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 authors 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 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 Straus (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,
CRITICAL VS. CREATIVE THINKING

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 method- ology 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. Qualitative 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.

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 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).

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.
framework that is bounded tightly, where all necessary information is
given, and the mode of thinking required is analytic and evaluative,
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). Balbin 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 Build-
ing 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

On the upper left hand corner of the model is the Management
component consisting of: Systems Literacy, Change Strategies, Perform-
ance 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
authors demonstrate the importance of a holistic study and understand-
ing 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 informa-
tion systems, technologies, business processes, and worker perfor-
ance," (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

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