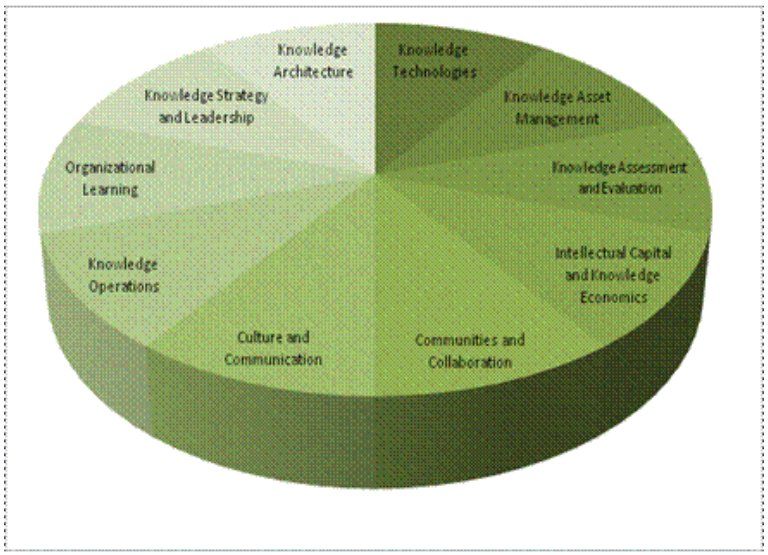

Figure 1: Ten Facets Of Knowledge Management

Table 1: 10 Facets Of Knowledge Management

Knowledge Management Facet	Description of Facet
Knowledge Technologies	KM Technologies focuses primarily on the hard aspects of knowledge work. This includes building applications, delivering technology solutions, the seamless integration of knowledge technologies into the business context, the configuration of virtual environments and applications to support knowledge workers wherever they are working, and the development of technologies to support knowledge creation, capture, exchange, discovery and preservation.
Knowledge Asset Management	Knowledge Asset Management includes capabilities related to knowledge retention and loss, mapping, diffusion and mobilization, transfer, knowledge organization systems, information governance, quality, disclosure, policy, content and records management, and preservation.
Knowledge Assessment and Evaluation	Knowledge Assessment includes capabilities related to organizational management, knowledge audits, knowledge metrics, benchmarking, and overall evaluation methods.
Intellectual Capital Management	Capability to manage an organizations intellectual capital, including its human capital, structural capital and relational capital. Human capital management includes understanding the theory of knowledge and expertise, the economic view of knowledge and knowledge assets, managing and investing in knowledge workers, talent and competencies, the skills required to manage a global workforce, a virtual workforce, and international workforces.
Communities and Collaboration	Collaboration and Communities has both hard and soft competencies. The soft aspects include fostering inter- and intra-organizational collaboration, intra-unit collaboration, encouragement of professional, knowledge and social networking, developing facilitation and resolutionary skills among team members. The hard aspects include designing and implementing environments and technologies that foster collaboration – whether in physical or virtual spaces.
Culture and Communication	Culture and Communications requires primarily soft competencies such as fostering a knowledge sharing culture, ensuring that the institutional ethics, reward systems, and cultural artifacts all reinforce the value of knowledge.
Knowledge Operations	Knowledge Operations also has both soft and hard competencies. The soft competencies include ensuring that knowledge processing is aligned with the organizations business goals and objectives, and is integrated into the organization's everyday business and work. It also includes decisions sciences and systems, business architecture and workflow management. The hard competencies include elicitation and representation of human capital (tacit knowledge and skills) as structural knowledge (business rules, business process applications), business process optimization, operations compliance, and business analytics

Knowledge Management Facet	Description of Facet
Organizational Learning	Organizational Learning includes capabilities that support a learning organization, including organizational learning, group learning, individual learning, situational learning, lifelong learning, learning in virtual environments, instructional design, and problem solving methodologies.
Knowledge Leadership and Strategy	Leadership and Strategy focuses on the capability to develop and promote a knowledge vision, to develop a strategy to realize that vision, to communicate the organization's commitment to the vision and strategy, leading by example, identifying opportunities for knowledge interventions, acting as a transformation agent in shifting the organization's thinking from industrial and financial capital to intellectual capital, and knowledge and intellectual policy guidance and formulation.
Knowledge Architecture	Knowledge Architecture includes the capability to elicit requirements, prepare functional specifications and design solutions to challenges found in knowledge work. Includes an understanding of data and information architecture but primarily focuses on people, how they work, how they think, how they create and test ideas, and on knowledge as an entity in the semantic grid. Knowledge architecture includes the capability to apply general architectural principles to the knowledge environment and problems.

The evolutionary development of knowledge management and its ten facets have produced a rich set of methods, practices and strategies. Knowledge management is an inclusive discipline, drawing effective theory and methods from other disciplines. As a result, it is highly multidisciplinary. Knowledge management thought leaders are drawn from many other subject disciplines. Knowledge management theory borrows heavily from other subject disciplines and from other professions. Table 2 illustrates the variety of thought leadership that contributes to knowledge management.

Table 2: Thought Leadership And Multidisciplinary Nature Of Knowledge Management

Knowledge Management Competency	Thought Leaders and Theoretical Foundations
Knowledge Technologies	Berners-Lee Hendler & Lassila (2001): Cooper (1973): Davis (2004): Hendler (2001): McComb (2004): Salton (1986): Stankosky (2012)
Knowledge Asset Management	Becerra-Fernandez (1999): Ghehardi (2000): Malhotra (1997): Prusak (1997): Skyrme (1997)
Knowledge Assessment and Evaluation	Holsapple (1987): O'Dell & Grayson (1998): Hanley (2000)
Intellectual Capital and Knowledge Economy	Al-Ali (2003): Allee (2000): Cooper (1983): Dahlman (2006): Foray (2004): Leydesdorff (1995): Machlup (1973): Neef (1997): Porat (2006): Snowden (2000): Stiglitz (1999): Thurow (1997): Varian (2000): Wiig (1997)
Communities and Collaboration	Brown & Duguid (2001): Coleman (1999): Crane (1969): Cross & Cummings (2004): De Solla Price (1986): McDermott (1999): Saint Onge (2012): Wenger McDermott & Snyder (2002)
Culture and Communication	Andrews & Stallick (2007): Blair (2004): Christensen (2002): Corney & Ward (2008): de Long (2004): Denning (1992): Drucker (1988): Kahan (2010): Peters & Besley (2006): Quinn & Spreitzer (1991): Schein (1984): Wiig (2012)
Knowledge Operations	Amar (2001): Fleischer & Bensoussan (2003): Fuld (2010): Horibe (2001): Kahaner (1996)
Organizational Learning	Allee (1997): Argyris (1992): Lave & Wenger (1991): Nonaka (1994): Polanyi (1958): Schoen (1973): Senge (1993): Wenger (1996)
Knowledge Leadership and Strategy	Davenport & Prusak (1997): Deming (1992): Drucker (1992): McElroy (2003): Wiig (1993)
Knowledge Architecture	Marchionini & Shneidermann (1988): Mayhew (2009): Nielsen (1994): Ranganathan (1950): Soergel (1999): Sowa (2000): Spink & Cole (2006): Zachman (1996)

The faceted and multidisciplinary nature of knowledge management in 2012 provides several points of alignment with Dr. Deming's theory and ideas.

Aligning Deming's System Of Profound Knowledge With Discipline Of Knowledge Management

The intended audience for this thought piece is well familiar with the breadth and depth of Deming's ideas. Ideally, the earlier discussion of knowledge management provides an opportunity for those experts to discover convergence with Dr. Deming's work. In working through this exploratory research, the author found two high level points of convergence, as well as several targeted areas. The two high level areas of convergence from Dr. Deming are: (1) the importance of leadership – in particular, transformational leadership – to realizing the new working environment; and (2) the focus on the true source of knowledge – people, teams, organizations and knowledge itself.

While Knowledge Leadership and Strategy is one of the ten facets of knowledge management, in practice leadership presents a significant challenge. Where knowledge management efforts are lead by transformational leaders, knowledge management generally achieves its goals and is regarded as successful. Transformational leadership, though, is not something that generally results from knowledge management education or training. Rather it is a leadership characteristic and behavior that the selected leader brings to the task. As Dr. Deming advised us, this must change. This change can be a critical success factor for knowledge management. The challenge, though, is how to define and elaborate this facet of knowledge management. How do we ensure that every knowledge management leader is a transformational leader? Transformational leadership is more critical to knowledge organizations in the 21st century than it was to manufacturing organizations in the 20th century. The nature of the shift from an industrial to a knowledge economy – in organizational culture, in collaboration, in technologies and simple operations – is a radical transformation.

Dr. Deming advised early in his writings that information is not knowledge. This may be intuitive to Deming disciples, but it has not been intuitive to many knowledge management professionals. In 2012, understanding this basic concept remains a challenge for knowledge management professionals. This is an after effect of the heavy alignment of knowledge management and technology in the 1990s.

Leveraging Semantic Methods To Map Two Disciplines

Throughout Deming's writings, there are many references to ideas that align directly with the ten facets of knowledge management. Subjectively and intuitively, we understand the alignments. However, to revive the dialog with the knowledge management community, the author attempted a more objective alignment. A three stage research methodology was designed to map Deming's ideas to the ten facets of knowledge management.

The first step involved leveraging semantic analysis technologies to identify the key concepts in Deming's principles and selected writings. The intent of grounding the research in semantics was to align meanings across the two disciplines. A core set of concepts was extracted, consisting primarily of nouns and noun phrases. The concepts were used to generate a semantic word cloud (Figure 2). The word cloud displayed more heavily used concepts in larger font size.

Figure 2: Word Cloud Of Concepts Drawn From Deming's Principles

The word cloud produced some interesting observations. While the term management is important to Deming because it is the context in which leadership takes place, we note that management is not as highly weighted as other concepts – leadership, knowledge, quality, change, education, improvement, cooperation. The word cloud emphasizes the fact that it is the culture of management that is important, not only the act of managing.

The second research step involved classification of all the extracted concepts to the knowledge management facets. We found that the key concepts from Deming's work have a strong alignment with six of the ten KM facets (Figure 3), including Leadership, Knowledge Operations, Organizational Learning, Communities and Collaboration, Culture and Communication, and Intellectual Capital. The strongest alignment is clearly with Leadership. This validates our perception that Deming's greatest contribution to the field of knowledge management is related to leadership and strategy. Organizational learning demonstrated the second strongest alignment. Again, this is not surprising given Deming's focus on the job training, continuous improvement, managing people and skills development. The third strongest alignment is with Knowledge Operations. In both contexts, the goal is to improve the effectiveness and value of business.

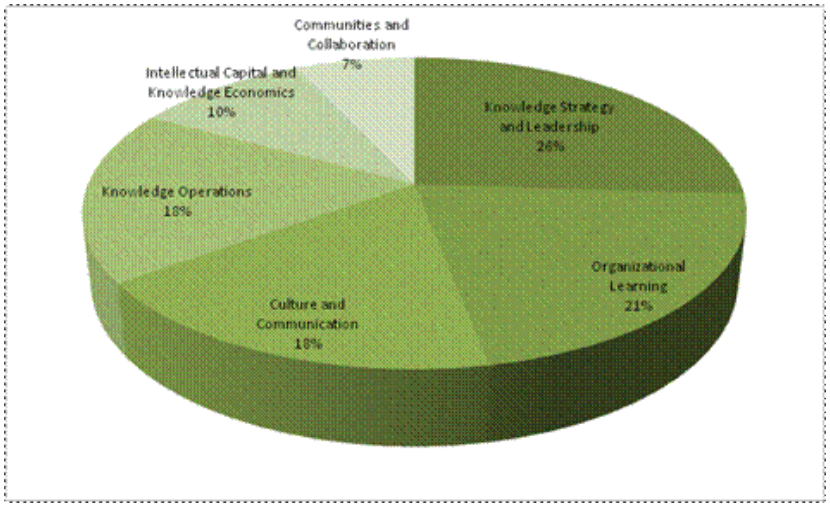

Figure 3: Alignment Of Deming's Concepts With Facets Of Knowledge Management

The key observation here is the strong alignment that Deming's work offers to a particular area of weakness in knowledge management – Leadership. Much of the knowledge management literature addresses change in terms of transitioning to a knowledge economy and knowledge society. They key facet for the transformation, as Deming has pointed out for sixty years, is Leadership. Case studies of knowledge management highlight the critical role of corporate level thought leaders who effect this transformation, whether consciously or unconsciously. Examples of transformational leaders might include James Wolfensohn at the World Bank, Sergei Brin and Larry Page at Google, or Mark Zuckerberg at Facebook. These leadership examples are far too rare, though, in the field of knowledge management. What we too often see are lower level knowledge management offices and unit level communities struggling to operationalize the concepts, to change the way the organization works from the bottom up.

Knowledge management is at a critical juncture. The uptake of the concepts aligns with the way the younger generation works, with their culture. The concepts align with the capability of technologies to support digital and knowledge ecosystems. It aligns with the shift in valuation of intellectual capital assets. However, there is a significant gap in terms of organizational leadership today.

A significant challenge is the educational preparation and skills development for knowledge management leaders. Knowledge management education in many instances continues to align with information science and technology, rather than the ten facets. As a result, current and future knowledge management leaders are not prepared to effect transformational change. Deming's work speaks directly to this gap. Deming's work needs to be reintroduced to the dialog in knowledge management. His principles need to be re-interpreted to apply directly to the Leadership and Strategy facet of knowledge management. Where support is lacking at the corporate level an organization is unlikely to effectively transition to the knowledge economy. As Deming tells us, leadership is critical to the transformation to a knowledge organization. We must ensure it begins, or at the very least, is strongly supported at the highest level of management.

Positioning Deming And Knowledge Sciences In The Academic Context

The second goal of this paper is to consider how to most effectively position Deming's ideas and education on the ten facets of knowledge management. There is a clear and obvious need in the knowledge management discipline to improve the way that we educate future leaders. The essence of the shift is from the primary focus on physical and financial resources in business administration curricula to the people and organizational environment focus we find in knowledge management. Two models are presented: (1) model curriculum for a Master's in Knowledge Management (Figures

4 and 5); and (2) model curriculum for a Master's in Business Administration with a concentration in knowledge management.

The model curriculum for a Master of Science in Knowledge Management addresses all ten facets. Each facet is anchored in a core course, with a rich set of electives, short courses and workshops to support skills building and investigation of emerging issues.

The Master of Science in Business Administration or Management Science with a concentration in knowledge management would be designed around courses selected from across the ten facets. A concentration in knowledge management would enable business schools to expand their educational offerings in the areas of intellectual capital management, organizational culture, the people and community aspects of organizations, and transformational leadership. Business administration students interested in strategic workforce planning and management would derive value from the intellectual capital curriculum. Business administration students interested in organizational culture and communication would derive value from studying business narrative, storytelling, organizational culture assessment, and organizational network analysis. Through an integrated curriculum, business administration and knowledge management students could expand their access to the core concepts of Deming's work.

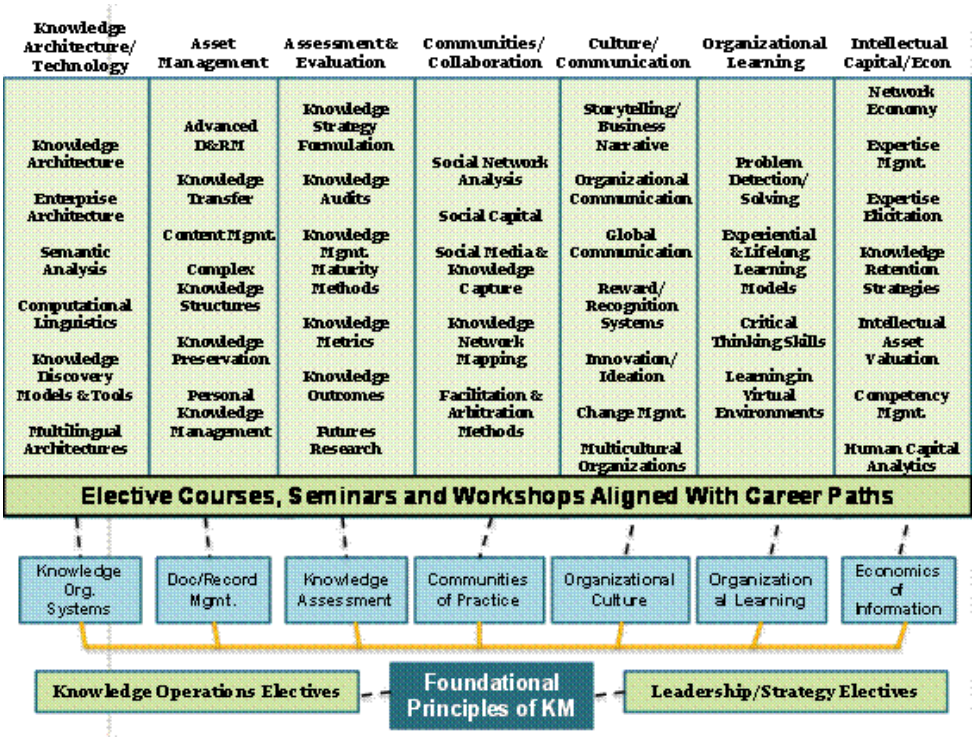

Figure 4: Model Curriculum For Ten Facets Of Knowledge Management

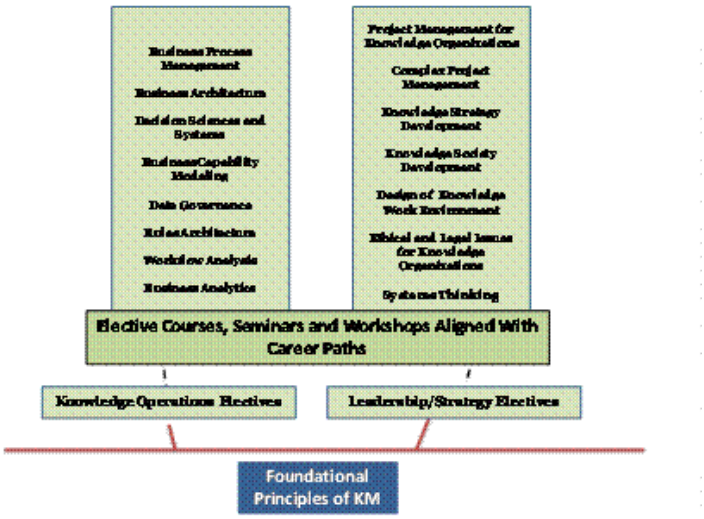

Figure 5: Core And Elective Courses For Knowledge Operations And Leadership

Observations And Conclusions

Three observations are drawn from this thinking exercise. First and most obvious, there are many points of alignment between Deming's work and the current generation of knowledge management. The knowledge management discipline has matured and is now positioned to leverage Deming's ideas. There are rich opportunities to revive the dialog and encourage collaboration. Second, Deming offers important advice on a topic that is a particular weakness for knowledge management today – transformational leadership. This facet of knowledge management should be supplemented from Dr. Deming's work. Third and finally, both knowledge and business professionals will continue to lead organizations into the 21st century. Where they are well grounded in profound knowledge and knowledge management, there is a higher probability that they will be transformational leaders. Transformational leaders are critical success factors for knowledge organizations in the 21st century.

References

Al-Ali, N. (2003). Comprehensive Intellectual Capital Management: Step-By-Step. Hoboken, NJ: Wiley.

Allee, V. (1997). The Knowledge Evolution: Expanding Organizational Intelligence. London: Routledge.

Amar, A. D. (2001). Leading for Innovation through Symbiosis. European Journal of Innovation Management, 4(3), 126-133.

Andrews, D.C., & Stalick, S. (1997). Avoiding Morning-After Syndrome: Transforming Your Organization Without Regrets. National Productivity Review, 16(4), 5-14.

Argyris, C. (1982). Reasoning, Learning, and Action: Individual and Organizational (pp. 85-101). San Francisco, CA: Jossey-Bass.

Becerra-Fernandez, I., & Aha, D. W. (1999). Case-Based Problem Solving for Knowledge Management Systems. In Proceedings of the Twelfth Annual Florida Artificial Intelligence Research Symposium. Menlo Park: AAAI.

Berners-Lee, T., Hendler, J., & Lassila, O. (2001). The Semantic Web. *Scientific American*, *284*(5), 28-37.

Blair, M. (2004). One Role of Story in Knowledge Management. Accessed September 2012: http://www.aberje.com.br/eventos/2010/forum/novo/artigos/Story-in-KM-final.pdf?ID_COLUNA=534&ID_COLUNISTA=18

Bollinger, A. S. & Smith, R. D. (2001), Managing Organizational Knowledge as a Strategic Asset. *Journal of Knowledge Management*, *5*(1), p. 8-18.

Brown, J. S. & Duguid, P. (2001). Knowledge and Organization: A Social-Practice Perspective. *Organization Science*, *12*(2), 198-213.

Christensen, C. M. (2002). The *Opportunity & Threat of Disruptive Technologies*. Boston, MA: Harvard Business School.

Coleman, D. (1999). Groupware: Collaboration and Knowledge Sharing. *Knowledge Management Handbook*, *12*(1), 12-15.

Cooper, M. D. (1983). The Structure and Future of the Information Economy. *Information Processing & Management*, *19*(1), 9-26.

Corney, P., & Ward, V. (2008). Narrative Enquiry: A Way to Get Organizations (and the People in Them) Talking and Acting Differently. *Business Information Review*, *25*(2), 105-120.

Crane, D. (1969). Social Structure in a Group of Scientists: a Test of the" Invisible College" Hypothesis. *American Sociological Review*, 335-352.

Cross, R., & Cummings, J. N. (2004). Tie and Network Correlates of Individual Performance in Knowledge-Intensive Work. *Academy of Management Journal*, *47*(6), 928-937.

Dahlman, C. J., Routti, J., & Ylä-Anttila, P. (2006). *Finland as a Knowledge Economy: Elements of Success and Lessons Learned*. Washington, DC: World Bank Publications.

Davenport, T. H. & Prusak, L. (1997). *Information Ecology: Mastering the Information and Knowledge Environment*. New York, NY: Oxford University Press USA.

Davis, M. (2004). *The Business Value of Semantic Technologies. TopQuadrant Special Report*. McLean VA: TopQuadrant.

DeLong, D. W. (2004). *Lost Knowledge: Confronting the Threat of an Aging Workforce: Confronting the Threat of an Aging Workforce*. New York, NY: Oxford University Press, USA.

De Solla Price, D. J. (1986). *Little Science, Big Science... and Beyond*. New York, NY: Columbia University Press.

Deming, W. E. (1982). *Quality, Productivity, and Competitive Position*. Cambridge, MA: Massachusetts Institute of Technology, Center for Advanced Engineering.

Deming, W. E. (1986). *Out of the Crisis*. Cambridge, MA: MIT Press.

Deming, W. E. (1992). *A System of Profound Knowledge*. Knoxville, TN: SPC Press.

Deming, W. E. (2000). *The New Economics for Industry, Government, Education* (2nd ed.). Cambridge, MA: MIT Press.

Drucker, P. F. (1988). The Coming of the New Organization. *Harvard Business Review on Knowledge Management*. Cambridge, MA: (pp. 1-19). Cambridge, MA: Harvard Business School Press.

Drucker, P. (1992). The New Society of Organizations. *Harvard Business Review*, *70*(5), 95-104.

Fleisher, C. S., & Bensoussan, B. E. (2003). *Strategic and Competitive Analysis: Methods and Techniques for Analyzing Business Competition*. Upper Saddle River, NJ: Prentice Hall.

Foray, D. (2004). The *Economics of Knowledge*. Cambridge, MA: MIT Press.

Fuld, L. M. (2010). The *Secret Language of Competitive Intelligence: How to See Through & Stay Ahead of Business Disruptions, Distortions, Rumors & Smoke Screens*. Indianapolis, IN: Dog Ear Publishing.

Gherardi, S. (2000). Practice-Based Theorizing On Learning and Knowing In Organizations. *Organization*, *7*(2), 211-223.

Hanley, S., & Dawson, C. (2000). A Framework for Delivering Value With Knowledge Management: the AMS Knowledge Centers. *Information Strategy*, *16*(4), 27-36.

Hendler, J. (2001). Agents and the Semantic Web. *Intelligent Systems, IEEE*, *16*(2), 30-37

Holsapple, C. W., & Whinston, A. B. (1987). Knowledge-based Organizations. *The Information Society*, *5*(2), 77-90.

Horibe, F. (2001). Creating the Innovation Culture: Leveraging Visionaries, Dissenters and Other Useful Troublemakers. Hoboken, NJ: Wiley.

Joiner, B. L. (1994). *Fourth Generation Management: the New Business Consciousness*. New York, NY: R. R. Donnelley and Sons, Co.

Kahaner, L. (1996). *Competitive Intelligence: From Black Ops to Boardrooms-How Businesses Gather, Analyze, and Use Information to Succeed In the Global Marketplace*. New York, NY: Simon & Shuster.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge university press.

Leydesdorff, L. (1995). The Triple Helix--University-Industry-Government Relations: A Laboratory for Knowledge Based Economic Development. *Easst Review*, *14*(1), 14-9.

Machlup, F. (1973). *The Production and Distribution of Knowledge in the United States*. Princeton, NJ: Princeton University Press.

Malhotra, Y. (1997). Knowledge Management in Inquiring Organizations. *Americas Conference on Information Systems (AMCIS) 1997 Proceedings*, p. 110.

Marchionini, G., & Shneiderman, B. (1988). Finding Facts vs. Browsing Knowledge in Hypertext Systems. *Computer*, *21*(1), 70-80.

Mayhew, D. J. (2009). Requirements Specifications Within the Usability Engineering Lifecycle. *Human-Computer Interaction: Development Process* (pp. 23-53). Boca Raton, FL: CRC Press.

McComb, D., & Arts, S. (2004*). The CIO's Guide to Semantics*. Fort Collins, CO: Semantic Arts, Inc.

McElroy, M. W. (2003). *The New Knowledge Management: Complexity, Learning, and Sustainable Innovation*. London: Routledge.

Neef, D. (1997). The *Knowledge Economy*. Oxford: Butterworth-Heinemann.

Nielsen, J. (1994, April). Enhancing the Explanatory Power of Usability Heuristics. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems: Celebrating Interdependence* (pp. 152-158). ACM.

Nonaka, I. (1994). A Dynamic Theory of Organizational Knowledge Creation. *Organization Science*, *5*(1), 14-37.

O'dell, C., & Grayson, C. J. (1998). *If Only We Knew What We Know: the Transfer of Internal Knowledge and Best Practice*. New York, NY: Free Press.

Peters, M. A., & Besley, T. (2006). *Building Knowledge Cultures: Education and Development in the Age of Knowledge Capitalism*. Lanham MD: Rowman & Littlefield Pub Incorporated.

Polanyi, M. (1958). *Personal Knowledge: Towards a Post-Critical Philosophy*. London: Routledge.

Porat, M. U. (2006). Global Implications of the Information Society. *Journal of Communication*, *28*(1), 70-80.

Prusak, L. (1997). *Knowledge In Organizations*. London: Routledge.

Quinn, R. E., & Spreitzer, G. M. (1991). The Psychometrics of the Competing Values Culture Instrument and an Analysis of the Impact of Organizational Culture on Quality of Life. *Research in Organizational Change and Development*, *5*(1).

Ranganathan, S. R. (1950). *Classification, Coding and Machinery for Search*. New York: Unesco.

Saint-Onge, H., & Wallace, D. (2012). *Leveraging Communities of Practice for Strategic Advantage*. London: Routledge.

Schein, E. H. (1984). Coming to a New Awareness of Organizational Culture. *Sloan Management Review*, *25*(2), 3-16.

Scholtes, P. R. (1997). The *Leader's Handbook: Making Things Happen, Getting Things Done*. McGraw-Hill, 1997.

Schön, D. A. (1973). *Beyond the Stable State: Public and Private Learning In A Changing Society*. London: Harmondsworth: Penguin.

Senge, P. M. (1993). The *Fifth Discipline: the Art and Practice of the Learning Organization*. New York: Random House.

Skyrme, D. J. (2000). Developing a Knowledge Strategy: From Management to Leadership. In Morey, D, Maybury, M., & Thuraisingham, B. (EDS.) *Knowledge Management: Classic and Contemporary Works*, 61-84.

Skyrme, D. (2012). *Capitalizing on knowledge*. London: Routledge.

Snowden, D. (2000). Cynefin: A Sense of Time and Space, the Social Ecology of Knowledge Management. In: *Knowledge Horizons: the Present and the Promise of Knowledge Management*. Oxford: Butterworth-Heinemann.

Soergel, D. (1999). The Rise of Ontologies or the Reinvention of Classification. *Journal of the American Society for Information Science*, *50*(12), 1119-1120.

Sowa, J. F. (2000). *Knowledge Representation: Logical, Philosophical, and Computational Foundations* (Vol. 13). Pacific Grove, CA: Brooks/Cole.

Spink, A., & Cole, C. (2006). Human Information Behavior: Integrating Diverse Approaches and Information Use. *Journal of the American Society for Information Science and Technology*, 57(1):25–35.

Stankosky, M. (2012). *Creating the Discipline of Knowledge Management*. London: Routledge.

Stiglitz, J. (1999). *Public Policy for A Knowledge Economy*. Accessed September 2012: http://akgul.bilkent.edu.tr/BT-BE/knowledge-economy.pdf.

Thurow, L. C. (1997). Needed: A New System of Intellectual Property Rights. *Harvard Business Review*, *75*, 94-107.

Varian, H. R. (2000). Buying, Sharing and Renting Information Goods. The *Journal of Industrial Economics*, *48*(4), 473-488.

Wenger, E., McDermott, R. A., & Snyder, W. (2002). *Cultivating Communities of Practice: A Guide To Managing Knowledge*. Cambridge, MA: Harvard Business Press.

Wiig, K. M. (1993). *Knowledge Management Foundations: Thinking About Thinking: How People and Organizations Create, Represent, and Use Knowledge*. Arlington: Schema Press.

Wiig, K. M. (1997). Integrating Intellectual Capital and Knowledge Management. *Long Range Planning*, *30*(3), 399-405.

Wiig, K. (2012). *People-Focused Knowledge Management*. London: Routledge.

Zachman, J. A. (1996). *Concepts of the Framework for Enterprise Architecture*. Los Angeles, CA.

About the Author:

Denise Bedford is currently the Goodyear Professor of Knowledge Management at Kent State University. She teaches courses in economics of information, intellectual capital management, semantic analysis methods, communities of practice, and other knowledge management topics. Her current research interests include communities of practice, use of semantic analysis methods and technologies, multilingual architectures, business rules engineering, search architectures and governance models, intellectual capital and knowledge economies. Dr. Bedford also teaches at Georgetown University and the University of Tennessee at Knoxbville. Prior to joining the faculty at Kent State University, Dr. Bedford was Senior Information Officer at the World Bank.

Dr. Denise A. D. Bedford, Goodyear Professor of Knowledge Management, College of Communication and Information, P. O. Box 5109, Kent State University, Kent Ohio 44242-0001; Tel: (301)-787-5257; Email: Dbedfor3@kent.edu

---