IDEA GROUP PUBLISHING

701 E. Chocolate Avenue, Suite 200, Hershey PA 17033, USA
Tel: 717/533-8845; Fax 717/533-8661; URL-http://www.idea-group.com

ITP5132

This paper appears in *Managing Modern Organizations Through Information Technology*, Proceedings of the 2005 Information Resources Management Association International Conference, edited by Mehdi Khosrow-Pour.

A Conceptual Framework and Model for Design of End-User Information Systems Curricula

Lola B. Smith, C. Steven Hunt, Rik Berry and Darla Hunt

Information Systems Dept., College of Business, Morehead State University, USA, {l.smith, c.hunt, r.berry, d.hunt@morehead-st.edu}

ABSTRACT

This paper's objective is to create a better understanding of the need for developing an IT environment in Organizational & End-user Information Systems' (OEIS) programs of study wherein hard skills are paired with soft skills, where qualitative research has as much intrinsic value as quantitative research, and where creative thinking and critical thinking is encouraged. To this end, the coauthors have developed the *Management, Technology, and Communication (MTC) Model for Training Knowledge Workers in a Digital Economy*. This model complements and reinforces the essential objectives and competencies housed in the Organizational Systems Research Association's newly designed 2004 *OEIS Model Curriculum.*

INTRODUCTION

Across the red blood-like cover of a 2004 "Wired" magazine, written large in shades of white innocence, are the words, "The Making of a Human Clone." This juxtaposition of color, words, and content leads one to reflect on the interaction of technology and human beings. While technology plays an increasing role in today's global economy, all too often, the importance of the human factor is overlooked. Yet, the current outsourcing phenomenon illustrates the need for a paradigm change which calls for organizations and end-users to engage in creative problem solving in a radically transformed business world that focuses more on the human element. This literature review presents an overview of the need for a new systemic model of training knowledge workers so that students can synthesize managerial, technical, and communication (MTC) skills. This *MTC Model for Training Knowledge Workers in a Digital Economy* (see Figure 2) demonstrates that these skills as a system, not as silo components, can prepare students for the changing business landscape. As background for the MTC model, this critique of the literature examines the human factor via the dichotomies and merits of (a) "soft skills" vs. "hard skills," (b) "quantitative" vs. "qualitative" methodologies, and (c) "critical thinking" vs. "creative thought." The model suggests the need to focus on a holistic approach that incorporates people, machines, and management methods. This model compliments and reinforces the Organizational System Research Association's (OSRA, 2004) newly designed Organizational & End-user Information Systems Model Curriculum (OEIS) (see Figure 1).

THE TECHNICAL/HUMAN INTERFACE

We live in a complex, interconnected, interdependent global village where everything systemically interacts with everything else. Technical and human aspects of all problems are interwoven. The global economist, Jeffrey Sachs insists the only way to solve current world economic problems is via an interdisciplinary approach (Davidson & Goldberg, 2004). Sachs proposes that we need to rethink the nature of the human factor and the global effects of economic change, precisely because of the rapid developments in science and technologies. Without the human element, "technology has no point of social reference," (p. B9). The human factor promotes the social literacy to comprehend both cultural and technological values.

This literature critique will demonstrate why knowledge workers must know how to interact and develop synergies with other people, as well as to utilize technologies to create innovative environments. A combination of technical prowess with human imagination and emotion must coexist to create a paradigm shift for this new economy. An Information Technology (IT) leader in the new socio-economic global market has the task of creating a "true whole that is larger than the sum of its parts; a production entity that turns out more than the sum of the resources put into it" (Drucker, 1954, p. 354). A manager's task is to set the internal environment of activities wherein subcategories provide details necessary for daily operations that are aligned with organizational strategies.

SOFT SKILLS VS. HARD SKILLS

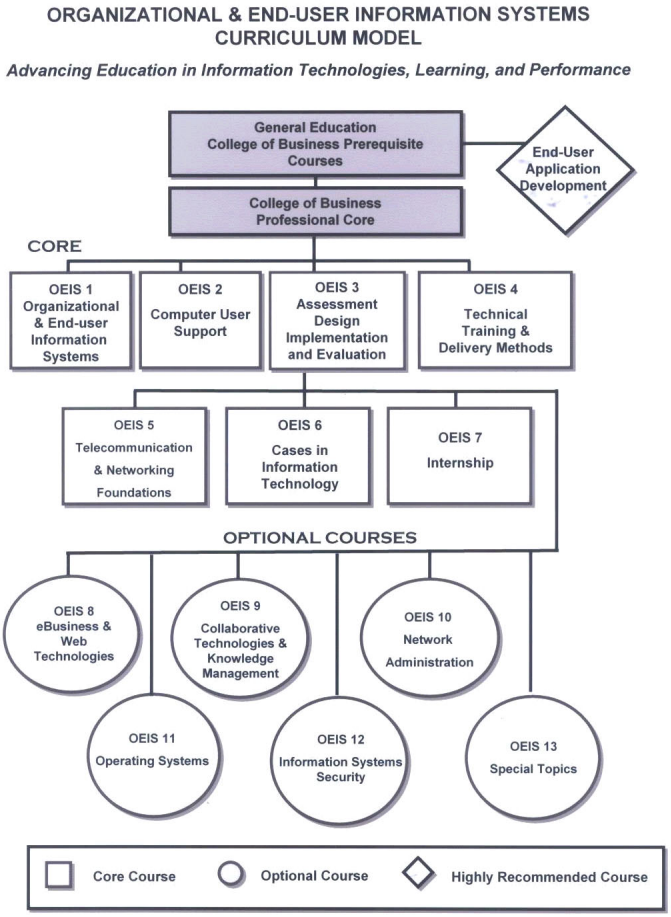
The strategic/technical and communication/personal sides of business are sometimes called, respectively, "hard" and "soft" skills. Statistical knowledge is classified as hard because facts are "hard," while soft skills involve the hypothetical "what ifs?" Kostenbaum (2002) notes the terms, "hard" and "soft" skills, when speaking about expertise needed in business organizations, are misnomers. "Paradoxical as it may seem, the personal precedes the strategic," (p. 8). "It is a hard fact that effective management must understand the soft center in every person" (p. 121).

Historically, soft-skills, (i.e., communication skills and being able to respond to and handle difficult people with interpersonal strategies), have not received the same respect as technical skills because of the misconception that "soft skills" are easy to acquire and easy to use. In reality, it's quite the opposite. Unlike hard skills that can be more often "nailed down" to formulas and facts, the wisdom one needs to negotiate sensitive issues cannot be condensed into a formula to be memorized and then routinely applied. Controlling people within various environments must be reformulated every time the cultural context changes.

Howard Strauss (2003), Manager of Technology Strategy and Outreach, at Princeton University observes, "Time spent on improving communication will have a bigger impact than anything we can do with technology gadgets," (p.42). In 1996, McGee noted that 68% of Communication Information Officers (CIOs) said that "soft skills," i.e., skills of a non-technical nature such as communication and team building, are more important today than five years ago. Van Slyke, Kittner, & Cheney's 1998 report about the Information System (IS) industry noted that because of the diversification of IS positions, "soft skills" apply to virtually every IS job. In 2002, Cappel conducted a study concerning entry-level IS job skills and the ability to succeed on the job. "Overall, employers rated non-technical skills even higher than technical skills," (p.81). The highest rated skills or abilities were: the ability to learn; teamwork; problem solving; written communication; and oral communication.

An IS executive focus session conducted at Morehead State University paralleled Cappel's findings (2003). Lewis (2003) noted,

Figure 1. Organizational & End-User Information Systems Curriculum Model (OSRA, 2004)



"Technical skills are great, but knowing when to act on opportunity is even more important. You have to be able to walk into an IT environment and sell your ideas …if you can't work on a team, you're not going anywhere."

These IS administrators concluded that academic environments need to give IS students the bigger picture – to problem solve, to understand how every piece fits in. They also agreed that academia needs to promote thought – how to write – how to organize, and more importantly how to present material orally. In addition, being an effective communicator involves being aware of how technology affects communication and how communication technologies are important for the creation and sharing of knowledge.

From the quantitative and qualitative data reported herein, it has been recognized that persons with poor interpersonal skills cannot be effective knowledge developers. "Their deficiency cannot help but detract from their relationships with experts, users, management, and others" (Awad & Ghaziri, 2004, p. 2008). As educators, we must see that human communication skills are now viewed as important ingredients for successfully operating within a highly technical environment. The coauthors believe the newly revised OEIS curriculum provides opportunities to incorporate more communication skills through case studies and the analysis and design course. When one examines the MTC model, it is obvious the foundation is based on effective communication.

QUALITATIVE VS. QUANTITATIVE

"Logical thinking may find out the best way of putting together A, B and C but it will not discover that A, B and C are inappropriate units anyway" (De Bono, 1969, p. 228). This example amply demonstrates the quantitative vs. qualitative research paradigms, which may be viewed as sets of principles that represent very different world views. Quantitative studies emphasize the measurement and analysis of causal relationships between variables, not processes, while qualitative reflects an attempt to secure an in-depth understanding of the phenomenon in question. Quantitative research is based on testing a theory composed of variables, measured with numbers and analyzed with statistical procedures, in order to determine whether the predictive generalizations of the theory hold true, (Creswell, 1994, p. 2). Qualitative research is based on building a complex, holistic picture, formed with words, reporting detailed views of informants, and conducted in a natural setting (usually, face-to-face interactions, utilizing communication).

Historically, there has been a heavy emphasis on quantification in sciences such as mathematics, physics and chemistry. These sciences are generally known as 'hard.' "Less quantifiable arenas, such as the social sciences are referred to as 'soft' less with pejorative intent than to signal their (putative) imprecision and lack of dependability," (Guba & Lincoln, 1994, p. 106). In recent years, strong counter pressures against quantification have emerged and there has been a movement to "question the very assumptions on which the putative superiority of quantification has been based," (p. 106). The coauthors contend that human behavior found in every business culture cannot be understood without reference to the meanings and purposes attached by human beings to their activities.

Over the past three decades a substantial methodological change in using qualitative approaches in business schools has evolved, especially given the case study approach pioneered at the Harvard Business School. With the case study approach, management has been provided with a means of investigating knowledge about human action and activities in organizations and intercultural activities that are much more systemic in nature. A number of OEIS programs do infuse case study reading so that students will be able to devise rules for decision making when they encounter similar problems in a real world environment. Unfortunately, this change has not yet been substantially implemented at the undergraduate level in terms of teaching a qualitative/quantitative methodology that emphasizes a systemic thinking approach. The MTC training model would stress such an approach.

Patton (1990) believes that the skilled researcher can successfully combine approaches, that quantitative and qualitative research can be complementary, rather than rival designs. For example, quantitative and qualitative approaches are like anatomical human components - the skeleton and the muscles - neither is much good without the other. Unless there is a skeleton, on which to pull, muscles are of little use. Quantitative methods are like a skeleton, while qualitative methods are the muscles that move bones into the desired position to support and to move the body of business. It is easy to see how such an approach would work in management and information technology. It is harder to visualize such an approach for disciplines like accounting, economics, and finance where the quantitative focus is on teaching students to calculate. Nonetheless, the qualitative approach is appropriate here as well, in terms of students knowing what and why to calculate, (i.e., the relationship between what is the reality and what is the desired future). In other words, students need to be better equipped to investigate a problem, to be able to deliver a solution that ties the technical, business, and the human element all together—which is another goal of the 2004 OEIS Model Curriculum.

CRITICAL VS. CREATIVE THINKING

Bailin (1994) notes critical thinking (hard statistical knowledge) and creative thinking (hypothetical "what if's") tend to be viewed as distinct from and even opposed one to another. Quantitative research is a

framework that is bounded tightly, where all necessary information is given, and the mode of thinking required is analytic and evaluative, involving judgments "made almost mechanically," (Balin, 1987, p. 25). Yet, when one works in the qualitative framework, one comes to understand fuzzy boundaries predominate, that in actuality, there are only a very limited number of cases in which we operate within clear-cut, clearly determined, and rigidly bounded frameworks. In most situations, frameworks overlap, shift, and have indefinite boundaries. Most disciplines are open-ended and dynamic. "They involve not merely information, but also live questions (interactions) and modes of investigating these questions," (p. 26). Bailin argues that critical thinking and creative thinking are not distinct and opposite kinds of thinking. Rather, they represent emphases along a continuum of good thinking, which has both generative and evaluative dimensions. For example, Taguchi techniques of quality engineering embody both statistical process control (SPC) and new quality related management techniques (QI2, 2001). "Due to the statistical balance of the designs, thousands of potential combinations of numerous variables (at different settings or levels) can be evaluated for the best overall combination, in a very small number of experiments," (Karbhari, 1994).

In looking at the complex business environments of today, who would not want employees to be more creative and open to change in problem-solving, while carrying out standardized work like bookkeeping? As evidenced by the outsourcing phenomenon, we must move beyond reproducing commodities and services (Anderson, 2004). We must respond productively to this new situation, to generate new and better solutions to problems, and to produce original works. We must approach analytic, highly judgmental aspects of business in such a way that we can generate creative results, and we must become imaginatively inventive in being critical.

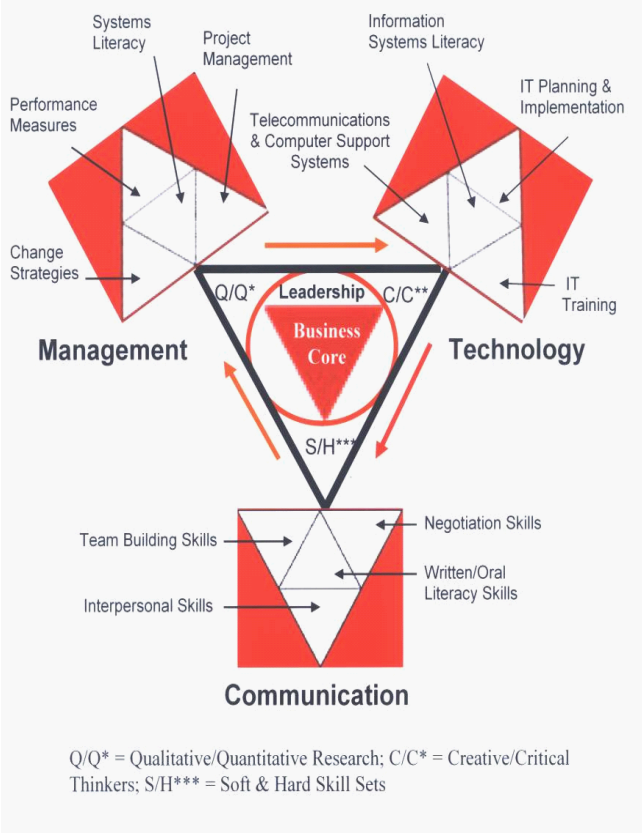
The coauthors of this paper recognize that within the social, historical and political framework in which all innovations operate, the immediate emphasis must be on changing attitudes and only later changing practice or procedure. Therefore, the purpose of this paper is to create a better understanding of the need for a business environment where hard skills are paired with soft skills, where qualitative research is seen as having as much intrinsic value as quantitative research, where creative thinking along with critical thinking is encouraged in our business schools. To this end, the coauthors' have developed the *MTC Model for Training Knowledge Workers for a Digital Economy*.

The MTC Model

The foundation of the MTC model is *Communication*, without which there can be no knowledge transmission. This component consists of the following: *Written/Oral Literacy Skills, Interpersonal Skills, Team Building Skills, and Negotiation Skills*. *Communication Literacy* is needed to understand how to make both oral and written messages comprehensible, credible, timely, adequate, and relevant (Andrews & Andrews, 2004), and to deliver complex information, both face-to-face and digitally, in such a way that all members of the audience can understand. *Interpersonal Communication* involves an awareness of oneself, the effective use of verbal and non-verbal messages, and the ability to listen carefully, as well as to respond sensitively to others by adapting to their cultural backgrounds, values, personalities, communication styles, needs, and goals. *Team-Building Skills* are essential because many times, "success at coalition building determines whether a project starts at all," (Kanter, 1983, p. 229). Finally, *Negotiation Skills* are essential as conflicts occur naturally as various points of view are presented and discussed, especially when "people from different cultures often have different approaches to solving problems, setting goals, and appropriating tasks," (Andrews & Andrews, 2004, p. 1973).

On the upper left hand corner of the model is the *Management* component consisting of: *Systems Literacy, Change Strategies, Performance Measures, and Project Management*. Of the multitude of proponents of a *Systems* approach to understanding organizations, Goldratt (1990), Deming (1994), and Senge (1990) are among the best known. Recognition that nothing occurs in isolation, these and other

Figure 2. Management, Technology and Communication (MTC) Triad Model for Training Knowledge Workers in a Digital Economy



authors demonstrate the importance of a holistic study and understanding of a company. *Change Strategies* such as those of Kanter (1983), Goldratt (1990), and Rogers (1995) propose an organized approach to change, first by recognizing the existing situation and then moving along the map of change in orderly, preplanned steps so as to increase success rates. Keeping the change on track, with specific, system oriented *Performance Measures* are required to keep local actions aligned with overall organizational goals. *Project Management* must understand the change process and be willing to develop and use appropriate global performance measures that align actions from organizational through process down to task levels when leading the organization toward its new destination. The project manager serves as the coordinator and involves other team members in the complex change process. Communication is "key" to management's success in implementing change within a system.

On the right upper corner of the MTC model is the *Technology* element: *IS Literacy, Computer Support Systems & Telecommunications, IT Planning & Implementation, and IT Training*. These components are drawn from the OEIS curriculum model for undergraduate education in information technology (OSRA, 2004). *Information Systems Literacy* provides for an "understanding of organizational and end-user information systems, technologies, business processes, and worker performance," (p. 4). This allows students to understand the changing role of systems analysts, managers, and end-users. The second component revolves around improving workplace performance and supporting core business processes by understanding requirements of the workplace and the selection of appropriate *Telecommunications & Computer Support Systems* hardware and software to meet performance needs, as well as applying technology to support knowledge workers in a wide variety of enterprises. *Planning and Implementation* focuses on assessment, design, implementation, and evaluation. Students need to learn methods and procedures "that empower them to define and solve large-scale OEIS problems or address new opportunities," (p. 11), by understanding IT

strategy, planned change strategies, human factors, and job redesign issues. Finally, the *Training* section includes technical training and delivery methods "which are supportive of and conducive to OEIS implementation," (p. 14). Here, students will focus on the design, development, and delivery of technical training.

At the heart of the MTC model, is *Leadership* - the stated outcome purpose. Just as in the game of chess where one must be able to see several moves ahead in order to plan winning strategies, our future IT leaders must have the ability to not only understand current issues, but must also see the changes lurking around the next corner. Tapscott and Caston (1993) suggest that a paradigm shift in leadership skills is needed because a "fundamental change is taking place in the nature and application of technology in business" (p. xi). As set forth in the MTC Model, this new style leadership is firmly rooted in the triad of management, technology, and communication skills. The MTC Model can help to create IT leaders who are not only tech savvy but also more conceptually minded and who will be "responsible for building organizations where people continually expand their capacities to understand complexity, clarify vision and improve shared mental models," (Senge, 1990, p. 340).

CONCLUSIONS

Developing the design and focus of undergraduate curricula is always an evolutionary process. "This is especially the case in the field of end-user information systems, which has undergone tremendous change due to the exponential development of technology and the constant shifting of workplace requirements," (Hunt, 2004, p. iii). The *MTC Model for Training Knowledge Workers in a Digital Economy* has three interdisciplinary portals for engagement: Management, Technology, and Communication. The major objective of this model is to aid academicians in becoming aware of ways to better prepare OEIS students for participation in a digital, knowledge-based economy of unbridled change. Hopefully, the literature supporting this model as well as the OEIS revised curriculum will provide you, the educator, with resources for design and implementation of curricula that will better prepare our graduates for the digital economy.

REFERENCES

Anderson, C. (2004). *The Indian machine*. Wired, February, p. 99.

Andrews, D. C. & Andrews, W. D. (2004). *Management communication: A guide*. Boston, MA: Houghton Mifflin Company.

Awad, E. A. & Ghaziri, H. M. (2004). *Knowledge management*. Upper Saddle River, New Jersey.

Bailin, S. (1987). *Critical and creative thinking*. Informal Logic, Vol. 9, pp. 23-30.

Bailin, S. (1994). *Critical thinking: Philosophical issues.* The International Encyclopedia of Education, Vol. II, pp. 1204-1208.

Cappel, J. J. (2002). *Entry-level IS job skills: A survey of employers.* Journal of Computer Information Systems. (Winter 2001-2002), pp. 76 – 82.

Creswell, J. W. (1994). *Research design: Qualitative & quantitative approach*. Thousand Oaks, CA: Sage Publishers.

Davidson, C. N. & Goldberg, D. T. (February 13, 2004*). A manifesto for the humanities in a technological age*. The Chronicle of Higher Education, pp. B7 - B9.

De Bono, E. (1969). *The mechanism of mind*. Middlesex, England: Penguin Books.

Deming, W. (1994). *The new economics for industry, government, education* (2nd ed.). Cambridge, MA: MIT Center for Advanced Educational Service.

Drucker, P. (1954). *The practice of management*. New York, NY: Harper Collins.

Goldratt, E. (1990). *What is this thing called Theory of Constraints?*. New York: North River Press.

Guba, E. & Lincoln, Y. S. (1994). *Competing paradigms in qualitative research*. In Denzin, N. & Lincoln, Y. (Eds.), Handbook of Qualitative Research, pp. 105-117.

Hunt, S. (2004). *Forward to Organizational & end-user information systems: Curriculum model for undergraduate education in information technology*. Morehead, KY: Organizational Systems Research Association. [Online]. Available: www.osra.org.

Kanter, R. M. (1983). *The Change Masters*. New York, NY: Simon & Schuster.

Karbhari, V. M. (1994). *Product and process development*. Loyola University. [Online]. Available: http://www.wtec.org/loyola/polymers/c7_s6.htm

Koestenbaum, P. (2002). *Leadership - the inner side of greatness: A philosophy for leaders*. San Francisco, CA: Jossey-Bass.

Lewis, K. (October, 2003). *Morehead State University IS advisory board interview*. College of Business, Morehead, KY.

McGee, M. (1996). *Soft skills can boost careers*. Informationweek, August 19, p. 84.

OSRA. (2004). *Organizational & end-user information systems curriculum model for undergraduate education in information technology*. Prepared by Organizational Systems Research Association National Organizational & End-User Information Systems Curriculum Committee Task Force. [Online]. Available: www.osra.org.

Patton, M. (1990). *Qualitative evaluation and research methods*, (2d ed.) Newbury Park, CA: Sage Publications.

QI2. (2001). *Design of experiments*. Quality Improvement International. [Online]. Available: http://www.doeqi2.com/

Rogers, E. (1995). *Diffusion of Innovation* (5th Ed.). New York: The Free Press.

Senge, *P. (1990). The fifth discipline: The art and practice of the learning organization.* New York: Doubleday.

Strauss, H. (2003). *Smart classrooms: The ultimate learning machines?* Syllabus: Technology for Higher Education, Vol. 17, No. 2, pp. 42.

Tapscott, D. & Caston, A. (1993). *Paradigm shift: The new promise of information technology*. New York: McGraw Hill.

Van Slyke, C., Kittner, M. & Cheney, P. (1998). *Skill requirements for entry-level IS graduates: A report from industry*. Journal of Information Systems Education, Fall, pp. 6-10.