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INVITED PAPER:

Implied Creativity No Longer Appropriate for I.S. Curriculum

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Beginning in 1995, creativity content is explicitly included in the national curriculum recommendations: *IS'95: Model Curriculum and Guidelines for Undergraduate Degree Programs in Information Systems.*[1] In previous reports, that content had been implicit. Just as industry has recognized the need for formal training about creativity, academia has acknowledged the same need. I'll describe the specific curriculum recommendations shortly; first, I'll give the background on how recognition of the problem was surfaced.

In 1988, I learned that CIOs perceived a lack of creativity among information system personnel. This knowledge came as a result of a national Delphi study I conducted among CIOs, asking their views on the key human resource issues for the 1990s.[2] Participating CIOs decided that the need for improved creativity ranked sixth on their list of top 20 issues for the 1990s. They agreed on the following description of that issue: "the need, in increasingly bureaucratic and complex organizations, for special emphasis on conceptualizing and developing creative and innovative approaches to problem resolution and system development."

Research on Creativity and Innovation

I had always been interested in creativity but had never formally studied it. As a result of the Delphi survey, I decided to initiate the Center for Research on Creativity and Innovation (CRCI). I obtained funding from CIOs in major IS organizations, such as Federal Express, Texaco, Microsoft, IBM and United Technologies. Our research revealed that, in the entire history of the IS field, only five articles had been published that included a discussion of creativity of more than one page in length! Our studies of five other disciplines identified more than 4,000 articles on the subject of creativity! No wonder that CIOs perceive a deficit in that area — there has been little formal study of creativity as it pertains to the IS field.[2] In the Delphi survey one CIO provided the following comment on the situation: "The U.S. has lost its lead in almost every competitive area. Innovative software previously gave our companies major competitive advantage and now even that area is threatened. IS must increase its creativity to help the U.S. regain its competitive edge."

Over the next five years our Center produced more than 20 reports on the subject of ways to facilitate creativity in IS organizations. All were published in refereed journals or conference proceedings, so the topic began to gain the attention and respect it needed. In the executive overview of our article published in the December, 1993 issue of *MIS Quarterly*, editor Blake Ives had the following observation: "System analysis and design books have a common shortcoming. They focus on analysis of the old system and documenting and implementing the new, but they give scant attention to conceptual design. Tom DeMarco noted in 1979, 'It is at this time [after analysis of the old system] that the analyst exercises his [or her] experience and imagination to come up with the new system concept... I won't tell you how to go about this...no tool that I could think of would aid the invention process! Fourteen years later, Tom Davenport found himself at a similar loss for words in describing how to re-engineer business processes: 'Ironically, there is less to say about the design phase of process innovation than about the activities that lead up to it. The design activity is largely a matter of having a group of intelligent, creative people review the information collected in earlier phases of the initiative and synthesize it into a new process. Ives concludes: "How curious that this creative process, so fundamental to our profession, remains as unexplained, largely unexplored, and, to a large extent ignored."

These are the reasons that the national curriculum committee, comprised of IS academicians and practitioners, chose to include explicit content about creativity in the national curriculum recommendations. The IS graduate curriculum recommendations are also in the process of revision; it is expected that content on creativity will also be explicitly included in those recommendations. The material on creativity was specified for coverage in three of the 8 recommended courses for an IS major in an undergraduate degree program. However, in the initial implementation of the new cur-

riculum recommendations, an IS academic unit might decide to allocate the material to any one of the required courses where a faculty member takes the initiative to incorporate this content in his or her course. The key objective is to ensure that no student exits the IS program without solid instruction and practical application of this important subject matter.

IS'95 Body of Knowledge Elements on Creativity

The creativity topics are consolidated into two elements in the Body of Knowledge portion of *IS'95*. One element is entitled "Improving Creativity in System Analysis and Design." The other is "Improving the Climate for Creativity." Each Body of Knowledge element is identified for coverage at four different points within the eight recommended courses for a major in IS. While this approach might appear redundant, it really isn't. To the contrary, it is recommended that this material be covered at four levels of knowledge/understanding as the student progresses through the curriculum.

Improving Retention of Knowledge Through use of the Bloom Taxonomy for Cognitive Thought

I.S.'95 curriculum utilizes the teaching approach designed by the internationally respected academician, Benjamin Bloom. Bloom's research proved that students who spend 90% of their study time in application of what they've learned retain 85% of that knowledge.[3] In the Bloom taxonomy, the first level of understanding is "awareness", demonstrated by behavior such as naming components and listing advantages and disadvantages. This level requires only recognition, with little ability to differentiate. The second level is "literacy," demonstrated by behavior such as comparing and contrasting, explaining, describing relationships to other subjects. Students begin to acquire a differential knowledge at this level. The third level of understanding is "conceptual use," demonstrated by behavior such as ability to interpolate and extrapolate, to relate the concept to a specific use. At this level students are able to explain the application of the material for issues, problems and tasks in an business area. The fourth level is "application," attained when students demonstrate the ability to apply the material to a real life-like situation, such as a comprehensive case, laboratory assignment or a small system analysis project in a local firm. Level five, "skilled use," is rarely attained in an academic setting. *IS'95* does not specify a 5th level of knowledge/understanding for any of the Body of Knowledge elements. Instructors and students might find it helpful if I provide an explanation of the four level progression for the two topics on creativity, since that approach has not explicitly been included in prior curriculum recommendations.

For the topic of improving creativity in system analysis and design, the four level progression would be as follows:

Level 1: Reading about creativity principles/concepts through assignments in a creativity textbook.[3] Answering the end-of-chapter questions.

Level 2: Participating in classroom exercises or mini-cases where an understanding of creativity principles, concepts and techniques is demonstrated.

Level 3: Individual use of creativity improvement techniques in personal situations, for micro tasks assigned by the instructor and on assignments for other courses, either IS or otherwise.

Level 4: Applying creativity techniques in each step of a comprehensive course project, such as a system analysis project for a local firm or an extensive case in a system analysis/design textbook

For the topic of improving the climate for creativity, the four levels of progression would be:

Level 1: Reading an article or a chapter in a textbook on the topic of improving the environment for creativity.[4] Answering the end-of-chapter questions.

Level 2: Discussing the four styles of creativity [4] and understanding how knowledge of those styles enables teams to be more cohesive and supportive of creativity activity among team members.

Level 3: Applying the principles of positive climate for creativity while working in a team assigned a problem solving task or activity. (The tasks identified in level 4 above are good examples of such a project). Conducting a post-mortem evaluation of the degree of team effectiveness in provide a nurturing, supportive climate for the task.

Level 4: Applying the problem reversal technique to determine the factors that ruin or squelch creativity techniques in an IS organization. Ranking the factors in terms of importance and deriving approaches for improving the climate for creativity.

Armed with the skills and abilities acquired from this level of instruction, graduates of the IS program should possess those characteristics that CIOs believe are deficient in today's practitioners. Such an education should provide a foundation for lifetime learning to enable our graduates to develop creative solutions not only for the 1990s but well into the 21st century.

REFERENCE

1. Couger, J.D., Davis, G.B., Gorgone, J.T., Feinstein, D.L. and Longenecker, H.E., *IS'95: Model Curriculum and Guidelines for Undergraduate Degree Programs in Information Systems*, 1995.

2. Couger, J.D., Higgins, L.F. and McIntyre, S.C., "(Un)Structured Creativity in Information Systems Organizations," *MIS Quarterly*, Vol. 17, No. 4, Dec., 1993, pp. 375-397.

3. Bloom, B.S., et. al., *The Taxonomy of Educational Objectives: Classification of Educational Goals. Handbook 1: The Cognitive Domain*, McKay Press, NY, NY, 1956.

4. Couger, J.D., *Creativity Improvement in I.S. Organizations*, Boyd and Fraser, Philadelphia, 1995.

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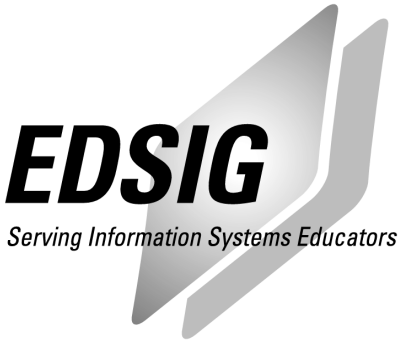

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